Spillover Effects of Local and Foreign Currency on Cross-Listed IPOs; Evidence from Alternative Investment Market (AIM)

Thesis

Submitted By

Hafiz Khawar Sajjad

Supervised By

Dr. Abdul Wahid

Dated: 02-12-2019

National University of Modern Languages, Islamabad

Table of Contents

Spillover Effects of Local and Foreign Currency on Cross - Listed IPOs; Evidence from Alternative Investment Market (AIM)

ABSTRACT

The study is conducted for the examination of the spillover effects of local and foreign currency on cross - listed IPOs. Study consists of a sample of six countries' companies which have been undergone through secondary listing in Alternative Investment Market (AIM) during the period of 2001-2018. Markov-switching model is applied to analyze the lowest / highest return produced by the cross - listed IPOs and to analyze the spillover magnitude of local and foreign currency on cross - listed IPOs. Results show that Australian and Bermuda Cross - Listed IPOs are greatly affected by local and foreign currency fluctuations and they are highly volatile. British Virgin Islands Cross - Listed IPOs are less volatile. Local currency and parental stock market have mainly influenced the IPOs in positive way, so that they remained stable during the given period of time. Canadian Cross - Listed IPOs have absorbed a greater influence by both local and foreign currency and both stock markets, but they remained stable and are less volatile. Irish and USA Cross - Listed IPOs have also absorbed a lot of pressure from both currencies and both stock markets but not get disturbed, and are least volatile as compare to all other countries. By concluding overall results, it can be said that local and foreign currency fluctuations; and parental stock market returns and Alternative Investment Market (AIM) returns can push the cross - listed IPOs to fluctuate from their positions, but it is about Cross - Listed IPOs that how they absorb or handle the spillover effects raising from local / foreign currency and parental / Alternative Investment Market (AIM) markets.

Key words: Cross-Listed, Spillover Effects, Local / Foreign Currency, IPOs, AIM, Volatility, Mean Return.

Chapter 1

INTRODUCTION:

The topic of Mean Return and Volatility Spillover has been the interest of researchers and academician since last two decades after globalization. Many of the researches have been done on different aspects of financial integration, co-movements of prices, returns and volatilities, partnerships and international diversification.

International or off - shore cross - listing occurs when a company; for the purpose of trading, lists its shares on two or more stock markets which can be located in different regions / countries of the world. By doing so, it is easy for international investors to access capital markets because of meaningless geographical boundaries. (Alaganar and Bhar 2004). Meanwhile, the listed companies are able to enlist their stocks / securities / shares for trading around the world without any disturbance and can attract international investors effectively, and these listed companies can control their business operations in their head offices which are located in different regions / corners of the world. (Dodd and Gilbert, 2016). Exchange rate spillover effects of cross-listed stocks have been discussed in literature such as the investigation of volatility and spillover effects between commodity price and foreign exchange rate (Lorna Katusiime, 2018), stock prices and exchange rate spillover effects (L Sui, 2016), exchange rate and stock prices spillover effects of volatility in respect of emerging economies (Mwambuli et al., 2016), stock markets and exchange rate markets spillovers and their interrelationship (Njegic et al., 2018) and stock markets and exchange rate volatility spillovers in oil exporting regions (Mikhaylov, 2018). Studies on exchange rate spillover effects provide companies useful insights to analyze the price volatility of their stocks and their trickledown influence as they list their companies' share on more than two stock markets. This creates awareness for the local and foreign investors to invest in the cross - listing entity.

Co - movements of stocks of cross - listed companies have also been debated in the literature such as the volatility spillovers and co - movement in housing market of China (Weng and Gong, 2017), the co-movement and spillovers: empirical evidence from BRIC equity markets (Singh and Singh, 2017), the spillover effect and co – movement volatility in the economies of Eurozone (MacDonlad et al., 2018), and the green bond & financial markets co-movement (JC Reboredo, 2018). Studies on co - movements of stock of cross - listings provide investors useful analytical techniques to evaluate the stock price movements (upside / downside) of cross - listed entity due to spillover effect of exchange rate.

While talking about cross - listing of companies; it is necessary for a company to list its shares in its local country stock market by which it is being operated, and then it can go beyond the sea to list its shares in host or foreign country stock markets. As a company plans to go for secondary listing; it has to furnish certain formalities that are required for secondary listing or off – shore listing. There are certain requirements for its local stock market that must be furnished at first and get clearance from respective authorities to run its business or open a subsidiary in foreign

country in which it is planning to go. These requirements are mandatory for the company to operate its business legally in host country and make remittances to its local country. These requirement may include; nature of business, authorized capital and paid - up capital, number of employees in local country and expected number of employees in host country, dividend policy of the company for local country and foreign country, company's revenues and potentials, legal framework of the company, board of members and their authorities, and other legalities. These requirements if fulfilled by company; make sure that the company is fully capable for secondary – listing and thus it will produce fruitful results for its local country and foreign country as well.

Apart from local country requirements; there are some formalities of foreign country that needs to be furnished by the company to run its business in that country. These formalities might be nature of business (legal or illegal for host country), amount of investment in host country, product offerings, cultural or ethical values of host country are fulfilled by product or not, dividend policy for foreign employees and their benefits, and other legal requirements. These formalities are required to furnish to make sure that the incoming company is genuine and it will not harm the host country's economy and their cultural / ethical values, but it will support to the foreign nationals. Furthermore, it is necessary to clarify that the company which is going to be cross – listed, it has to list its shares in any Alternative Investment Market (AIM). An Alternative Investment Market (AIM) works under the main stock market of certain countries, like Alternative Investment Market (AIM) which is the subsidiary of London Stock Exchange (LSE). Then – after the cross listing company can go in any country of the world. It could be explained as; if a Pakistani company wants to do its business in Africa, America, England, Japan, or Canada; it has to list its shares in Alternative Investment Market (AIM) in London. After that it can operate or lists its shares in any one of the above mentioned countries.

In the case of cross – listing of companies; monitory policy of a local market play a vital role on cross – listed stock returns. The effect of monetary policy on the stock market returns flow through different potential channels, interest rates is one of the most important factor to influence. Linkages association with one market eventually either positively or negatively influence to the other markets. In financial integration local stock markets play a vital role but these markets are very much sensitive because these are effected badly due to change in monitory policy, but it is possibility that change may be differ from market to market and region to region, change in interest rates rumors effect negatively to the stock markets(Bhattarai, Chatterjee, & Park, 2019).

Different researchers have different arguments regarding impact of monetary policy on stock markets, increase in stock prices may be cause of increase in money supply that may encourages the activity in stock markets. Over the past few decades stock markets have further matured and integrated. The efficient market hypotheses submitted that due to the increases in integration; stock markets have become more sensitive and effect due to change in economies across the globe.

Shocks which are resulted from monetary policy changes; have an important role in volatility of stock markets as far as it is designed to influence the economy at macro level, which is enough to indirectly affect the stock markets. Upon the globalization of world economy and the integration of financial markets, the shocks resulted from developed economies like United States and China affect other stock markets by different transmission mechanisms like balance sheet, credit channel and trade channel etc. (Laeven & Tong, 2012).

Apart from the studies on exchange rate spillover effects and co-movement of stocks of cross-listings; still there is a gray area which can be focused by researchers. Mean return and price volatility of cross-listed IPOs has not been taken as course of action. As a company lists its shares in the foreign stock market; it has to deal with two risks, local currency risk and foreign currency risk. These two risks might have the major effects on company's financial statements as the company consolidates its primary stock market and secondary stock market financial statements.

PROBLEM STATEMENT:

Globalization changes the dynamics of stock market trading which fertilizes financial integration of stock markets i.e. co - movements of exchanges, mean returns and price volatility, interdependency among exchanges. It also further produces the concept of cross - listing or offshore listing of companies. As a company lists its shares on foreign stock market - secondary listing that brings financial synergies and vulnerabilities with regard to local currency and foreign currency. This phenomenon brings forth new discourse in dynamics of mean return and price volatility by exhibiting a question " how do host and parental market's currency change the dynamics of mean return and price volatility" ?

RESEARCH OBJECTIVE:

- To measure the mean return and price volatility spillover effect from local and foreign currency on cross-listed IPOs.

RESEARCH QUESTION:

- How local and foreign currency affect on mean return and price volatility of cross - listed IPOs?

SIGNIFICANCE OF THE STUDY:

The focus of the study is done on evaluating the mean return and price volatility resulting from the spillovers of local and host country currency fluctuations in the context of cross – listed IPOs. The investment managers and foreign investors would have the knowledge of spillover affects while making their portfolio investment in cross – listed IPOs. The study would have the major contribution in their decision making regarding foreign investments / cross – country investments. The study would also have the contributions in the literature for academicians to expand their ideas in the context of volatility spillovers.

Chapter 2

LITERATURE REVIEW:

Studies have confirmed that spillover effect between stock markets, bond markets and option markets exist because of the financial integration between stock exchange in the globalized era. The spillover effect might be among domestic / local markets of a country or even it might be among two or more than two countries depending upon their markets' integrations. Contemporaneous relations between markets are very important to measure the magnitude and direction of spillover effects, and that it leads to inappropriate conclusion while ignoring them. (Finta, Frijns, & Tourani-Rad, 2017). A study on feed barley of Western Canadian, US corn and Alberta Cattle Markets shows unidirectional spillovers from input to output markets. It is examined in the study that spillovers are stronger as cattle prices are low and feed costs are high. Feeder cattle markets are influenced by feed barley due to transmission of volatility flow, but the flow does not occur in opposite directions. (Zhen, Rude, & Qiu, 2017).

Tule, Ndako, & Onipede, (2017) investigated oil price shock and volatility spillover in the Nigerian sovereign bond market by using VARMA - AGARCH model. In the study they confirm that the existence of volatility transmission in cross – markets of oil and sovereign market is significant. While Mi & Hodgson, (2018) believe in strong information flow with volatility linkages. Tsai, (2019) investigated the market integration of England housing market and with respect to stock market spillovers. He found that stock market returns easily affect housing market, and central regions of England diffuse risks easily and are affected by money supply changes and stock market returns.

Regardless of spillovers between local country markets; the existence of spillover effects between two or more than two countries has been confirmed by researchers. Chan, Wang & Chen (2017) studied the UK, US and Taiwan stock markets and found the bidirectional spillover effect between index options and their underlying markets. Their findings also state that in the underlying markets volatility spillover effect is generally outweighed by information shocks. Cross - country spillovers have benefits as well as losses for foreign investors. A research on the United States and international stock markets has been done to analyze volatility spillover by using GARCH model. It is evidenced in the in - sample study that there exists a strong volatility spillover in-between the United States and five major stock markets. The magnitude of the spillover was found stronger in the study during business cycle recession in the United States of America. (Wang, Pan, & Wu, 2018). Bairagi, (2017) examined the foreign direct investment (FDI) spillover and its volatility to the integrated economies of Indian subcontinent and documented the bidirectional causality of foreign direct investment (FDI) exists in India and Pakistan, while in case of Bangladesh there is a unidirectional causality to both India and Pakistan.

Fischer, Hoyer, & Wolframm, (2019) raised the questions; what happen if an unexpected event occur to my brand? And they conducted a study on spillover effects raising from positive and

negative events in co – branding partnerships. The study results show that major events to one of the brands can occur as brands enter into co - branding agreements, which can have either positive or negative consequences for the brands involved in the agreements. These unexpected events can be caused by political instability in their home country, increase / decrease in the value of parent currency, or management decisions about firm's business. It is still unanswered that what is the magnitude of spillover effects that raise from one country to other country in co – branding and partnership agreements. Mandal & Liquor, (2019) studied the Washington and Colorado markets and investigated the spillover effects caused by marijuana legalization to the neighboring states of the Washington and Colorado. They found in the study that in border countries of neighboring states there is a sharp increase in marijuana possession arrests relative to non - border countries in these states which are caused by recreational marijuana legalization (RML). By using the separate data on self – reported marijuana use, they have further discussed that with respect to non – neighboring states, there is an increase in use of recreational marijuana legalization (RML) in the neighboring regions.

The spillover effects of Foreign Direct Investment (FDI) in respect of economic growth have been discussed and reconciled in the literature. For example, Blomstrom, Lipsey, and Zejan (1994) have proved that the richness of the country is attributed by the growth in Foreign Direct Investment (FDI). Spillover effect is exploited by the educated work (Borensztein et al. 1998). While talking about the foreign direct investment, the unobserved variables effects related to growth re-trading may have effects on economic growth (Lensink and Morrissey, 2006). However, as the argument of Guillaumont and Chauvet (2001) macroeconomic barriers affect positively to the foreign direct investment volatility. Bairagi (2017) has challenged the studies which are in favor of foreign direct investment of having positive effects on the countries' economic growth. He used volatility as determinant instead of taking foreign direct investment as positive determinant of economic growth. He has done the study on developing countries especially in Indian subcontinent. He took data from the World Bank from 1975 to 2014. Based on the study results, a rising trend in both Gross Domestic Product (GDP) and the conditional volatility has been found. To investigate the conditional volatility EGARCH model is applied. The findings of the study support his hypothesis that there exists spillover and volatility of foreign direct investment in the integrated economies of Indian subcontinent. It is also documented in the study that existence of causality of foreign direct investment between India and Pakistan is bidirectional, and a unidirectional causality is found from Bangladesh to both countries India and Pakistan.

The persistence of volatility in all economies of the Indian subcontinent is documented, but the convergence from Pakistan and India to Bangladesh is very slow. Conditional volatility of positive shocks is affected by themselves in case of foreign direct investment on India. The researcher has make suggestion for India that it should attract more foreign direct investment in comparison to its neighboring countries by providing innovative investment opportunities. These innovative opportunities can be created or developed in response of better institutional quality,

openness to the large market availability and providing skilled labor force to the foreign investors. The concluding point of the study is; the instead of uncertainty caused by macroeconomic positive innovations can influence foreign direct investment, even more than that; along with its conditional volatility. The growth effect of FDI is reconciled in the study by documenting that the volatility of FDI is a positive factor to determine the growth of the developing countries.

Betterndorf, (2018) investigated the global financial crisis of 2008 in the context of banking risk spillover across the globe. According the researcher, it is going to believe that exchange rates are influenced world – wide by sovereign and bank risk. He used Global BAR model to investigate and estimate the spillovers of these dynamics. General risk shocks and bailout shocks are identified in the study in selected countries. Significant and strong spillover effects from general risk shock to the bank and sovereign are found in the applied model. However, in the case of bailout less significant spillovers are pronounced. Regarding the Euro effects, it is indicated in the results that depreciations in Euro – Yen exchange rate and Euro – Dollar exchange rates are caused by general risk shock. The important drivers to get affected by these spillovers are mostly large countries and distressed countries. An interesting thing is that important sources of fluctuations in exchange rates are the shocks obtained from the third countries. In accordance to the findings, strong pressure has been put on the Euro exchange rate by the risk increase. However, exchange rates of other currencies are not much affected.

Bhuyan, (2016) took the period of 1999 – 2012, and conducted a research to examine the spillover effects among BRICS countries' stock markets in comparison to United States. The statistics of the model reveal that in light of the higher risk or return South Africa is the interesting market for foreign investors as compared to United States stock markets. In comparison to other BRICS stock markets; India and Brazil are also a better opportunity for foreign investors as considered in the study. Under the GARCH framework, aggregate shock model has been applied in the study to analyze the spillover effects. By using the model stated above, mean return and volatility spillover effects have been analyzed between United States equity markets and BRICS equity markets. It is suggested in the study that mean return and volatility spillover effects have been taken by the United States stock market from the BRICS stock markets. In the case of China and India, both stock markets have gotten mean spillover effects from one another equally. Further, the daytime returns have significantly influenced the overnight returns in the BRICS stock markets. It is justified in the study that spillover effects from the United States to other developed stock market are not only exists, but they have also been found from United States to emerging BRICS stock markets. The examination of the study show that the spillover effects may not be captured between the United States and BRICS equity markets by the volatility transmission model. Just like that, the misleading conclusions can be lead by the use of close to close returns in respect of transmission of information between United States and BRICS equity markets.

The process of transmission of volatility has been investigated by the Chan et al. (2017). They have concluded that the existence of volatility spillover is bidirectional between options and cash markets. The spillover effects are more pronounced in the crisis period as the correlation under the volatility becomes higher. It is also observed in the study that from the cash market the spillover effect magnitude is stronger to the options markets. The volatility of option markets is more strongly affected by the information shock except in the markets of Taiwan. Options contract is considered as the good tool for betting, so that higher income can be generated by the investors through movement in volatility. The usefulness of options might be looked as for hedging in the long – run, because the information shocks are immediately reflected by them in both option markets and their underlying markets. Depending upon the information flow which exists in cash market of the Taiwan, the cash market of Taiwan is considered to be the more sensitive to information shocks than those of option markets. It is supported in the findings that the effect of volatility spillover has been outweighed generally by underlying markets shocks.

Innovation comes in human minds and thus they develop new / advance machinery or discover new thing around the world. In response to this innovative ideas might have greater effects on human minds. They urge human minds to be more diversified, modern, innovative and speculative. A study has been conducted on human capital to analyze the spillover effects from innovative ideas in 2017. In this study the public infrastructure interactions in comparison with human capital with R & D activities are discussed. This paper has made an important contribution to the literature. The results show the existence of spillover effects on learning from the stock of ideas have significant role in generating innovative technologies. Thus it verifies the interaction in two – ways between innovation and human capital. It is also verifies in the findings that cut – offs in public spending allocation may emerge inevitably. In order to achieve efficient outcomes, establishments in the countries with low - income have to utilize their limited resources / budgets as part of holistic measures in light of these potential trade – offs. (Ali, n.d.).

By analyzing the Meteor shower hypothesis Ghouse & Khan, (2017) have investigated the volatility spillover effect between leading foreign stock markets and Pakistani stock exchange. They used data on daily bases from nine worldly equity markets, and divided whole data set into two subsets. First subset of the data covers the era of global financial crisis of 2008 and is thus analyzed from 2005 to 2009. Second subset of the data is after global financial crisis and thus covers the era from 2010 to 2014. To explore the dynamic linkages between Pakistani stock market and leading foreign stock markets univariate GARCH type models are employed. Both subsets provided the results that unidirectional mean and volatility spillover effect exists among leading foreign stock markets and Pakistani stock market. They also found that there is a bidirectional spillover effect between KSE 100 and DFMGI. While talking about linkages, they have found that only one indirect linkage exists through information is transmitted to KSE 100, and due to the co – movement among KSE 100, DFMGI and NASDAQ 100 this linkage is developed in crisis period. The sign of indirect linkage is provided due to integration among these stock markets. The volatility in Pakistani stock market return is caused by direct and

indirect linkages as well. The study results have gained the attention of portfolio managers, financial institutions, market players and academician to diagnose the nature and level of linkages among financial markets.

A study is done on emerging financial markets to analyze the spillover effects. In the study the authors found that global financial crisis of 2008 did not allow the emerging markets to be spared from its spillover effects. The European debt crisis of 2009 has also left its effects on the emerging financial markets. During these financial crises volatility spillovers are measured, and the magnitude effects of these crises are also analyzed. Results of the study show that the volatility movements in cross – market cause the strong volatility spillovers to the emerging financial markets. External shocks have affected the cross – market movements. Since the interdependence levels of cross – market were not high. The volatility interdependence is affected by the European debt crisis, and in different directions the spillover dynamics have been exhibited. (Liow, 2015). The volatility dynamics and daily returns have been examined in another study. The target markets of this study were the United States stock market, Hong Kong stock market and the mainland China stock market. The time duration of this study was from 2 January 2001 to 8 February 2013. The study suggested four types of result. (1) It is evidenced that the unidirectional spillover return has been absorbed by the other three stock markets rising from the United States, on the other hand no spillover is found between Hong Kong and other two mainland China markets. (2) It is evidenced that unidirectional GARCH effects also have been absorbed by the three markets rising from the United States. (3) Across the stock markets correlations of returns differ; the highest correlation is found between the two Chinese stock market which is 93.5 percent, medium correlation is found between mainland China stock market and Hong Kong stock markets which is of 30 percent, and low correlation is found between the United States and China stock markets which is comprised of 6.4 percent and 7.2 percent. It is also suggested in the study that international investors may get benefits by investing their assets in China stock markets. (4) Besides the recent financial crisis of 2007, an increase in correlation between China and other stock markets is suggested by the patterns of dynamic conditional correlation. (Mohammadi & Tan, 2015)

Mouna & Anis, (2016) have investigated the stock returns sensitivity in financial sector of eight countries which include China Economies, the United States and various European Countries over the period of 2006 – 2009. As independent variables they have taken market rate, interest rate and exchange rate risk to analyze the spillover effects to the stock returns of financial sector (financial services, insurance and banking) during the financial crisis period. To analyze the volatility spillovers they have used four – variate GARCH – in mean model. Significant effects in both way; positive and negative are shown in the empirical results of the stock market returns, exchange rate volatility and interest rate of the financial sector during the period of crisis. Besides this, they also found significant volatility spillovers in both way; positive and negative from the interest rate, market returns and exchange rate in the financial services and banking

sector in both economies of the United States and the European countries during the financial crisis.

Transmission of volatility spillover from one market to another enable the local and foreign stock markets to identify the factors that cause. Zealand, (2018) suggested two levels that transmit volatility spillovers across markets: they are realized volatility (at firm level) and implied volatility (at index level). While Dawson & Sanju, (2017) prove in their study that volatility is dependent on its own past volatility and it is positive relatively. Wong, (2018) divided volatility spillovers into two components, permanent component which can be categorized as long - run component and transitory component which can be categorized as short - run component. He confirms that permanent component volatility spillovers between exchange rate return and stock price returns are stronger than transitory component volatility spillovers between exchange rate returns and stock price returns of Malaysian market.

Finta et. al (2017) have worked on UK and US stock markets. By applying Rigobon's approach they have investigated the volatility spillover effects of UK and US stock markets. They have used SVAR model and split data into two periods; overlapping trading period and non - overlapping trading period. The findings of their study reveal interesting points. At the very first level, they have evidenced the spillover effects which are asymmetric in nature. They found that as trade in stock markets takes place simultaneously; an increase in the volatility of stock market of US exists to the UK stock market, and the same incident does not exist vice versa. At the second level, their findings suggest that as the overlapping trading period takes place; the volatilities from the both countries markets react more intensively to the non – overlapping of previous day volatility of US stock market, and the same relation does not exist vice versa. This suggests that the United States stock market is affected on the same day non – overlapping volatility by the overlapping volatilities of both US and UK stock markets. At the third level the study demonstrate that different conclusions about volatility spillovers magnitude and direction can be lead by ignoring the contemporaneous relations between two stock markets. Many important implications are suggested by the Finta et. al (2017). First, the transmission of volatility is instantaneously as the markets trade is simultaneously. So, it will be useful to capture the contemporaneous relations for the trading in high frequency. Across the markets the volatility prediction can be done in better way which can be used for the purpose of hedging. Secondly, it is analyzed in the study that the overestimation is done regarding impulse responses and the dynamic relations by using traditional VAR. So the transmission of volatility between the two stock market; United States and United Kingdom stock markets, can be evaluated inadequately by the investors and risk managers.

Mi & Hodgson, (2018) investigated the stock, bond and money markets, and analyzed the volatility linkages among them. They found that an intensive growth is being experienced by the real estate sector and it is attracting a great interest of investors. The study is conducted for the purpose to provide the understanding about the real estate and other major financial markets, and how information flows between them. The volatility linkages among real estate, stock market,

bond market and money market are examined in the study. Study supports the theory of Kyle, 1985 and Ross, 1989 that at the same rate is reflected directly by the prices volatility at which rate information flows among these markets. Shortly, it is to be said in the study that a strong correlation exist among these financial markets. Furthermore, the results obtained from the volatility correlation approach and the GMM estimation of Fleming, (1998) are compared. The method delivers the same volatility spillover correlations for all markets combinations as the implied volatilities correlation approach does.

Shahzad, (2017) has examined the transmission of risk between Islamic and Conventional stock markets. He found that over the last decade a vertiginous growth has been seen in the industry Islamic finance; even in the financial crisis of 2008, and it is still growing enormously. The study examines the return and volatility transmission between global Islamic and conventional stock markets. Data from 1996 – 2016 has been taken on daily basis and the VAR approach is used to examine the spillovers. The study results show that a significant risk transmission regarding return and volatility exists between Islamic and conventional stock markets. An interesting point in the study is that at the beginning of the financial crisis of 2008; an increase in spillover effects has been seen. So it is suggested that there exists a strong correlation between global Islamic market and conventional equity market.

Tule, (2017) used the daily data and evaluated the Nigeria Sovereign market and oil price spillover effects between them. For the examination of volatility spillover he applied VARMA – GARCH model, which is useful to analyze both variance and returns along with the asymmetric effect. This model is modified by the researcher to incorporate significant structural break points in the study. According to the study results, there exists a significant volatility transmission in cross market between Nigerian bond market and oil. However, a quite sensitivity of results to structural breaks is also found in the study. Hedge ratio and optimum weight portfolio have been computed in both with and without structural breaks, and it is indicated equally in the results that structural breaks are sensitive to bond market. Therefore, ignoring the structural breaks presence in the series may cause the biasness to the parameter estimates and even hedging strategies effectiveness also exaggerated. The usefulness and the importance of the current study is the implication of VARMA – GARCH model to assess the volatility spillover between oil price and bond markets. It is suggested in the results that there is a significant transmission of volatility between oil and bond market of Nigeria. As a developing country Nigeria is dependent heavily on oil because it is the main source of earning in terms of foreign exchange revenue. As such, domestic economy of Nigeria is linked with the oil, which means that any shock / fluctuation in the oil price will directly affect country's monetary and fiscal policies. A dilemma has been created due to the fall in price of oil during June 2014, which has grabbed attention of government authorities in respect of expenditures on infrastructure and electricity. In response, it has led a huge deficit in budgets. Author has suggested the government authorities in the way that there is need for proper coordination between monetary and fiscal authorities to mitigate the volatility spillover effects that lies in between oil and bond market of Nigeria. As the

coordination between in fiscal and monetary authorities is done, there would be seen significant benefits in financial market. For any economy, this phenomenon is true, but it is even more true for the developing economies.

Wang et al, (2018) applied the HVS – GARCH model to investigate the spillover effects from United States to international stock markets. They rejected other models which have been used in previous studied to analyze the spillover effects. They have justified their model in the way that volatility is decomposed into two components by using the heterogeneous volatility spillover GARCH model: one component is categorized as past volatility itself, and the second component is categorized as volatility spillover from another asset at different time intervals. The robustness of this model is evidenced by Monte Carlo in comparison to other two popular models. The empirical results of the study show that international stock returns can be predicted by United States stock returns. To extend the work of previous studies investigation about the stock volatility of United States has been done in the study. A strong volatility spillover has been found from the United States stock market volatility to the international stock markets. In the recession time of the United States economy the spillover effect in time – varying was more stronger.

Existing studies of volatilities and assets correlations have fundamental attention for investors locally and internationally as well. Preference has been given to the security portfolios in these studies with risk and high returns. Diversifying the portfolio is suggested in the modern theory of fundamental portfolio to reduce the level of risk associated with assets. Grubel has further strengthened the concept of portfolio diversification. He suggested that diversification of portfolio to the international markets reduce the risk level and the correlation among the assets become low. Many combinations of the stock markets have been explored by the researchers around the world. Different relationship levels among international stock markets have been found by the researchers. Trade blocks of different countries have been focused in these studies. Advantages and disadvantages regarding integration of markets have been shown in the literature. Unification of the markets is brought by the market integrations for the investor perspective. On the other hand diversification benefits are decreased by the market integration. It is suggested by the Ferreira that there is positive impact of market integration on the economy growth, and an increased value of overall welfare can be obtained by the better allocation of countries resources and households savings. Nonetheless, if proper allocation of capital inflows is not done due to market integration, the financial instability could be caused by market integration and the growth could not be achieved. And because of market integration the contagion risk is also increased. Moreover, researchers have found a common disadvantage of stock market integration, which is the increasing number of stock market integrations have decreased the benefits of portfolio diversification for investors.

Many determinants are disclosed in the literature regarding integration of stock markets at national level and international level as well. Trade linkages among the countries as the most significant determinant has been found in some studies of stock markets mutual interdependence.

According to the Gupta and Guidi there are no effects of bilateral trade to the synchronization of stock markets among countries. Because of the increasing number of trade relationships between countries, attempts have been done by the empirical studies to investigate the stock market relationships between countries for the long – run. Extensive literature is available on the topic of stock market integration among regional and different international markets. Paramati, et al. (2017) have studied the integrating relationship of Australian stock market and the stock markets of its trading partners. The AGDCC – GARCH model is used by them. Correlation in strong position has been found in their study between Australian stock market and the stock markets of its trading partners. Another study has investigated the relationships of Australian stock market and China stock market based on the trade linkages. Positive influences on the relationships between two stock markets have been found in this study too. Ordinary least squire model is used in this study.

Moreover, the relationships between Australian stock market and the stock market of its trading partners have been examined by the Paramati, et al. (2018). To analyze the intensity of trade effects, they have classified trading partners of Australia into three categories; minor, medium and major trading partners. The intensity of trade of each trading partner category is examined separately. It is revealed in the study results that there is no effect of trade intensity on relationship among markets for the long – run. It is also showed in the results that the stock markets of Australia are more integrated with developed economies in comparison with less developed economies. Furthermore, the integration level increased among Australia and its trading partners during the time of global financial crisis.

Vo (2017) studied the Asian countries and investigated the financial integration among them. He found the bidirectional causality in the selected economies. It is revealed in the results that stock markets of each country affect with other country's economy. In contrast, Dhanaraj, et al. (2016) investigated the macroeconomic variables in Asian countries, and found no integration among their stock markets. Vithessonthi and Kumarasinghe (2018) conducted a detailed study. They took data of stock prices of fifteen (15) countries for twenty eight (28) period and concluded that integration of stock market can be supported by country's financial development, while integration of stock market does not get affected by bilateral integration of trade with other countries.

An enormous change has been seen in the global financial markets after the financial crisis of 2008. Because of the global market integrations, benefits of diversification have decreased. It is evidenced in the literature that the financial or information shocks arising from one developed country spread very quickly to other developed economies of the world due to financial markets integrations. It is considered as risky to make portfolio investments only in developed countries. However, increasing number of developed markets integrations, the investors prefer to make their investments in emerging economies. Therefore, the ideal diversifying investment combinations is the making investments in developed and emerging economies at same time. A useful combination of portfolio investment is constricted in the given study. DCC – GARCH

model is applied in this study. The usefulness of this model is that the volatility at every period is captured along with correlation, which is helpful in finding the news that are behind the chocks. It is stated in the descriptive statistics that volatility at average is low in the selected countries. The conditional and unconditional volatilities are reported in the model along with correlations for the selected sample of countries. Higher fluctuations are found in the study during the GFC. Small fluctuations are observed after the GFC, which means stable position of the volatilities in remaining period. Less correlation is shown in the market pairs by the graph values of the conditional correlations. In the context of Pakistan low values of volatility has been found with its trading partners. The study results indicate the opportunity for portfolio managers to make their investments in given set of markets. Low conditional correlation is found regarding Pakistan with its major trading partners. The useful insights in the study results is indicated for policy makers in respect of portfolio investment in these countries and to make financial integrations with these economies.

Nicoletti and Rabe, (2018) studied the spillover effect in a different aspect; which is spillover effects of sibling in school achievement. In the study, they took administrative data of two hundred thirty thousand (230,000) siblings and analyzed spillover effects by providing empirical evidence. School achievement is measured by using test scores which siblings have obtained in compulsory subjects in national exams of England. Strong spillover effects of siblings is found and evidenced in the school achievement. An increase has been found in the corresponding score by the increase in older sibling test scores. The effect has been seen as an equivalent to the school expenditure in term of grade improvement. The large size sample data has allowed to perform analyses of subgroup and allowed to remove the inequality of spillover effects of siblings. Substantially larger grades are found due to spillover effects from older sibling to younger siblings, whereas the bad performance of older siblings is smaller considerably. So it can be suggested that older siblings can play an important role for younger siblings, they might be role models as they are effective teacher. Findings of the study show that irrespective of socioeconomic background this pattern holds for younger siblings. In comparison with high income families' children; low income families' children are much helped by their older siblings who have attained top positions in their academic careers. On the other hand, the older siblings of low income families' children who have not performed well at school; seems to have influence on their younger siblings negatively. Therefore, the performance of children has been decreased who belongs to families with low income, whereas the improvement has been seen by children who belongs to families with higher income in England. As the comparison between eligible children and not eligible children for free lunches at school, a gap of sixty one percent (61%) is found on average attainment score at school in the study, and the average gap which is explained by the spillover effect of sibling is 8.4%.'

Dutta, et al. (2019) studied the volatility spillover of biofuel stock prices and evidenced from the United States stock market. The usefulness of the study findings could be helpful for the economists of energy sector and policy makers who can mitigate the market risk of corn by

improving hedging strategies of their businesses. A superior environment can be created by properly hedging the market risk of corn and ethanol production can be promoted too, by which the dependence on the fuels based on fossil materials could be limited. Moreover, it is confirmed in the finding that volatility in corn market of the United States is induced by the CIV index. Thus, effective measures must be adopted to control the price volatility. Functioning improvement of future markets of corn could be the better strategy to the monitoring system of the market. The market risk of corn can be limited by the future market if the future market is well developed and improvement has been done in the market functioning. The associated markets with corn market could also be stabled.

Important implications have been revealed by empirical research for the investors. An appropriate allocation of assets can be done by implementing the findings of the study as various corn products are being traded in the markets. Furthermore, investors can get help from the outlined study results to hedge their portfolio risks which comprise of biofuel and food investments. Additionally, help could be gotten by the United States stock market to predict risk in corn market as it is seen as indicator for the financial market of the world.

Baule, et al. (2017) studied the discovery of volatility for option markets and warrants. They have investigated the volatility discovery for the option markets of non – retail commodities and warrants markets of retail commodities. They have addressed the question that whether the pricing of warrants markets is dependent on only relying on information by issuers, or whether the volatility discovery is only contributed by information of issuers. Nine issuers have been taken as base, upon them the volatility discovery is computed by time series in respect of issuer specific model. The correlation of volatility series with underlying DAX is highly negative, by which the effect of sticky strike eliminates the time series modifications. They have also examined that whether the volatility discovery is contributed by options or warrants, and identified the warrant issuers who have contributed significantly. Special measure for information share is adapted for time series from the classic variance idea of decomposition.

To check the interdependence between time series of issuer specific and option market, the stationary information share method is applied in the study. Leadership position has always taken by VDAX in a bivariate system as compared to each single warrants market issuer. In comparison to information shares, the ratio of warrants market is aggregated as fifty percent (50%) above. The level of single issuers is considered small in the case of information shares of warrants markets but it is different significantly from zero. On the other hand, the effect of high information from a single issuer is not verified by result to the option market, which indicates that option market is simply followed by the issuers when they price their warrants at large extent. On the one hand, the information share is greater than zero significantly of warrants markets, so it is concluded that a significant small contribution of issuers exists in the process of volatility discovery. As the pricing behavior of issuers is examined, the findings reveal that when an upward trend is exhibited by VDAX at small level, a significant decrease in time series of volatility on issuer specific has been seen over day time. In reference with previous results of

leverage certificates, there is a highly demand of warrants in early hours, while many of the warrants are sold back to the issuers by the investors in late hours. The pricing strategy of issuers is reflected by this pattern, like in the morning time the issuers trade their warrants at higher prices which generate high volatility, and they buy their warrants back in the evening at low price which generates low volatility.

Christafore and Leguizamon, (2018) have studied the spillover effects of neighborhood inequality of gentrification. According to the authors, it is thought about the low income gentrification that most vulnerable populations are made by them. It is experienced that cost of living increases in gentrified areas and many of them relocate to other areas which are affordable regions for low income households. Due to the migration of low income population, the inequality of income may increase / decrease among the population in newly gentrified areas. As the migration of low income people takes place to neighboring low income households, the segregation in income level can be observed. For the low income population, it might be harmful to them if corresponding segregation at local level is done. Consequences have been seen negatively of rising prices of houses due to opposition to gentrification in low income population areas. The issue is that how the changes could be experienced by gentrification in the mixture of low income and high income population areas. The question is simple, whether the spillovers from gentrification affect the surrounding neighborhoods. Many of the studies have examined that how neighboring areas affect the gentrified areas. Christafore and Leguizamon, (2018) worked in opposite direction and examined how gentrified areas can affect neighboring areas. An increase in neighboring areas inequality could be expected if the migration of low income population is done to the neighboring areas. On the other hand, a reduction in inequality might be experienced by newly gentrified areas if households of low income are migrated from the general region.

To examine the influence of potential spillovers, data of thirty largest CBAs is taken by the authors. A higher income inequality is found within neighborhood for the area that has experienced gentrification. Just like that, being the part of newly gentrified area is affiliated with income inequality at higher level. Only in the surrounding neighboring areas, the influence of this spillover is evidenced. It seems to be unlike that a displace households with low income is attracted by the rich neighboring area relatively. The study findings suggest that the gentrification effects extend to the impacted areas directly, and the exact influence of the gentrified areas to the community may be missed by policy makers who only focus to gentrified areas. The emphasis of the study is on how income inequality in neighboring areas can be shaped by gentrified areas because of gentrification spillovers. An important role can be played by legacy effects while taking into account the advantages and drawbacks of gentrification on the population with low income level. Due to gentrification the movement of households is quite different from the experimental research movement, as it is the case of households with low income, and because of gentrification the similar movement influence could not be observed.

Malhotra, (2016) investigated the volatility spillover of oil and oilseeds dynamics on the spot and future markets of India. He suggested that oil and oilseeds are heavily demanded for domestic use and also by industries. It is expected that trading will bring price stability for the development of its physical market in future. Anyhow the contracts of price risk and price discovery management is useless in future. The study investigates the ups and downs brisk in place and select goods from the sector of future markets. Undertaken the econometric analysis for test the ups and downs overflow between future market and spot, and come to know whether an unexpected increment in open interest is instable or future trading ratio for underlying spot market. It is observed that there is a huge impact of ups and downs of spot market on the ups and downs of future markets, and it is cleared that informational efficiency of oilseeds spot markets is powerful than future market. Ups and downs of physical markets prices cleared that analysis of the study identifies that destabilizing effect of futures trading is three out of four goods analysis. It also indicates that there will be a destabilizing the underlying spot market from lowering the information content of prices and introducing noise in future due to badly informed traders.

The outcomes are very important only for those hedgers who knows that future trading can gains welfare which is just possible due to there will be not any changes in prices. If the speculative activity does not make changes in future then hedged portfolio's risk will not be reduced in resulting there will be reduction in welfare. In India there are spot markets that are unrecognized, unframed and unorganized for Agricultural commodities. In future markets becomes victim of instability perpetrated very easily by noisy speculative activity due to lack of transparency. Therefore it is also encourages to the formers, processors, traders and stakeholders for participation and that will bring fundamental information about commodities in the future markets. Due to the derivative contract the confidence of farmers and traders will be enhanced. The information technology can strengthen to spot markets by equipping them like electronic price ticker boards. There will be increment in transparency and speed in spot trading through these measurements. Administrative autonomy and greater financial to forward market commission which is working under Department of consumer till now and it will also handle the instability of prices and such incidents. If the traders are involved in fraudulent activities then there will be taken an action against them by increment of punitive powers of FMC. The impact of excessive speculations can be controlled by regulators by adopting measures when instability is witnessed, such as declaration of warehouses, checking of members, and watch over positions and additional margins etc. it is also indicated that in narrow goods the future trading should not be allowed. Such commodities do not meet the stable requirements. There is not availability of forecasts of demand and supply due to limited domestic production. Menthe oil and cardamom are examples of narrow agriculture commodities, in the absence of precise data it becomes potential candidates for price manipulation.

Some researchers have worked on exchange rates with comparison to stock markets, and examined the effects of volatility spillovers. For example, data from 1990 – 2003 on weekly bases has been used by Mun (2007) to analyze the effects of fluctuations rising from exchange

rate to stock market. He compared eight countries with United States in his study. Apart from the volatility spillover effects; study also focuses on the correlation between stock markets of the sample countries with United States. The findings of the study declare that fluctuations in higher exchange rate cause the increase in volatility of local stock market. On the other hand, because of strong correlation between exchange rates and stock returns the United States stock market has been decreased. Due to the stronger correlation between local stock markets and United States stock market, there is negative effect of fluctuations rising from exchange rate on the correlations. However, asymmetric relationship between two stock markets is not considered in this study. Zhao (2010) has worked out on Chine. He used data from 1991 – 2009 on monthly bases to analyze the relationship between stock market and foreign exchange market. To analyze the spillover effects VAR and M-GARCH models are applied. Mean spillover between two markets not found. However, spillover effects in bi – direction are found. Two stock markets from East Asian Countries have been taken by the Lee, Doong, and Chou (2011) to examine the relationship. They have taken data from 2000 – 2008 on weekly bases. To determine the correlation effects of stock market volatility between two markets a bivariate GARCH model is applied. Study results show that a significant existence of spillover effects have been found between stock market and foreign exchange market in five East Asian Countries. It is also declared in the study that there is an existence of volatility spillovers between two countries due to strong correlation. Only the symmetric relationship is considered by the Lee et al. and Zhao (2010).

A study has been done to investigate the exchange rate effect to the volatility of stock market in four emerging markets. Markov Switching model is applied to investigate the spillover effects. Walid et al. (2011) have used weekly data to do their research. A behavior of regime switching is evidenced by the researchers in case of emerging stock markets. It is also evidenced in the study that there exists a relationship between exchange rates and stock prices, and an asymmetric volatility spillover has been found in stock markets. Depending upon the economic state of the stock markets asymmetric effect is considered, whether it is low or high. A clear discussion has been not made whether the effects are caused by positive shocks or negative shocks. Liu and Tu (2011) have examined stock prices, capital markets and exchange rates for Taiwan. To examine the relationship they took data from 2001 – 2007 on daily bases. They have used GARCH – M model to investigate the relationship. They have tried to investigate how capital inflow obtained from foreign investors effects stock market returns, and how decision of foreign investors are changed due to exchange rates. In their research they found that the behaviors relating to overbuying or overselling cause the fluctuations in exchange rates and stock prices in foreign capital markets. It is also revealed in the study that there is an asymmetric conditional heteroskedasticity of these foreign markets. A study is done on five European countries with comparison to United States by the Aloui (2007) to investigate the volatility spillover between stock prices and exchange rates. He used data from 1990 – 2005 on daily bases, and applied the EGARCH model to investigate the volatility spillovers. The study reveals that there exists a specific spillover effect which flows from stock market to foreign exchange market for four

European countries in the given period of time. There are minor effects of exchange rates to the stock prices in the given period. Exchange rate volatility has been affected more significantly by the negative shocks in stock prices in the following period. Although in terms of volatility spillover Liu and Aloui (2007) have focused only asymmetric effects, there main focus is remained in five European countries with comparison to United States, while Liu and Tu have focused on Taiwan only.

An ample of studies is available on the topic of volatility spillover in the Africa Continent. However, nobody has catered about the asymmetric effects between exchange rate and stock returns. For instance, Bonga (2013) has investigated the South Africa by examining stock returns and foreign exchange market. He used data from 1995 – 2010 on weekly bases. To analyze the transmission of volatility between two markets he used VAR model. The study reveals that the volatility transmission flows from stock market to foreign exchange market. Due to a large number of foreign investors in South African stock market this capital outflow occurs. In the opposite direction volatility transmission is transitory. A multivariate GARCH model is applied by the Oberholzer and von Boetticher (2015) to examine the spillover between stock market and foreign exchange market. They have taken data from 2002 – 2014 on daily bases to find out the relationship between two markets. Their results show that volatility spillover flows from South African local currency (Rand) to all share index of South African stock market.

Elyasiani et al. (2014) have worked on the banking sector and insurance companies of European Union, United Kingdom, Japan and United States markets to investigate the volatility interdependencies among them. The period of financial crisis of 2008 is also investigated to analyze the changes in industry linkages and cross – market spillovers. The contagion which is relevant to the regulators or policy makers is traced to certain banking fundamentals. It is suggested in the study results that there is a strong spillover in the banking industries during the period of financial crisis. This spillover exists among four markets. The researchers have tried to gain the attention of regulatory bodies towards the coordination landscape and monetary policy. Exceptionally, a weak connection between banking sectors in the United States and Japanese markets is found, because there has not found any spillover between these two markets. Elyasiani et al. has discussed a new debate in their study, which is the structural differences between two markets. As US is a market oriented economy and the Japan is bank oriented economy, so the dissimilarity in spillover effects can be found in these two markets. Their findings also reveal the asymmetric volatility transmission across the markets, and they have considered the United States as a main origin of volatility transmission to the international counterparts. This shows the United States banking leadership across the globe.

In case of insurance sector, there are strong linkages among the markets. For the European Union and United Kingdom markets a positive and significant spillover has been evidenced in the study, while limited effects have been recorded in case of United States and Japanese markets. As compared to banks, the magnitudes of return spillovers have not been altered across insurance markets during the period of financial crisis. However, during the period of financial crisis the

volatility spillover do intensify to the United States and European Union insurance markets, and thus it raised systematic risk for the insurance sector. The reason behind the strong volatility spillovers could be an increment in default probability because of sharp decrease in asset values across the insurance portfolios in time of financial crisis. Exceptionally, the Japanese insurance markets are likely to be more insulated as compare to other markets. It reflects the isolated nature of Japanese banking and insurance markets. In respect of interdependence between banking sector and insurance sector, they found United States as the major volatility spillover influencer to the other countries' markets. Bidirectional interdependence is found in global banking and insurance markets. These findings could be due to a strong integration between banking sector and insurance sector from the last two decades. Volatility transmission is also evidenced between two financial intermediaries. There is a competitive nature of spillovers in respect of returns, which is in favor of insurance companies, even in the financial crises. It is evidenced in the sense that as banks suffer or bankruptcy takes place, the insurance sector get benefit by attracting its customers towards life safety. It is also proved in the study that information could be transferred to the global banking portfolios by the local banks, if they are able to capture their leverage size. Higher the leverage of the banks; the more sensitivity of other global banks to news. Finding also show that leveraged bank, bigger banks by their assets can create linkages and play a leading role to the United States banking sector as they present themselves as information exchange centers. The findings can support the regulatory bodies to design a framework to curb the international level spillover effects for financial institutions.

In the era of 2006 – 2007, the commodity prices of agriculture substantially rose up and an increase in volatility spillover have been seen in the study conducted by Dawson et al. (2016). To estimate the index trading effects on future markets of corn, they applied bivariate MGARCH model. Their findings show that an insignificant effect exists on current returns by their own past returns, and a little spillover effect have been seen from corn to other commodities. On the other hand, the returns and volatility is positively dependent upon their past shocks. I trivariate model is also applied in the study. As in comparison of soybeans with corn, a significant spillover has been seen in the trivariate model which shows that both crops have complementary nature in respect of feed components. As per the researcher argument, it is very difficult to explain the spillover between wheat and soybeans, because soybeans can be replaced by wheat in context of feed, and the use of wheat in this regard in very small. An empirical approach of this study suggests that index trading effects are disentangles on both; returns and volatility. A key finding in the discussion can be described as that corn returns, wheat returns and soybeans returns have gotten positively and significantly influence from changes in index trading of their own. This contradicts with the study of Gardebroek et al. (2015) who have used MGARCH model in their study, and found an open interest proxies to men equations. The results in this study are suitable to market models for both private as well as public information which become compounded in prices or volume due to electronic trading. It is also evidenced in the study that the past index trading effects on returns are significant for corn, which is applied by the market inefficiency. The effect of index trading has been ignored generally in the previous studies, which is very

useful to examine the index trading effects on returns by using Granger – Causality tests. Further, a limited evidence is found in the study that the effects of cross – trading in corn and index trading volatility in case of soybeans. By taking overall review of analysis it is concluded that there are mainly two effects of index trading upon the hedging strategies of farmers in the context of agricultural futures. These two effects are categorized as input supply firms and food processing firms. At the first level, if we consider an increase in future prices; then it will be beneficial for farmers but it will harm to input supply firms or food processing firms. At the second level, if volatility falls; then it will be beneficial for everyone, farmers, input supply firms and food processors. If we look at the legal framework of Commodity Exchange Act which is currently prevailing in the United States, future markets are protected by the act from excessive speculation which may cause unwarranted fluctuations in price.

A study is conducted to evaluate the relationships (long – term and short – term) between housing markets at the national and regional scales. Data from 1995 to 2017 has been taken for the nine regions of England. It is also discussed in the study that in the past studies the empirical models can only be used to analyze market integration or they are used to examine risk estimation separately. They are not enough able to identify whether correlation exist between markets, or is it attributable to return. It is evidenced in this study that a heterogeneous volatility exists in regional markets. Additionally, monetary policy has affected housing markets in England. Performance of stock market is also affected by the monetary policy. So the biasness exists when the consideration upon risk diffusion is not done. The inconsistent result can be caused by taking data from different eras. To evaluate the relationship among markets accurately, it needs to be make estimations between regional and nationwide housing markets simultaneously. So VECM – MGARCH model is applied in this study. A significant information is revealed in house prices in the regions of southeast for both periods; long – term as well as short – term. Talking about return volatility of house prices; risk has been diffused easily in the central regions. Money supply changes and return on stock market has affected volatility transmission notably. The volume of systematic risk is exhibited as low, because in the northern regions the housing markets are slightly correlated with other regional markets. When the overall risk and systematic risk are evaluated, the analysis shows that the time when financial crisis occurred; housing markets in northern areas are lower than the housing markets in other regions. Particularly to the London, low risk in housing markets and high return is exhibited. Although interest rate and performance of stock market both have affected the London housing market, but the London's housing market has reacted to long – term approach, and it has received only one sided risk diffusion from overall housing market. This can be the cause why earlier studies seldom find that there is a ripple effect between United Kingdom and London housing markets.

Due to globalization market trends have been changed. Markets within a country are interlinked and interdependent with one another. Increase / decrease in price of one product / market cause upside / downside shift in other product / market. This phenomenon is not limited to within country trading, but has been experienced in cross - country trading. Cross - listing of companies,

cross - country market integrations and joint ventures have been taken place to attract optimum level of capital and diversified labors. This has enabled potential companies to access foreign investors and acquire skilled labor in host country. By contrast, the company that is going to cross - list; takes some risks with it from its local country. And that these risks could not be ignored by foreign investors in the host country. i.e devaluation of local currency value with comparison to host country currency, operational risks and cultural / ethical barrios.

RESEARCH HYPOTHESES:

H_0

The spillover from the local and foreign currency fluctuations affects the cross – listed IPOs.

H_1

The spillover from the local and foreign currency fluctuations does not affect the cross – listed IPOs.

Chapter 3

RESEARCH METHODOLOGY:

Sample of the study would be comprised of the cross - listed IPOs those are undergone process of secondary listing during the period of 2001 - 2018 at Alternative Investment Market (AIM).For this purpose researcher will use systematic sampling. In first step, I calculate the mean return through the following formula:

$$r_t = \log\left(\frac{P_1}{P_0}\right) \quad (1)$$

Mean, median, standard deviation and Markov - switching regression is used for the measurement of market trend and behavior. The need to use the Markov-switching is to identify the lowest and highest level of market returns which are further categorized as BULL and BEAR regimes. This technique is applicable by using following equation:-

$$r_t = \mu_{St} + \epsilon_t, \epsilon_t \sim i.i.d/(0, \sigma_{st}^2) \quad (2)$$

In the above stated equation μ_{St} and σ_{St}^2 describe the regime specific mean and variance respectively. Market condition will be considered as m if $st = m$. In this view, we can categorize Bull regime as $st = 1$ and Bear regime as $st = 0$, and differentiate between both accordingly (Leon Li, William Lin, and Hsiu-hua 2005). Further, the market return (r_t) transition probability in two - state Markov process is obtained by using equation as:

$$P(s_t = j|s_{t-1} = i) = P_{ij}(t) \quad (3)$$

Generally, it is deduced that probabilities are time-invariant (t), so there is no need of restriction in these probabilities (Goodwin & Goodwin, 2017). By using following matrix this phenomenon can be explained:

$$P = \begin{bmatrix} p^{00} & p^{01} \\ p^{10} & p^{11} \end{bmatrix} \quad (4)$$

Where $P^{00} = P(s_t = 0|s_{t-1} = 0); P^{11}(s_t = 1|s_{t-1} = 0); P^{01} = 1 - P^{11}; P^{10} = 1 - P^{00}$. It is decided statistically that two regimes are there - Bull and Bear, then the probabilities that are filtered are calculated for Bull and Bear. Actually, it is the probability of Bull and Bear to transit from one regime to another in a given timeframe which may be a week, a month or any other time interval: $\theta_{jt} = P(s_t = j|\varphi_{t-1}), j = \{0,1\}$. Himilton (1989) developed and tested this technique first time, which states that real GNP growth follows an (autoregressive) AR (4) process (Huang, 2014). Based on the discrete shifts in the mean the issue of nonlinearity arises in this technique. By the following equation these discrete shifts can be explained:

$$r_t - \mu_{st} = \emptyset_1(r_{t-1} - \mu_{st-1}) + \emptyset_2(r_{t-2} - \mu_{st-2}) + \emptyset_3(r_{t-3} - \mu_{st-3}) + \emptyset_4(r_{t-4} - \mu_{st-4}) + \sigma\varepsilon_t, \sigma\varepsilon_t \sim \mathrm{N}(0,1) \quad (5)$$

In the second step, I calculated the mean return and volatility spillover effects across the cross - listed IPOs by obtaining the standardized residual (standardized error term) and by taking its square in the first step i.e. equation / process of parental currency market and including these values / calculations in the second step process i.e. mean and volatility equation of cross - listed IPOs as shown below:

$$r_{c,t} = \delta_0 + \delta_1 r_{c,t-1} + \delta_2 V_{c,t} + \delta_3 \mu_{c,t-1} + \eta_c \mu_{c,t} + \mu_{c,t}, \mu_{c,t} - N(0, V_{c,t}) \quad (6)$$

$$V_{c,t}\ \tau_0 + \tau_1 V_{c,t-1} + \tau_2 \mu_{c,t-1}^2 + \sigma_c \iota_{p,t}^2 \quad (7)$$

Where:

$\iota_{p,t}$ = Standardized residual series for parental currency market index and is capturing mean return spillover effects from parental currency markets. To examine the volatility spillover effect, the exogenous variable $\iota_{c,t}^2$- square of standardized residual series is included in the conditional variance i.e. volatility equation and this volatility is calculated as: $\iota_{p,t} = \frac{\mu_{p,t}}{\sqrt{V_{p,t}}}$

METHODOLOGY DESCRIPTION:

In this study spillover effects of local and foreign currency have been analyzed. To cope up with the research objective and research question initial public offerings (IPOs) of sixty companies have been analyzed. These companies are taken from different countries of the world. Ten companies from Australia are taken which have gone through secondary listing in Alternative Investment Market (AIM) of London Stock Exchange. Ten companies from Bermuda, ten from British Virgin Islands, ten from Canada, ten from Ireland and ten from United States of America have been selected which have undergone through secondary listing in Alternative Investment Market of London Stock Exchange. The purpose of choosing these countries is that they are well established countries and are economically stabled. Irrespective of economically developed countries; it has been seen in the study that fluctuations in the home currency and host country currency may have major effects on cross – listed IPOs.

After the selection of countries, companies which are listed in their home country stock markets and have a history records in the parent stock markets are selected. The reason to select history based companies is to analyze the magnitude of the spillover effects of local currency and foreign currency along with the parent stock market index fluctuations and Alternative Investment Market (AIM) changes. Initially one hundred companies were selected that have undergone through secondary listing, but at the time of data collection; data of some companies was not available on authentic sources. Most of the data has been taken from yahoo finance as it is the valid, authentic and reliable source. So the companies' data which was not available on yahoo finance were removed from the companies list, and selected those companies whose data were available and whose complete historic stock prices were available.

Data of the selected companies is taken on the daily bases; starting from the 01 January 2001 to 20 April 2018. While collecting data, event study has been conducted, and the data for three years has been taken. Starting from the company is listed in Alternative Investment Market (AIM) till three years of its historical stock prices have been taken. These historical stock prices are saved in a separate excel sheet. Then historical exchange rates of local currency with comparison to United States Dollar and foreign currency exchange rate with comparison to United States Dollar have been taken. These historical exchange rates are then placed at the next columns of stock prices. After that stock values of local stock exchanges of respective country have been taken and place at the next column of the foreign currency exchange rates. In the final step values of Alternative Investment Market (AIM) have been taken and placed at the next column of the parent stock market values.

First of all working on Australian Cross – Listed Initial Public Offerings (IPOs) was done. While collecting data of Australian Cross – Listed IPOs; stock prices of the each company of Australia were taken from yahoo finance and maintained in a separate excel sheet. At the second step exchange rate of local currency which is Australian Dollar was taken with comparison to United States Dollar, and place the values at the very next column of the stock prices. At the third level Great Britton Pound (GBP) exchange rate was taken with respect to United Stated Dollar (USD), and placed at the next column of the local currency exchange rate. While analyzing the data collected, it was analyzed that some of the stock values were missing from the data set. This is because of the stock markets remained closed in the weekends and thus the values for these dates were missing. Irrespective of stock market values, it is also observed that the values in currency exchange rates (whether it is Australian Dollar (AUD) exchange rate or Great Britton Pound (GBP) exchange rate) were also missing. To cope up with these missing data all values from the data set (stock prices, local currency exchange rate, foreign currency exchange rate, parent stock market and alternative investment market (AIM) have been arranged according to date wise, and eliminated the non – related values. Data of all companies have been maintained in same format. After that all companies' data is merged in a single file. Each column of the data set of all companies have been pasted at the end of the first company. So at the end it is completed like first column as Stock Prices, second column as Local Currency Exchange Rate, third column as Foreign Currency Exchange Rate, fourth column as Parent Stock Market Index and fifth column as Alternative Investment Market (AIM) Index.

At the second step, working on Bermuda Cross – Listed IPOs is done. Ten companies have been taken from Bermuda to analyze the spillovers. Stock prices of all companies is downloaded from yahoo finance, and stock values of all companies are maintained in separate excel sheets. United States Dollar (USD) exchange rate is taken as local currency exchange rate, and was placed at the very next column of stock prices column. Then Great Britton Pound (GBP) exchange rate is taken as foreign currency exchange rate, and placed at the next column of local currency exchange rate. After that New York Stock Exchange (NYSE) index values are taken as parental market index, and placed at the next column of foreign currency exchange rate. At the final stage

alternative investment market (AIM) index is taken and placed at the next column of parental stock market index. After maintaining each company work sheet separately; stock values, local currency exchanges rate values, foreign currency exchange rate values, parental stock market index values, and alternative investment market (AIM) index values are arranged according to date wise, and non – correlated values are omitted from the data set. After arranging and rectifying complete data set, all companies' data is merged into a single work sheet. All of the rest companies' data is pasted at the end of first company according to the data set category. All companies' stock prices are merged into a single column, all Bermuda companies local currency exchange rate is filed in a single column, all Bermuda companies foreign currency exchange rate is merged in a single column, all Bermuda companies parental stock market index values are placed in a single column, all Bermuda companies alternative investment market (AIM) index values are merged into a single column. After summarizing the complete data set, return on each column (stock price, local currency exchange rate, foreign currency exchange rate, parental stock market index, alternative investment market index) is calculated by taking their logs. As the return has been calculated, the values are placed in eviews (software) to generate final result, and analyze actual spillover effects of Bermuda Cross – Listed IPOs.

At the third level working on British Virgin Islands has been done. Fifteen well established companies from British Virgin Islands are taken, but ten of them are selected to check the spillover effects. Stock prices of these ten companies are taken from yahoo finance. Separate excel work sheets are maintained for each company. As the local currency of British Virgin Islands is United States Dollar, so United States Dollar (USD) exchange rate is taken as local currency exchange rate, and placed the value in the next column of stock prices. Great Britton Pound (GBP) is the local currency of London, so Great Britton Pound (GBP) exchange rate is taken as foreign currency exchange rate for the British Virgin Islands cross - listed companies. The values of foreign currency exchange rate are placed at the very next column of the local currency exchange rate. Then after New York Stock Exchange index is taken as the parental stock market index, and placed the values at the next column of the foreign currency exchange rate. At the last alternative investment market (AIM) index is taken as the foreign country stock market index, and placed the values at the very next column of the parental stock market index. After attaining all required data missing values are diagnosed and arranged the whole data set according to date wise. Unnecessary data from the data set were eliminated, and all data columns (stock prices, local currency exchange rate, foreign currency exchange rate, parental market index, alternative investment market index) are arranged by matching the dates. As the whole data is arranged and correctness of the data is assured, all companies are merged into a single work sheet. Stock price columns of all British Virgin Islands companies are merged into a single column, all companies' columns relating to local currency exchanges rates are merged into a single column, all companies' columns relating to foreign currency exchange rates are placed in a single column, all companies' columns relating to parental stock market indexes are placed in a single column, all companies' columns relating to foreign stock market indexes are merged and placed into a single column. After making single work sheet for all British Virgin Islands

companies, return on each column / factor has been calculated and saved in as separate work sheet. These calculated returns are then placed into eviews to generate further results. In eviews Markov - switching is run and produced the final results. After then these results are saved into a separate word file.

At the forth step working on Canada in done. Eighteen companies from Canada were taken which have undergone through secondary listing in Alternative Investment Market (AIM), but ten companies are selected whose complete historical data is available on yahoo finance. Historical stock prices are downloaded from yahoo finance and separate work sheets are maintained in excel for each company. Then historical exchange rates of Canadian Dollar (CAD) were downloaded as a local currency exchange rate, and placed at the very next column of the stock prices. Then historical exchange rates of Great Britton Pound (GBP) were downloaded as foreign currency exchange rate, and placed at the very next column of the local currency exchange rate. After that historical index values of the Canadian Stock Market are taken as parental stock market, and placed at the very next column of the foreign currency exchange rate. At the last historical index values of alternative investment market (AIM) are taken as foreign country stock market, and placed at the next column of the parental stock market. When all Canadian companies required data is collected and placed appropriately, the rectification of data is done. Data rectification is done in accordance with the dates. Unnecessary values (whether they are from stock prices, local currency exchange rate, foreign currency exchange rate, parental stock market index or alternative investment market index) are mitigated and whole data set is rectified by same dates. After that all companies data have been merged into a single excel work sheet. During the merger, data is pasted at the bottom of respective columns. When all data is summarized into one work sheet, the return on each factor (stock prices, local currency exchange rate, foreign currency exchange rate, parental stock market index an alternative investment market (AIM) is calculated by taking log. As the mean return on each factor is calculated, these values are then pasted in eviews to generate the final results. Markov - switching technique is used to generate the lowest and highest return produced by the cross – listed IPOs with Z – stats; standard error is also calculated by using eviews. The result produced by eviews are saved and maintained in as separate word file.

After the Canadian Cross – Listed IPOs, working is done on Irish Cross – Listed IPOs at the fifth step. Twenty three cross – listed companies of Ireland were taken, but only ten are selected who are well established and have a good historical record in the Irish stock market. Yahoo finance is taken to download the historical data as it is an authentic source. Stock prices of all Irish cross – listed companies are downloaded from yahoo finance and are maintained in excel work sheets. Separate excel work sheet is maintained for each cross – listed company. Euro exchange rate is taken as local currency exchange rate, and historical values of Euro exchanges rate are placed at the very next column of the stock prices. Then Great Britton Pound (GBP) exchange rate is taken as foreign currency exchange rate, and placed the values of Great Britton Pound (GBP) exchange rate at the very next column of the local currency exchange rate. After that historical index

values of Irish Stock Market are taken as parental stock market, and placed the values of Irish Stock Market index at the very next column of foreign currency exchange rate. The historical values of alternative investment market (AIM) are taken as foreign country stock market index, and values of alternative investment market index are placed at the very next column of the parental stock market. As necessary data of all Irish Cross – Listed Companies is gathered and placed in appropriate columns, the rectification of data is done immediately. Unnecessary data values (whether they are from stock prices, local currency exchange rate, foreign currency exchange rate, parental stock market or alternative investment market) is eliminated and whole data set is rectified by matching the same dates. After the whole data set is rectified and summarized accordingly, all work sheets are merged into a single excel work sheet. Stock prices columns of all companies are merged into a single column, local currency exchange rate columns of all companies are merged into a single column, foreign currency exchange rate columns of all companies are merged into a single column, parental stock market columns of all companies are merged into a single column, and alternative investment market columns of the all companies are merged into a single column. Thus only one excel work sheet for Irish Cross – Listed Companies is maintained separately. After that return on all factors is calculated by taking log of all values. Then these values are pasted into eviews to see the lowest and highest return produced by Irish Cross – Listed IPOs. Standard error is also calculated. Probability values of all factors are also generated by the eviews along with duration values. Markov – Switching technique is used in eviews to generate the results. At the final step these results are saved in a separate word file to analyze the spillovers on Irish Cross – Listed IPOs.

At the final step, working of United States of America Cross – Listed Companies is done. Fifteen companies are taken who belong to United States of America, and ten are selected to be worked on; which are renowned in the region and helped a much more in the development of the economy of the United States of America. Their historical stock prices are taken from yahoo finance, and maintained in excel work sheets. Separate excel work sheet is used for each company. Stock prices are taken from the date in which the companies are established and listed in their home country stock exchange. From the first day of listing till three years data is collected. United States Dollar (USD) exchange rate is taken as the local currency exchange rate, and the values are placed at the very next column of the stock prices. Then Great Britton Pound (GBP) exchange rate is taken as foreign currency exchange rate, and the values of foreign currency exchange rate are placed at the very next column of the local currency exchange rate. After that New York Stock Exchange (NYSE) historical index values are taken as parental stock market index, and the values are placed at the very next column of the foreign currency exchange rate. At the end historical index values of alternative investment market (AIM) are taken as foreign country stock market index, and the values of alternative investment market index are placed at the very next column of the parental stock market index column. As the required data for each cross – listed company is gathered and summarized, data correction is done. Data of each company is rectified according to date wise. Unnecessary data values (whether they are form stock prices, local currency exchanges rate, foreign currency exchange rate, parental stock

market index or alternative investment market index) are omitted from the data set, and whole data set is arranged in respective columns. As the whole data set is organized and rectified, all separate companies' work sheets are merged into a single work sheet. Data values are pasted at the bottom of each column respectively. Now the final work sheet for all United States of America Cross – Listed companies is maintained. Return on all factors (stock prices, local currency exchange rate, foreign currency exchange rate, parental stock market index, alternative investment market index) is calculated by taking their logs. As the return has been calculated, the return values are then pasted in eviews to generate further results. By using Markov – Switching technique; lowest and highest return has been calculated along with standard error. Probability values of lowest and highest regimes are also calculated along with time durations. These systematic results are saved and maintained in a separate word file.

Chapter 4

DATA AND RESULTS:

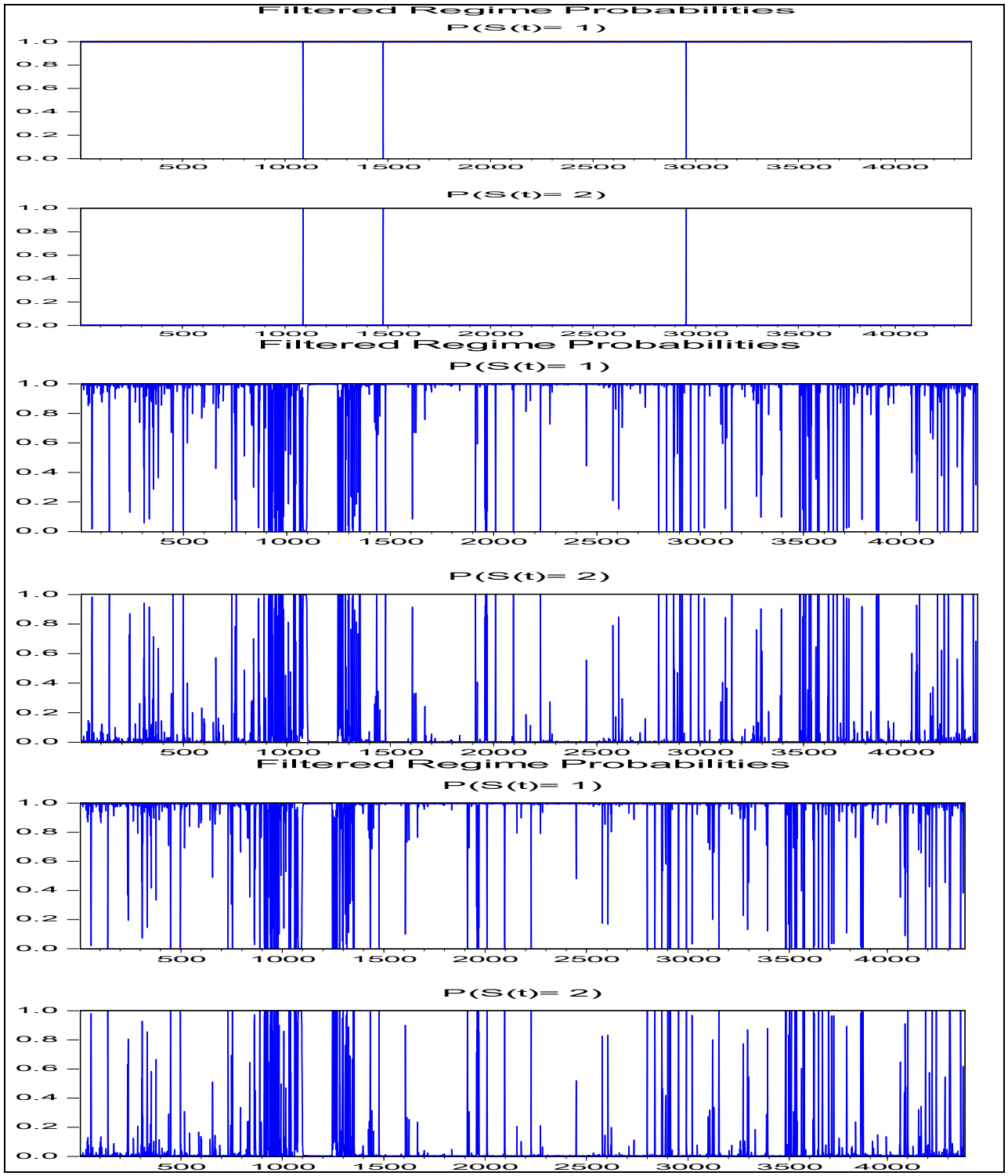
As discussed earlier sample of the study is comprised of the Initial Public Offerings (IPOs) that had been undergone through secondary listing during the period of 2001 - 2018 in Alternative Investment Market (AIM). These IPOs are further categorized in six countries and the spillover effects of their local currencies, host currencies, local stock markets and Alternative Investment Market (AIM) have been analyzed. Stock Price / Return is taken as dependent variable, whereas other four factors (local currency exchange rate, foreign currency exchange rate, parental stock market return and alternative investment market (AIM) are taken as independent variables. They are also considered as regressors. The spillover effects of each regressor is analyzed individually on the dependent variable, and combine spillover effects of the four independent variables are also analyzed. Apart from the statistical results; filtered regime probabilities of each variable (dependent or independent) are also shown in the form of graphical charts.

Table 1: Spillover effect of local and foreign currency on Australian Cross - Listed IPOs.

Australian Cross - Listed IPOs

	Stock Return	**USD**	**Local Currency**	**Australian Market**	**AIM Effects**
Lowest	-0.002	-0.002	-0.001	-0.001	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Z - stat	-1.150	-3.033	-2.817	-2.872	-2.789
Highest	4.369	0.046	0.048	0.045	0.049
	(0.062)	(0.032)	(0.040)	(0.026)	(0.034)
Z - stat	70.176	1.466	1.206	1.757	1.440
$p\ lowest$	0.998	0.971	0.973	0.948	0.973
$p\ highest$	0.001	0.494	0.512	0.052	0.503
Duration:					
Lowest	582.83	35.44	41.29	19.45	39.31
Highest	1.00	1.98	2.05	1.05	2.01

First row shows the mean value of market return. The figures quoted in brackets below the actual estimates are standard errors. Z - stat shows the value of skewness adjusted Z - test. The transition probabilities, $p\ lowest$ and $p\ highest$, relate to the lowest and highest regimes, respectively. The expected durations of the two regimes are also provided in the last two rows.


Filtered Regime Probabilities
P(S(t)= 1)
1.0
0.8
0.6
0.4
0.2
0.0
500
1000
1500
2000
2500
3000
3500
4000
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)

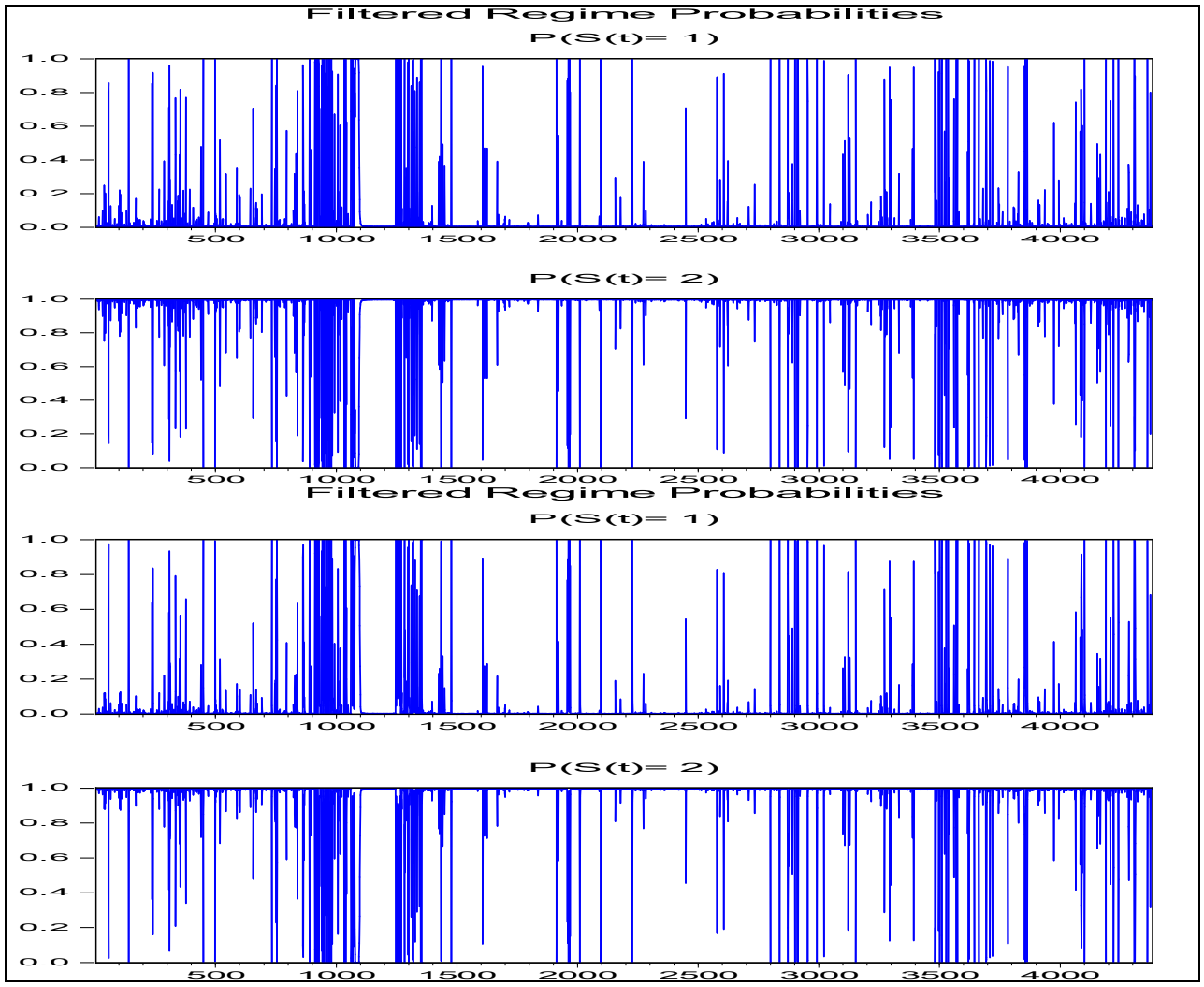


Figure 1: Filtered probabilities of Markov Switching Model of Australian Cross - Listed IPOs.

Table 1 presents the results of Australian Cross - Listed Initial Public Offerings (IPOs) and shows that the mean return of Australian Stock is reported as (lowest = -0.002, Z - stat = -1.150) and (highest = 4.369, Z - stat = 70.176), which shows high volatility of stocks. The value of Z-stat = -1.150 is insignificant which mean that there are less chances for Australian stocks to produce low returns, and the value of Z-stat = 70.176 is significant which show that Australian stock are very much supported to produce high returns. The opposite direction of both Z-stat values clearly describes the high volatility of Australian Cross-Listed IPOs. It also indicates that the probability to produce low return is (p - lowest = 99.8%) and to produce high return is (p - highest = 0.1%). The transition from lowest to highest is very low (p - lowest, 1 - 0.998 = 0.002). The estimated duration to remain in low regime is 583 days and to remain in high regime is only 1 day. Which mean that Australian Cross - Listed IPOs have produced mostly low returns and there are seldom chances that it has produced high returns. The influence of local currency can be seen by looking at the p - value which is 0.973. Its mean that local currency of Australia has the major effects of its Cross – Listed Initial Public Offering (IPOs) who has pushed the stock

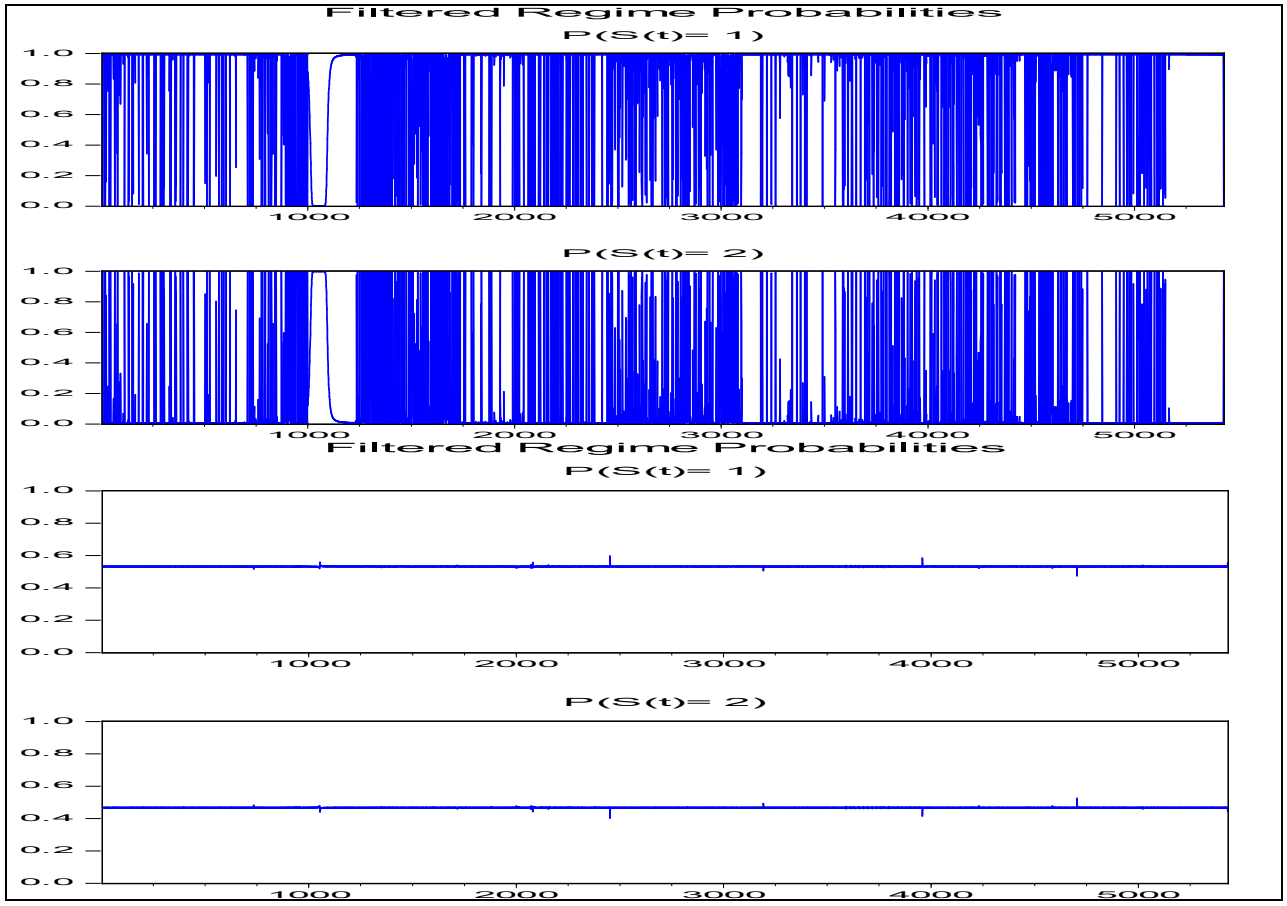
return to produce low by 97.3%. Foreign currency has also major spillover effects of Australian Cross – Listed IPOs. It has pushed the stock returns to produce low by 97.1%. Z-stat values of local and foreign currencies -2.817 and -3.033 respectively are significant and show that they both have negatively affected Australian stocks to produce low returns. On the other hand Z-stat values of local and foreign currencies 1.206 and 1.466 respectively are insignificant which show that they both are not supportive to Australian stocks to produce high returns. If we look at the highest p – value of local currency which is 0.512, it shows that local currency has pushed the Australian Cross – Listed IPOs to produce high return by 51.2%. The highest p – values of foreign currency is 0.494, which means that foreign currency has pushed the Australian Cross – Listed stocks to produce high by 49.4%. The influence of estimated durations figure is also another factor to analyze the Australian stocks volatility. Local currency has been supportive to Australian Cross – Listed IPOs to produce high returns by 2.05 days, and it has pushed the Australian Cross – Listed stock to produce low by 41.29 days. It means that local currency has been affecting the Cross – Listed stock many times to be in low regime. On the other hand foreign currency has been supportive for Australian Cross – Listed IPOs to be in high regime by 1.98 days, and it has pushed the Australian Cross – Listed IPOs to be in low regime by 35.44 days. Furthermore, Australian parental stock market has less influence rather Alternative Investment Market (AIM) has greater influence on Australian Cross - Listed IPOs to remain in its domain. By looking at the Parental stock market p – values, which is 0.948; it shows that Australian stock market has greater influence to its Cross – Listed IPOs to produce low return, and thus it has affected the Australian Cross – Listed IPOs by 97.8% to produce low returns. While looking at the highest p – value of parental stock market, which is 0.052; it shows that it has been supportive to Australian Cross – Listed IPOs to produce high return by 5.2% only. Time duration values of parental stock market play a main roll to analyze the spillover effects. By looking at the lowest time duration value of parental stock market, it is said that parental stock market has pushed the Australian Cross – Listed IPOs by 19.45 days to produce low returns. Whereas the highest time duration values of parental stock market is 1.05, which show that parental stock market is supportive to its Cross – Listed IPOs by only for 1 day. At the end the spillover effects of Alternative Investment Market (AIM) are also shown in the given table. The p – value of Alternative Investment Market (AIM), which is 0.973; shows that Alternative Investment Market (AIM) has pushed the Australian Cross – Listed IPOs to produce low return by 97.3%. The Alternative Investment Market (AIM) has been supportive to Australian Cross – Listed IPOs by 50.3% as the p – values is 0.503. Alternative Investment Market (AIM) has pushed the Australian Cross – Listed IPOs by 39.31 days to be in low regime, while it has allowed the IPOs to be in high regime by only 2 days. By looking at overall results, it is analyzed that Australian Cross - Listed IPOs are highly volatile and influenced by local and foreign currency changes. Both stock markets; Parental stock market and Alternative Investment Market also have greater influence on Australian Cross – Listed IPOs. Changes in the parental stock market and alternative investment market cause the changes in cross – listed stock, and mostly these changes affect the cross – listed stocks negatively.

Table 2: Spillover effect of local and foreign currency on Bermuda Cross - Listed IPOs.

Bermuda Cross - Listed IPOs

	Stock Return	USD	Local Currency	American Market	AIM Effects
Lowest	0.001	-0.001	0.001	-0.000	0.001
	(0.000)	(0.003)	(0.000)	(0.000)	(0.001)
Z – stat	1.067	-0.157	1.372	-0.983	0.890
Highest	4.851	0.000	4.301	0.000	5.211
	(1.221)	(0.000)	(3.261)	(0.000)	(4.891)
Z - stat	3.968	0.965	1.316	1.014	1.067
p lowest	0.177	0.487	0.177	0.499	0.177
p highest	0.823	0.549	0.823	0.500	0.823
Duration:					
Lowest	1.22	1.95	1.22	1.99	1.22
Highest	5.64	2.22	5.65	2.00	5.65

First row shows the mean value of market return. The figures quoted in brackets below the actual estimates are standard errors. Z - stat shows the value of skewness adjusted Z - test. The transition probabilities, *p lowest* and *p highest* , relate to the lowest and highest regimes, respectively. The expected durations of the two regimes are also provided in the last two rows.



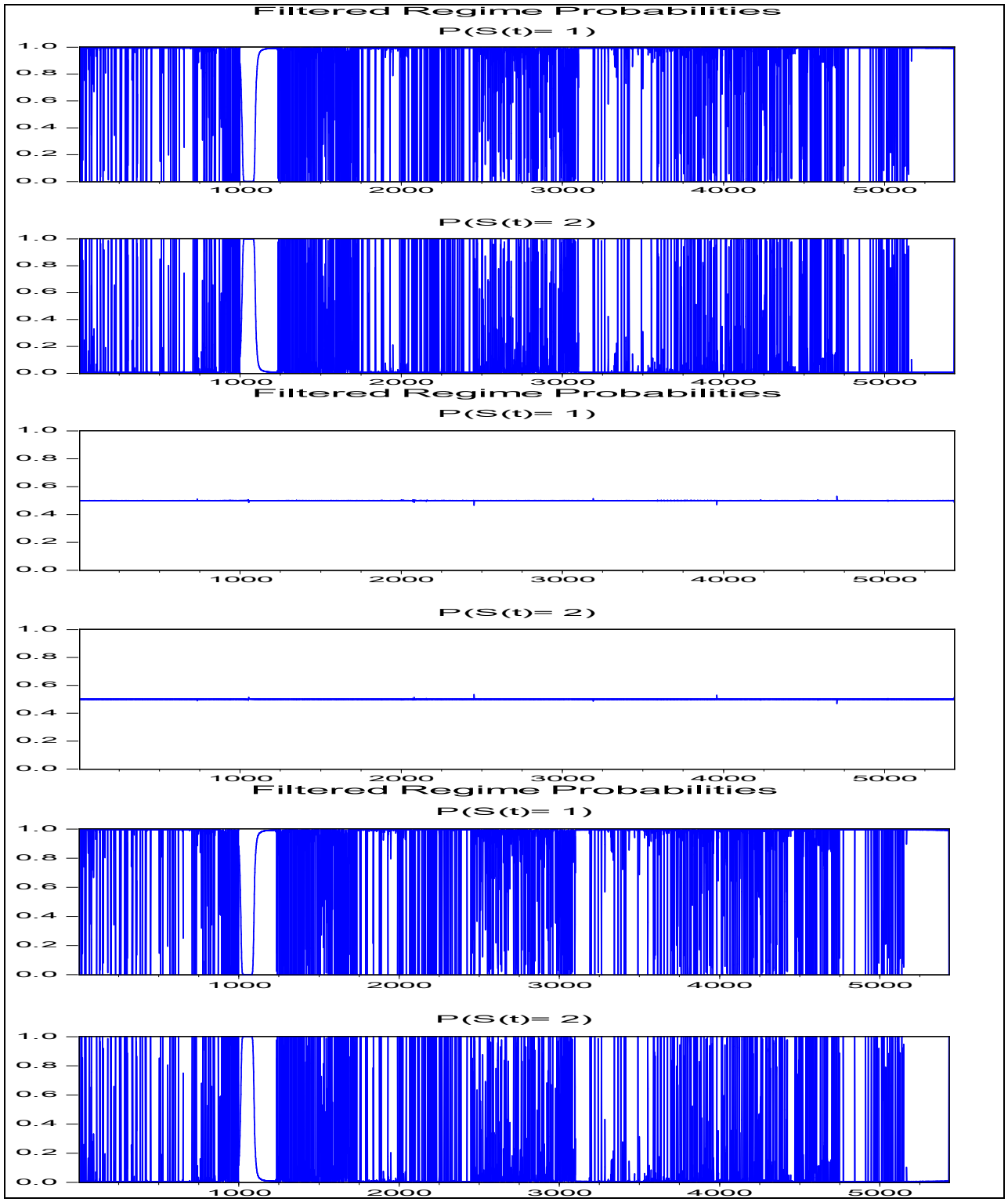


Figure 2: Filtered probabilities of Markov Switching Model of Bermuda Cross - Listed IPOs.

Table 2 exhibits the results of Bermuda Cross – Listed Initial Public Offerings (IPOs) and shows the lowest mean return of Bermuda stocks is (lowest = 0.001, Z - state = 1.067) and highest mean return is (highest = 4.851, Z - state = 3.968), That mean Bermuda Cross - Listed IPOs are highly

volatile as Australian was. The Z-stat value to produce low return is 1.067 which is insignificant, and the Z-stat value to produce high return is 3.968 which is significant. Understanding from the both Z-stat values is that Bermuda Cross-Listed IPOs are highly volatile. P-values of Bermuda Cross - Listed IPOs are contrast with the Australian Cross - Listed IPOs, which state that 17% chances are to produce low returns and there are 82% chances that IPOs produce high returns. The transition from lowest to highest is very high (p - lowest, 1 - 0.177 = 0.823), which means that there are 82.3% chances that stock return will move from low to high and produce high returns. Estimated durations of Bermuda Cross - Listed IPOs indicate that stock returns remain in low regime by 1 day and they remain 6 days in high regime; rest of the 5425 days they remain in normal state. Local currency has pushed the Bermuda Cross - Listed IPOs to produce low returns by 17%, while it has supported the Bermuda Cross – Listed IPOs to produce high return by 82%. The Z-stat values of local currency = 1.372 is insignificant, which means that local currency is not affecting Bermuda stocks to produce low returns. The Z-stat value of foreign currency = -0.157 is insignificant, which describes that foreign currency also did not affect Bermuda stocks to produce low returns. Similarly, Z-stat values of local and foreign currencies 1.316 and 0.965 are insignificant, which means that they both have not affected the stock to produce high returns. The time duration in which local currency pushed the Bermuda Cross – Listed IPOs to remain in low regime; is 1.22 days, while it has allowed the IPOs to be in high regime by 5.65 days. By considering the local currency effect; it is said that local currency had been supportive for Bermuda Cross – Listed IPOs and thus IPOs have been producing high returns. Foreign currency had been also supportive for the Bermuda Cross – Listed IPOs as indicated by the p – values. Foreign currency has pushed the Bermuda Cross – Listed IPOs to produce low return by 48.7%, while it has supported the IPOs to produce high return by 54.9%. Time duration of foreign currency is 1.95 days; by which it has pushed the Bermuda Cross – Listed IPOs to be in low regime, while it has allowed the IPOs to be in high regime by 2.22 days, which shows the enough influence of foreign currency on Bermuda Cross - Listed IPOs to produce high returns. By looking at the p - value of parental stock market (American Market) it is shown that parental stock market has pushed the Bermuda Cross – Listed IPOs to produce low by 49.9%, while it has been supportive to Bermuda Cross – Listed IPOs to produce high return by 50%. Time duration of parental stock market shows that it has pushed the Bermuda Cross – Listed IPOs to remain in low regime by 1.99 days, while it has allowed the IPOs to be in high regime by 2 days. By considering the parental stock market factor, it is said that it has equally influence the Bermuda Cross – Listed IPOs in both positively and negatively. By contrast of parental stock market; alternative investment market has the greater affect on Bermuda Cross – Listed IPOs. It has pushed the Bermuda Cross – Listed IPOs to produce low by 17.7%, while it has supported the IPOs to produce high return by 82.3%. Time duration of the alternative investment market shows that it has pushed the Bermuda Cross – Listed IPOs to remain in low regime is 1.22 days, while it has allowed the IPOs to remain in high regime by 5.65 days. By considering the alternative investment market factor individually, it is said that alternative investment market has been supportive for Bermuda Cross – Listed IPOs to produce high returns. While considering the

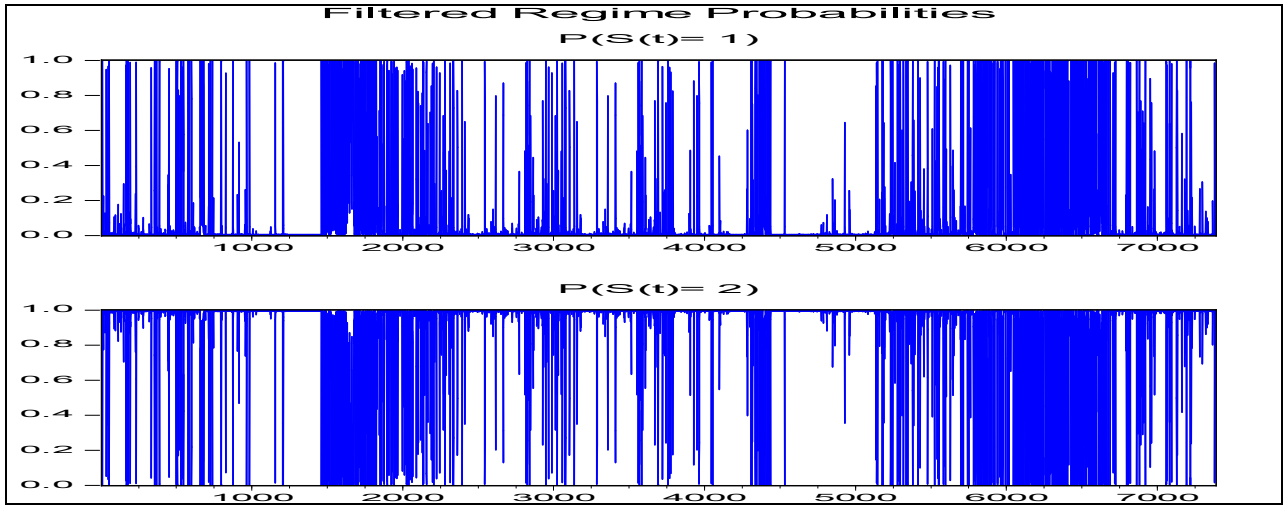
overall p - values and duration values of parental and Alternative Investment Market (AIM), it is said that Bermuda Cross - Listed IPOs have produced mostly highest and absorb enough spillover effect of local and foreign currencies along with Alternative Investment Market (AIM) and parental market changes. Combine analyses for the Bermuda Cross – Listed IPOs is that, all independent factors are supportive to it, and they all have their participation to produce high returns.

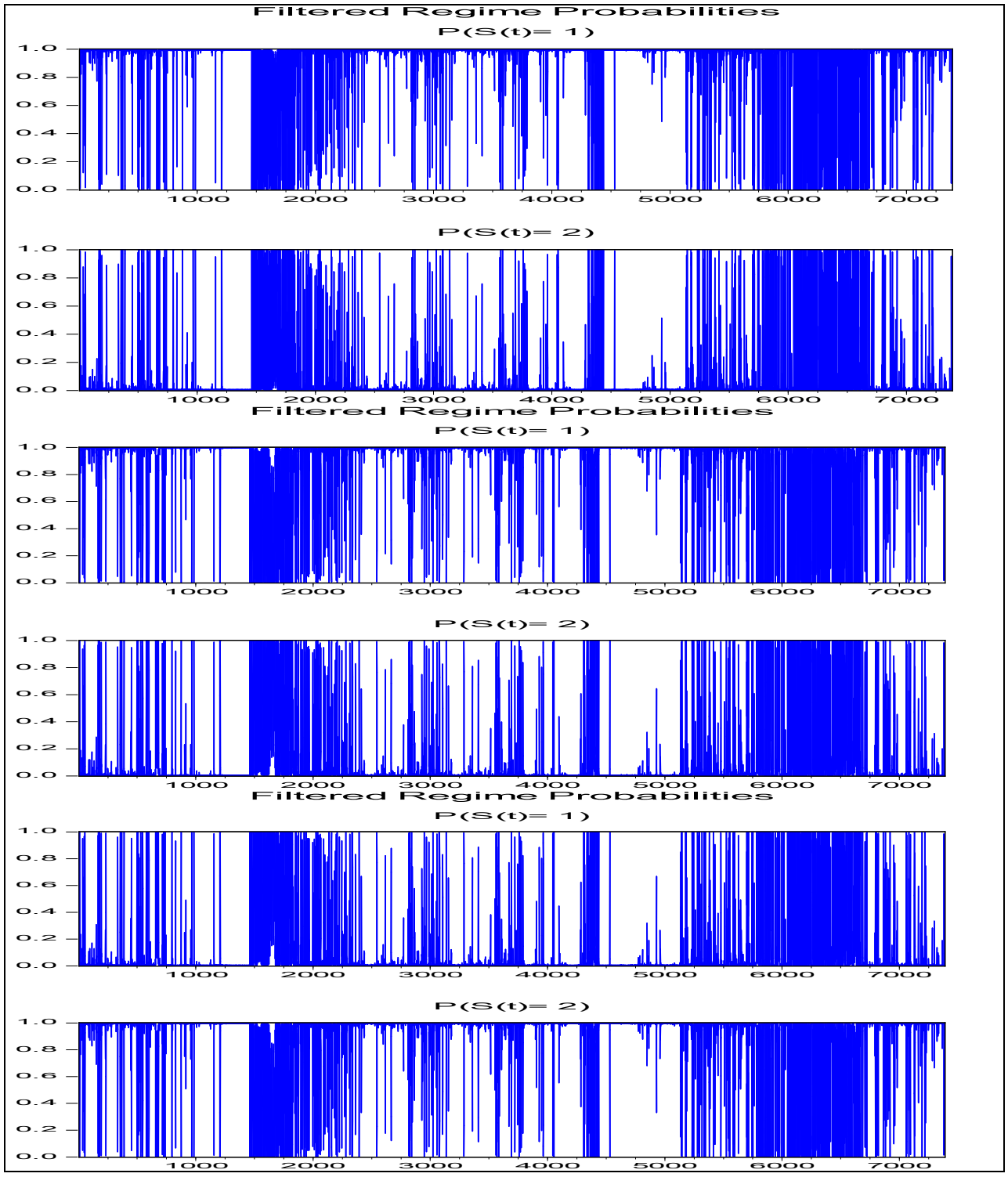
Table 3: Spillover effect of local and foreign currency on British Virgin Islands Cross - Listed IPOs.

British Virgin Islands Cross - Listed IPOs

	Stock Return	USD	Local Currency	American Market	AIM Effects
Lowest	-0.001	-0.001	-0.001	-0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Z – stat	-4.061	-3.657	-3.614	-3.620	0.588
Highest	0.009	0.011	0.009	0.009	0.001
	(0.003)	(0.012)	(0.009)	(0.011)	(0.001)
Z – stat	2.528	0.889	0.889	0.802	0.471
p lowest	0.931	0.89	0.932	0.931	0.542
p hihest	0.518	0.10	0.519	0.519	0.458
Duration:					
Lowest	14.58	10.03	15.16	14.93	2.19
Highest	2.08	1.11	2.08	2.08	1.84

First row shows the mean value of market return. The figures quoted in brackets below the actual estimates are standard errors. Z - stat shows the value of skewness adjusted Z - test. The transition probabilities, $p\ lowest$ and $p\ highest$, relate to the lowest and highest regimes, respectively. The expected durations of the two regimes are also provided in the last two rows.




Filtered Regime Probabilities
P(S(t)= 1)
1.0
0.8
0.6
0.4
0.2
0.0
1000
2000
3000
4000
5000
6000
7000
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)

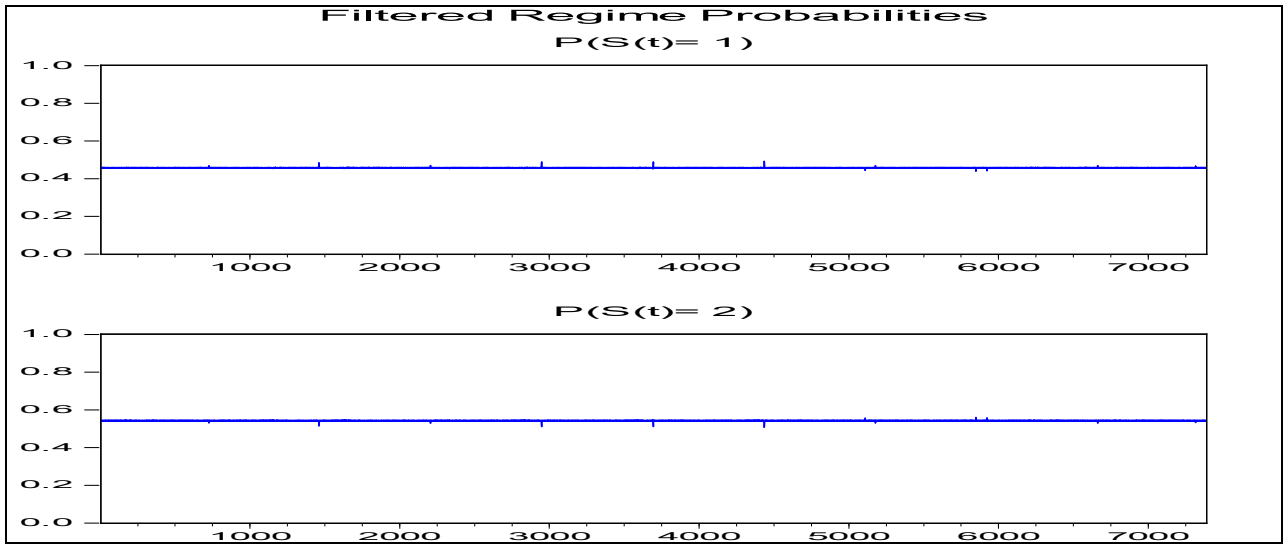


Figure 3: Filtered probabilities of Markov Switching Model of British Virgin Islands Cross - Listed IPOs.

Results of British Virgin Islands Cross - Listed IPOs are presented in table 3. Initial Public Offerings (IPOs) have produced lowest return by (lowest = -0.001, Z - state = -4.061) and the value of highest return is (highest = 0.009, Z - state = 2.528), which shows that British Virgin Islands Cross - Listed IPOs are less volatile and they are not much affected by the factor. The Z-stat value = -4.061 is significant, which means that British Stocks are badly affected to produce low returns. The Z-stat value = 2.528 is also significant, which means that the British Stocks are also supported to produce high returns. Thus they are less volatile. Probability to produce low return is (p - lowest = 93%) and to produce high return is (p - highest = 52%). Duration in which British Virgin Islands Cross – Listed IPOs remain in low regime is 15 days, and the time duration in which they remained in high regime is 2 days. Although the British Virgin Islands Cross – Listed IPOs have been producing low return, but they remained stable and are not affected by the influencing factors. Local currency has major effects to produce low and high returns (93% and 52% respectively) along with the time spam to produce low and high returns (15 days and 2 days respectively). By contrast, foreign currency has not much more effects on stock returns, which is described by probability to produce low is (lowest = 89%) and to produce high is (highest = 10%). The IPOs are not much more influenced by foreign currency durations as compare to local currency to remain in low regime and high regime (10 days and 1 day respectively). The IPOs have absorbed a greater influence from the foreign currency exchange rate, but they did not get disturbed from their positions. Z-stat values of both local and foreign currencies -3.614 and -3.657 respectively are significant, which means that both currencies have mainly affected British stocks to produce low returns. The Z-stat values of both currencies 0.889 and 0.889 respectively are insignificant, which means that they both have not influenced to produce high returns. By looking at the parental stock market, it is said that parental stock market has pushed the British Virgin Islands Cross – Listed IPOs to produce low return by 93.1%, while they have supported the IPOs to produce high return by 51.9%. Time span for the British Virgin

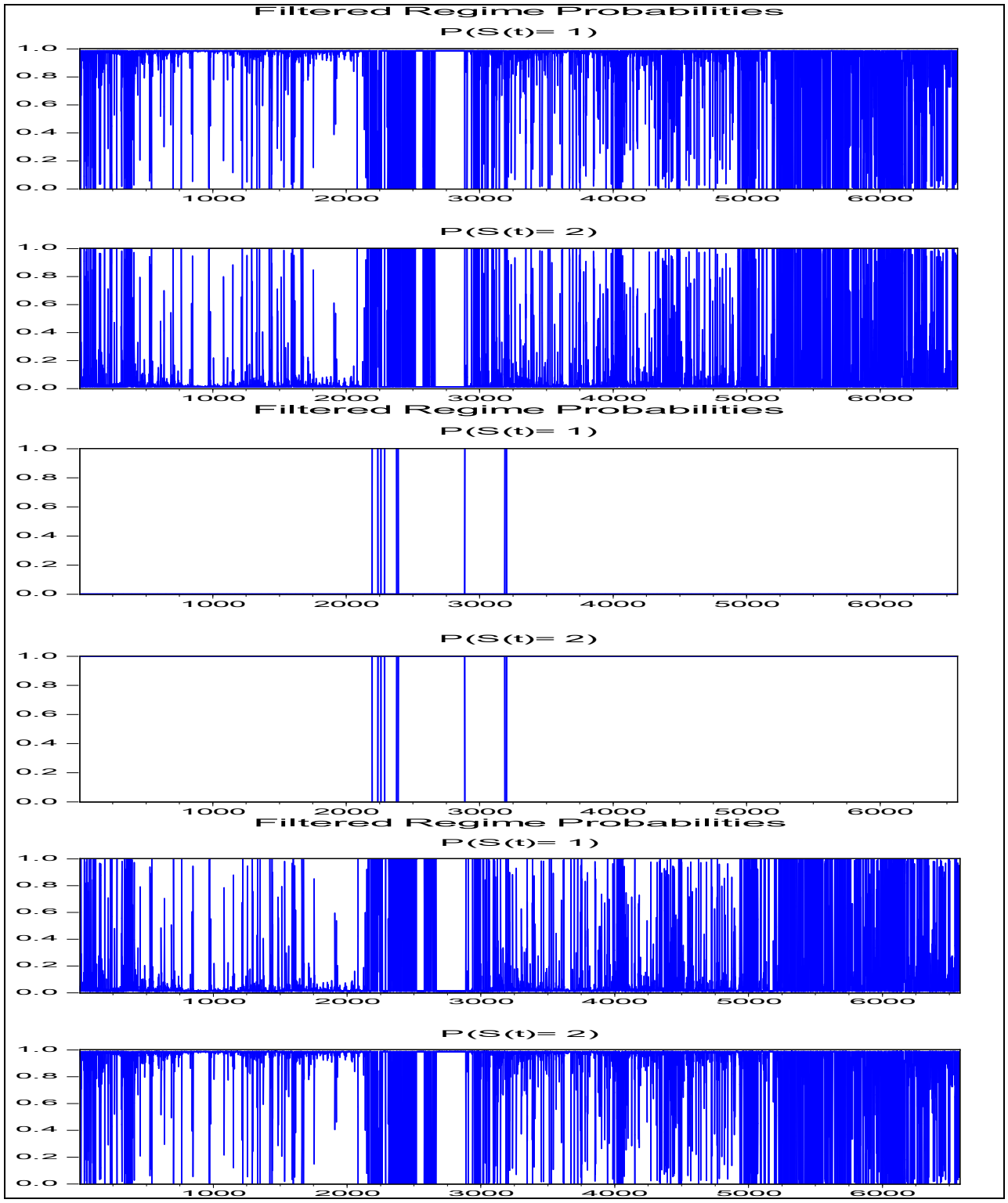
Islands Cross – Listed IPOs to remain in low regime is 14.93 days, while IPOs remained in high regime by 2.08 days. British Virgin Islands Cross – Listed IPOs got affected by alternative investment market (AIM) by 54.2% and produced low returns, while alternative investment market (AIM) has allowed the IPOs to produce high return by 45.8%. 2.19 days of time duration of alternative investment market (AIM) pushed the British Virgin Islands Cross – Listed IPOs to remain in low regime. While 1.84 days of time duration has allowed the IPOs to remain in high regime. By taking into account the Alternative Investment Market (AIM) effects and parental stock market effects, it is analyzed that parental stock market has major effects than Alternative Investment Market (AIM) to produce low or high returns. Combining overall results, it is concluded that British Virgin Islands Cross - Listed IPOs are mainly affected by its local currency exchange rate and parental stock market, rather from foreign currency exchange rate and Alternative Investment Market (AIM). And that is the reason; IPOs are less volatile.

Table 4 : Spillover effect of local and foreign currency on Canadian Cross - Listed IPOs.

Canadian Cross - Listed IPOs

	Stock Return	**USD**	**Local Currency**	**Canadian Market**	**AIM Effects**
Lowest	-0.002	-0.004	-0.002	-0.002	-0.005
	(0.000)	(0.002)	(0.000)	(0.000)	(0.002)
Z – stat	-5.720	-2.402	-5.204	-4.964	-2.700
Highest	0.009	2.929	0.009	0.008	2.615
	(0.004)	(0.053)	(0.011)	(0.009)	(0.047)
Z – stat	1.952	55.037	0.769	0.992	55.147
$p\ lowest$	0.833	0.999	0.833	0.833	0.998
$p\ highest$	0.167	0.001	0.167	0.167	0.002
Duration:					
Lowest	5.99	855.69	6.03	6.03	755.74
Highest	1.20	1.00	1.20	1.20	1.00

First row shows the mean value of market return. The figures quoted in brackets below the actual estimates are standard errors. Z - stat shows the value of skewness adjusted Z - test. The transition probabilities, $p\ lowest$ and $p\ highest$, relate to the lowest and highest regimes, respectively. The expected durations of the two regimes are also provided in the last two rows.


Filtered Regime Probabilities
P(S(t)= 1)
1.0
0.8
0.6
0.4
0.2
0.0
1000
2000
3000
4000
5000
6000
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)

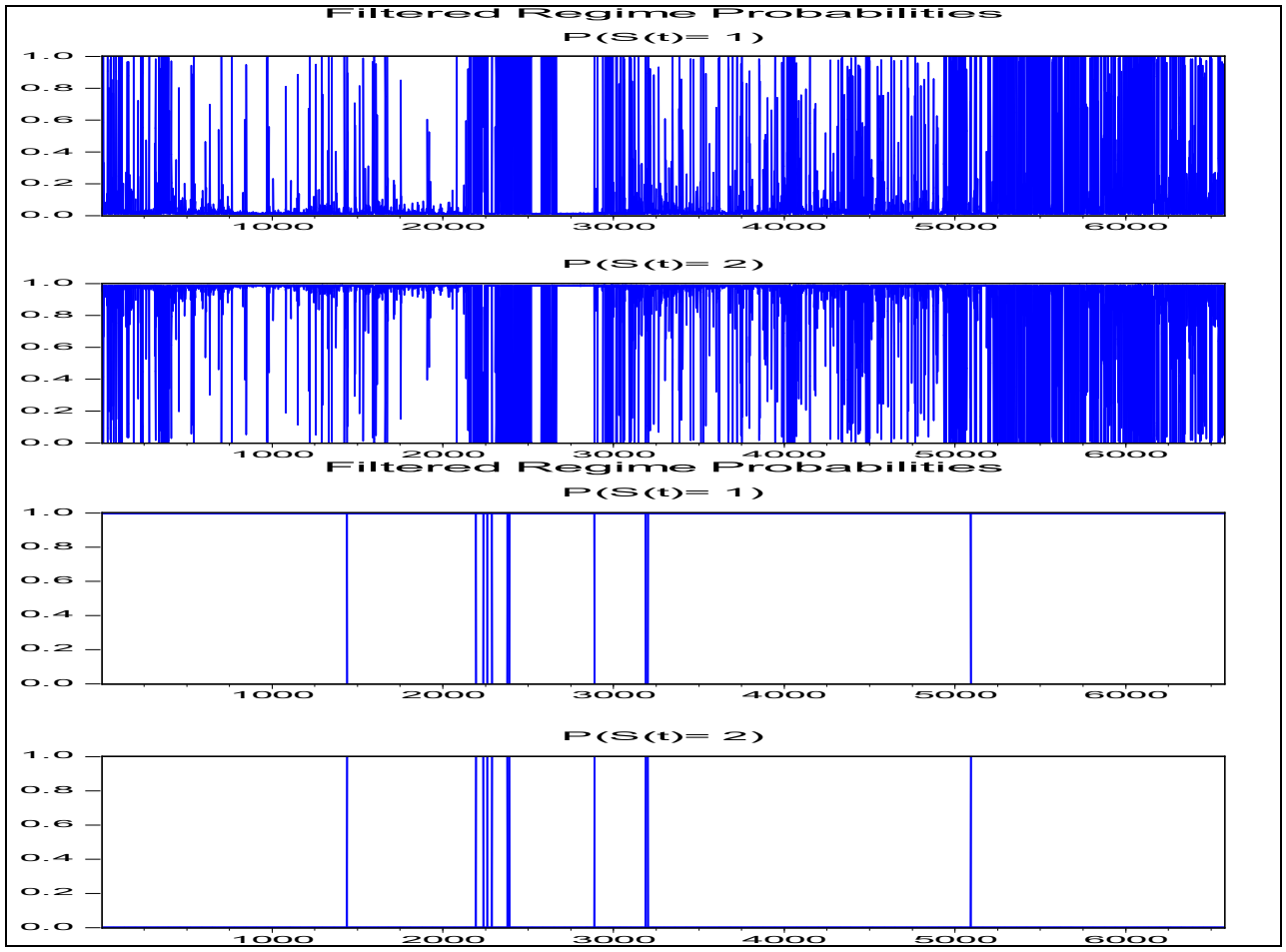


Figure 4: Filtered probabilities of Markov Switching Model of Canadian Cross - Listed IPOs.

Results of Canadian Cross - Listed Initial Public Offerings (IPOs) are exhibited in table 4, that shows lowest stock return (lowest = -0.002, Z - state = -5.720) and highest stock return (highest = 0.009, Z - state = 1.952) are produced by Canadian Cross - Listed IPOs during the period of 2001 - 2018. By considering the lowest stock return and highest stock return values it is analyzed that the IPOs are less volatile. The Z-stat value = -5.720 is significant, which states that Canadian Cross-Listed IPOs are negatively affected to produce low returns. The Z-stat value = 1.952 is insignificant, which describes that the stock are not influenced to produce high returns. The probability to produce low return is (p - lowest = 83%) and to produce high return is (p - highest = 17%). The probability values show that the IPOs have produced mostly low returns, but they are stable and are not highly volatile. Estimated number of days in which the stocks remain in low regime are 6 days and only 1 day stocks remain in high regime. By considering foreign currency values, it shows that foreign currency has more affected the Canadian Cross - Listed IPOs than its local currency. (p - lowest = 99%) probability value indicates that foreign currency has pushed IPOs to produce low returns and it gave only (p - highest = 1%) chances to produce high returns. Furthermore, time duration of 856 days pushed IPOs to remain in low regime and only 1 day it allows the IPOs to be in high regime. However, local currency supported Canadian Cross - Listed IPOs to produce high returns by (p - highest = 17%). Local currency exchange rate

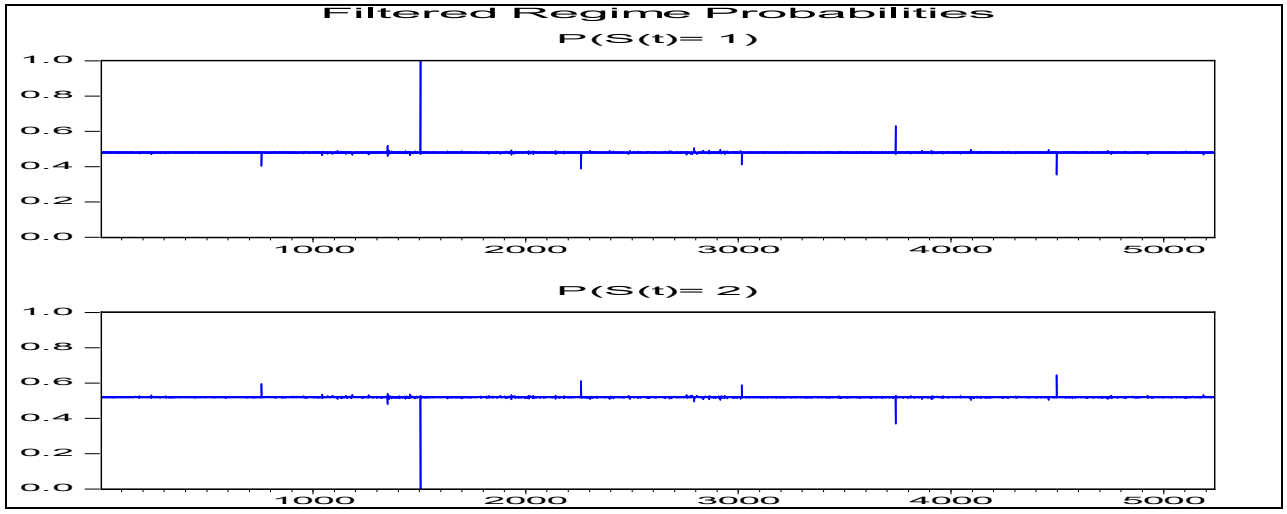
has also affected the Canadian Cross - Listed IPOs to produce low return by 83%. Time span of local currency exchange rate has pushed the IPOs to remain in low regime by 6 days, and it has allowed the IPOs to remain in high regime only by 1 day. Rest of the days they are in normal stat. The Z-stat value of local currency -5.204 is significant, which means that local currency has negatively affected the IPOs to produce low returns. On the other hand, the Z-stat value = 0.769 is insignificant, which means that local currency has not influenced the IPOs to produce high returns. The Z-stat value of foreign currency = -2.402 is significant and it has badly affected the IPOs to produce low returns. The Z-stat value of foreign currency = 55.037 is also significant, which means that foreign currency has greatly influenced the IPOs to produce high returns. Canadian Cross – Listed Initial Public Offerings (IPOs) are mainly affected by alternative investment market (AIM) rather its parental stock market that pushed the IPOs to produce low returns. As indicated by the p – value of parental stock market (p – values = 83%) who has pushed the Canadian Cross – Listed IPOs to produce low returns, and it has supported the IPOs to produce high returns by 17%. Time span of 6 days of parental stock market has pushed the Canadian Cross – Listed IPOs to remain in low regime, while it has allowed the IPOs to be in high regime by only 1 day. By analyzing the overall effects of parental stock market it is to be said that parental stock market has influenced the Canadian Cross – Listed IPOs a lot to produce low returns. Along with the parental stock market, alternative investment market also has influenced greatly Canadian Cross – Listed IPOs. The probability value of alternative investment market (AIM) indicates that there is a great influence of alternative investment market on Canadian Cross – Listed IPOs, thus it has pushed the IPOs to produce low returns by 99%, and it has only supported the IPOs to produce high returns by 0.2%. Time duration value of alternative investment market (AIM) who has pushed the Canadian Cross – Listed IPOs to remain in low regime by 756 days, and it has allowed the IPOs to remain in high regime by only 1 day. By taking alternative investment market (AIM) into account it is analyzed that alternative investment market has influenced the Canadian Cross – Listed IPOs very greatly to produce low returns. So it is concluded that Canadian Cross - Listed IPOs are mainly affected by foreign currency and Alternative Investment Market (AIM), rather its local currency and local stock market. One thing must be included that, although foreign currency exchange rate and alternative investment market (AIM) spillover effects have been absorbed by the Canadian Cross - Listed IPOs but it has sustained its stocks and is less volatile.

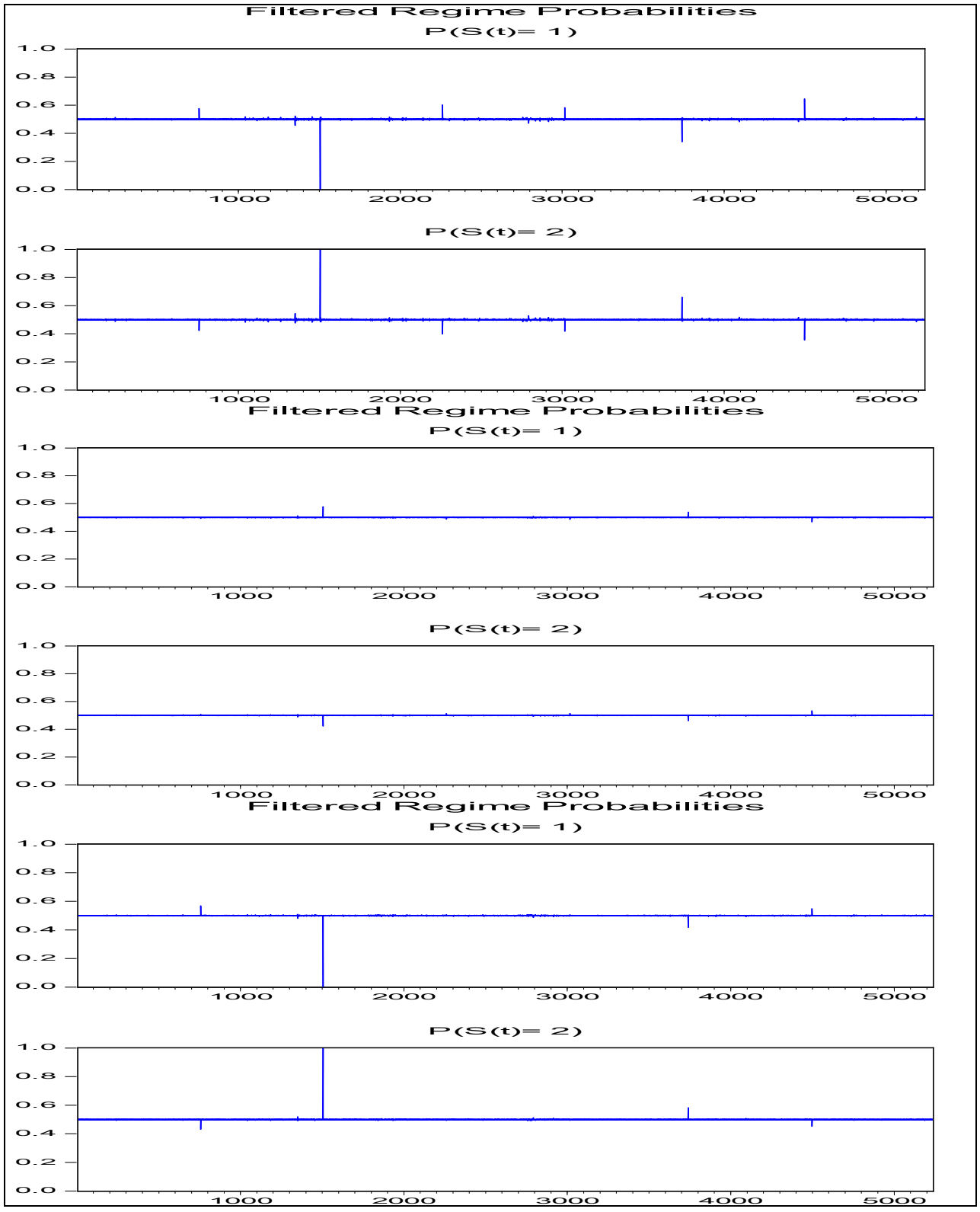
Table 5: Spillover effect of local and foreign currency on Irish Cross - Listed IPOs.

Irish Cross - Listed IPOs

	Stock Return	USD	Local Currency	Irish Market	AIM Effects
Lowest	-0.002	-0.001	-0.001	0.000	0.001
	(0.003)	(0.001)	(0.001)	(0.001)	(0.004)
Z – stat	-0.698	-0.619	-0.983	0.738	0.308
Highest	0.003	0.005	0.000	0.002	0.006
	(0.004)	(0.003)	(0.001)	(0.003)	(0.004)
Z – stat	0.625	1.309	0.534	0.839	1.613
$p\ lowest$	0.519	0.499	0.499	0.499	0.500
$p\ highest$	0.480	0.500	0.500	0.500	0.499
Duration:					
Lowest	2.08	1.99	1.99	2.00	2.00
Highest	1.92	2.00	2.00	2.00	1.99

First row shows the mean value of market return. The figures quoted in brackets below the actual estimates are standard errors. Z - stat shows the value of skewness adjusted Z - test. The transition probabilities, $p\ lowest$ and $p\ highest$, relate to the lowest and highest regimes, respectively. The expected durations of the two regimes are also provided in the last two rows.




Filtered Regime Probabilities
P(S(t)= 1)
1.0
0.8
0.6
0.4
0.2
0.0
1000
2000
3000
4000
5000
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)

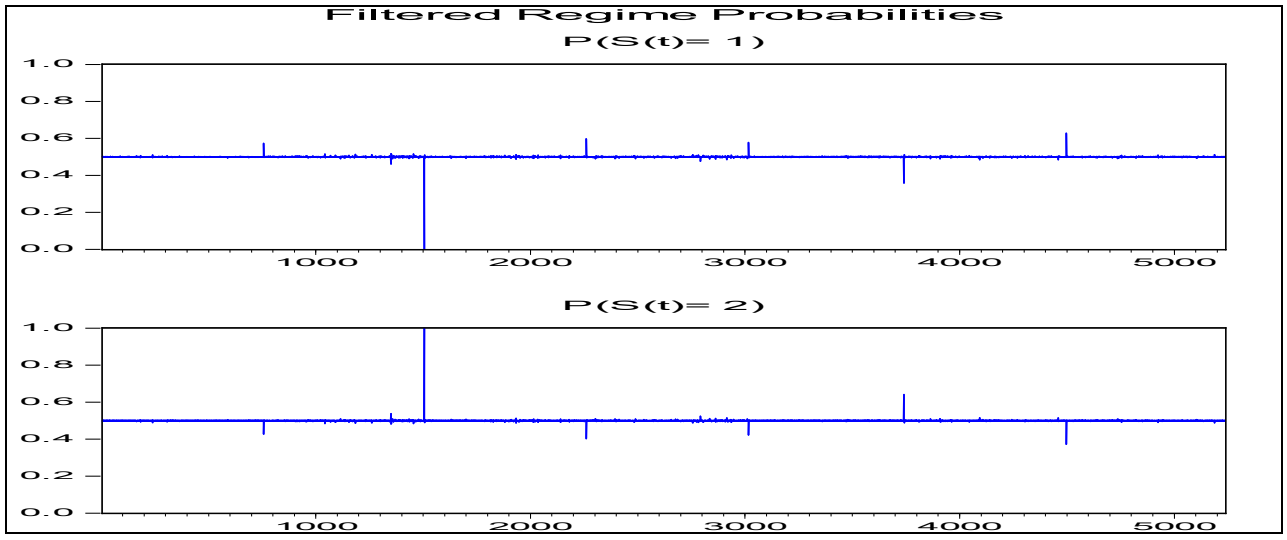


Figure 5: Filtered probabilities of Markov Switching Model of Irish Cross - Listed IPOs.

Table 5 presents the findings of Irish Cross - Listed IPOs, which states that the lowest return produced by the Irish Cross - Listed IPOs is (lowest = -0.002, Z - state = -0.698) and highest return that is produced by the Irish Cross – Listed IPOs is (highest = 0.003, Z - state = 0.625) during the period of 2001 - 2018. That's mean Irish Cross - Listed IPOs are very less volatile and not affected by local or foreign currencies and AIM or parental stock market fluctuations. The Z-stat values of stock return in lowest and highest returns -0.698 and 0.625 respectively are insignificant, which means they both have no influenced the stocks. Similarly, the Z-stat values of local and foreign currencies are also insignificant, which means that they both have no influenced the Canadian stocks. That's the reason that Canadian Cross-Listed IPOs are less volatile. The probability value to produce lowest returns is (p - lowest = 0.519), which mean that the stock has produced lowest by 52%, and the probability value to produce highest is (p – highest = 0.480) which mean that the stock has produced highest return by 48%. Duration period of stocks to remain in low regime is 2 days, and the duration period of stocks to remain in high regime is only 1 day. Considering the p – values and duration values it is analyzed that the stocks remained mostly in low regime and thus they have produced low returns. Irrespective of the time durations of low regime, it is clearly said on the bases of results that Irish Cross - Listed IPOs are more stable than others, and they are not influenced by local and foreign currencies. The probability value of local currency is (p - lowest = 49%) that pushed IPOs to produce low returns, and the probability value of local currency is (p - highest = 50%) that pushed IPOs to produce high returns. The time span of local currency is 2 days that pushed the Irish Cross – Listed IPOs to remain in low regime, and time duration of local currency is 2 days that pushed the IPOs to remain in high regime. Rest of the 5234 days IPOs remain in normal state. Considering the overall effects of local currency exchange rate, it is analyzed that local currency exchange rate has effect the Irish Cross – Listed IPOs equally in both states; to produce high return or low return. Likewise, the foreign currency exchange rate has the same results as the local currency exchange rate. The probability values (p – lowest = 0.499) who has pushed the

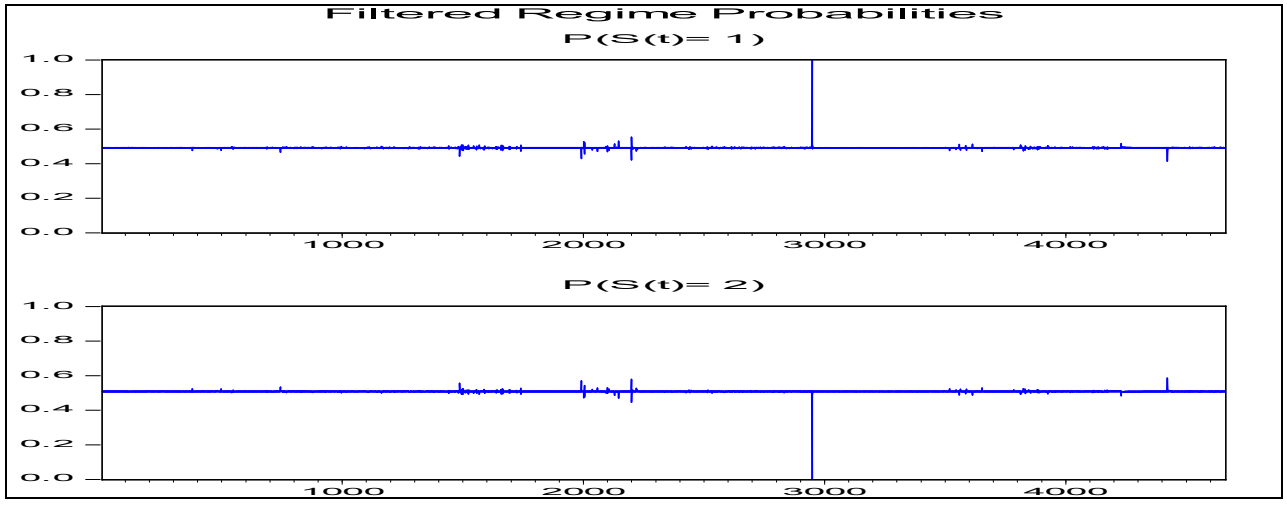
Irish Cross – Listed IPOs to produce low return by 49%, while the probability values (p – highest = 0.500) is indicating that the foreign currency exchange rate has been supportive for the Irish Cross – Listed IPOs to produce high return by 50%. Time duration values of foreign currency exchange rate also same as the local currency exchanges rate. The time span of 1.99 days indicates that the foreign currency has pushed the Irish Cross – Listed IPOs to be in low regime by only 2 days, and the time span of 2 days show that the foreign currency has supported the Irish Cross – Listed IPOs to be in high regime by 2 days only. Combining the whole information about foreign currency exchange rate, it is analyzed that the foreign currency has influenced the Irish Cross – Listed IPOs equally in both sides; to produce low or high returns. While talking about the currency spillover effects on Irish Cross – Listed IPOs, it is to be said that both currencies have been pushed or supported the IPOs equally in both sides, whether to produce low return or to produce high return. So that it can be said that stock return of Irish Cross – Listed IPOs moves in accordance with the local and foreign currency changes. If we look at Alternative Investment Market (AIM) and parental stock market p - values and duration values, it is the same results as local and foreign currencies have. The probability values of parental stock market is (p – lowest = 0.499) which means that the parental stock market has pushed the Irish Cross – Listed IPOs to produce low return by 49%, and it has been supportive for the Irish Cross – Listed IPOs to produce high return by 50% as indicated by the probability value (p – highest = 0.500). Time duration of parental stock market which has pushed the Irish Cross – listed IPOs to remain in low or high regime is 2 days only. Like the parental stock market; alternative investment market (AIM) also the same results. The probability values of alternative investment market is (p-lowest = 0.500) which mean that the alternative investment market has pushed the Irish Cross – Listed IPOs to produce low return by 50%, and it has been the supportive to the Irish Cross – Listed IPOs to produce high return by 49% as indicated by the probability value (p – highest = 0.499). Time duration values of alternative investment market (AIM) are almost same with the parental stock market. The time span of alternative investment market which has pushed the Irish Cross – Listed IPOs to be in low regime is 2 days, and almost 2 days it has allowed the Irish Cross – Listed IPOs to be in high regime. While talking about the both stock market (parental stock market and alternative investment market (AIM) it is analyzed that both stock markets have influenced the Irish Cross – Listed IPOs equally in both sides; to produce low return or high return. It also can be said that the Irish Cross – listed stock returns move in accordance with the changes in parental stock market return and alternative investment market (AIM) return. So it can be easily analyzed that Irish Cross - Listed IPOs are very much stable. They are equally influenced by both currencies and both stock markets. The fluctuations in both currencies and both stock markets are unable to disturb Irish Cross - Listed IPOs individually.

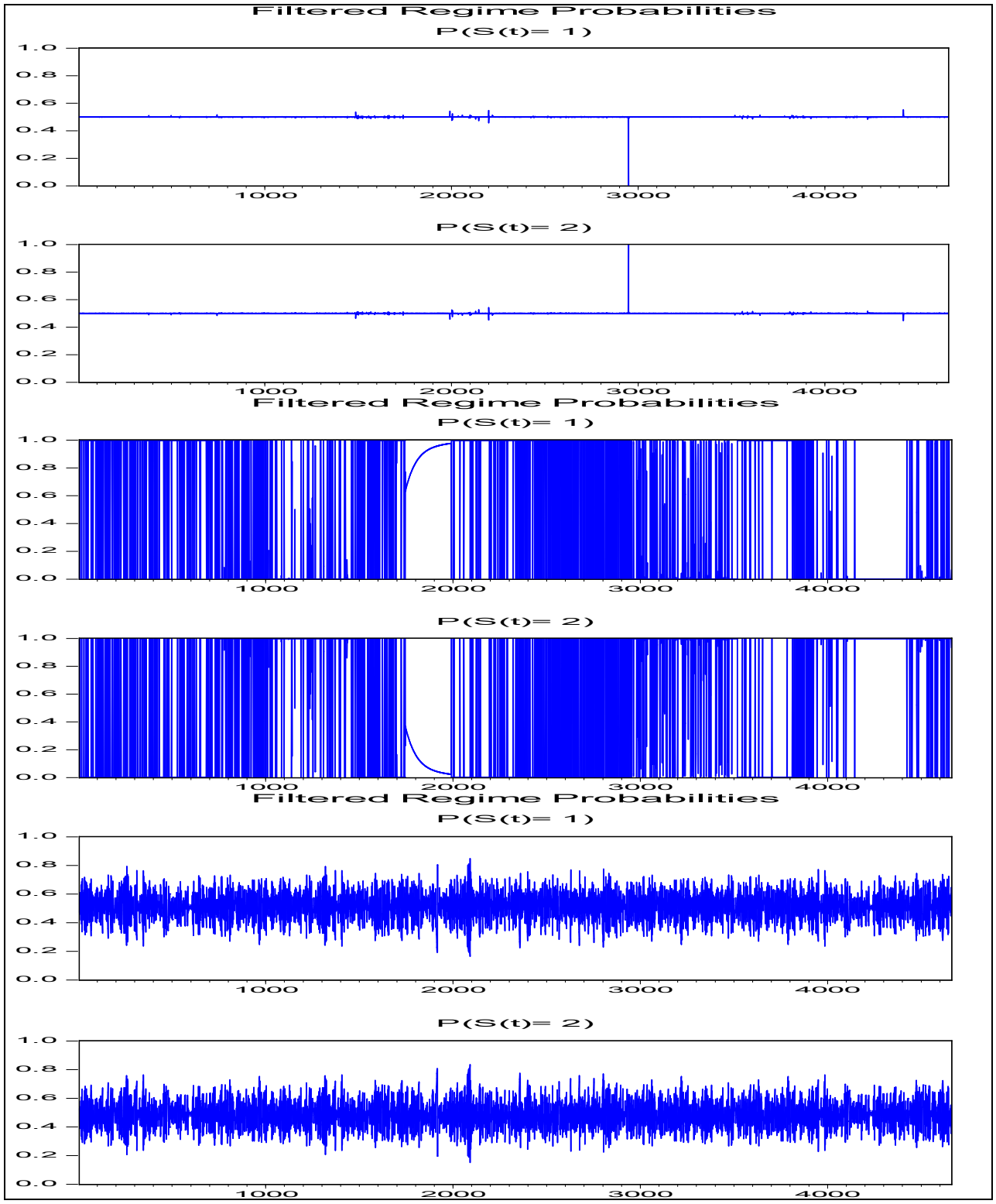
Table 6: Spillover effect of local and foreign currency on USA Cross - Listed IPOs.

USA Cross - Listed IPOs

	Stock Return	USD	Local Currency	American Market	AIM Effects
Lowest	-0.001	-0.001	0.000	0.001	0.000
	(0.001)	(0.005)	(1.251)	(0.002)	(1.241)
Z – stat	-1.545	-0.269	13.028	0.707	13.134
Highest	0.002	0.001	0.002	0.002	0.002
	(0.001)	(0.006)	(0.005)	(0.004)	(0.002)
Z – stat	1.525	0.178	0.310	0.612	0.666
$p\ lowest$	0.509	0.500	0.500	0.476	0.500
$p\ highest$	0.491	0.500	0.500	0.464	0.500
Duration:					
Lowest	2.04	2.00	2.00	1.99	1.99
Highest	1.97	1.99	1.99	2.00	2.00

First row shows the mean value of market return. The figures quoted in brackets below the actual estimates are standard errors. Z - stat shows the value of skewness adjusted Z - test. The transition probabilities, $p\ lowest$ and $p\ highest$, relate to the lowest and highest regimes, respectively. The expected durations of the two regimes are also provided in the last two rows.




Filtered Regime Probabilities
P(S(t)= 1)
1.0
0.8
0.6
0.4
0.2
0.0
1000
2000
3000
4000
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)
Filtered Regime Probabilities
P(S(t)= 1)
P(S(t)= 2)

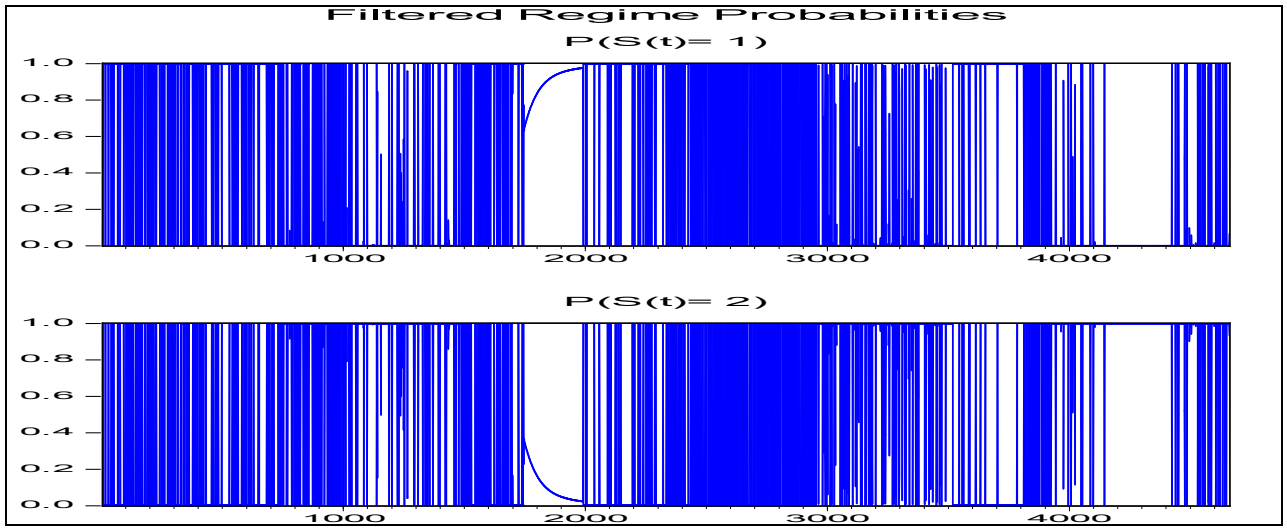


Figure 6: Filtered probabilities of Markov Switching Model of USA Cross - Listed IPOs.

Table 6 exhibits the findings of USA Cross - Listed IPOs which shows that IPOs produced lowest return by (lowest = -0.001, Z - state = -1.545) and highest return by (highest = 0.002, Z - state = 1.525) during the period of 2001 - 2018. That's mean United States of America Cross - Listed IPOs are very less volatile as Irish Cross - Listed IPOs. The Z-stat values are also insignificant. The local currency Z-stat value = 13.028 is significant, which means that local currency has affected the IPOs to produce low returns. The Z-stat values of foreign currency are also insignificant, which means that the foreign currency has no influence to the stocks. The probability to produce low return is (p - lowest = 0.509) which mean that there are 51% chances that stocks have produce low returns, and the probability values to produce high is (p - highest = 0.491) which mean that there are 49% chances that the stocks have produced high returns during the given period of time. The duration period to remain in low regime is 2 days and to remain in high regime is 1.9 days, which clearly states that IPOs remained stable during the given period of time. Local currency having the probability values of (p- lowest = 0.500) shows that local currency has pushed the United States Cross – Listed IPOs to produce low return by 50%, the probability value of (p – highest = 0.500) indicates that the local currency exchange rate has pushed the IPOs to produce high return by 50%. Duration period of local currency exchange rate which has pushed the United States Cross – Listed IPOs to be in low regime by 2 days, and similarly it has supported the IPOs to be in high regime by 2 days. Like local currency exchange rate, the foreign currency exchange rate has the same results. Looking at the probability value (p - lowest = 0.500) it shows that foreign currency has pushed the United States Cross – Listed IPOs to produce low return by 50%, and it also has been supportive for the United States Cross – Listed IPOs to produce high return by 50% as indicated by the probability value (p – highest = 0.500). Time duration values of foreign currency exchange rate also matches with the local currency exchange rate values. 2 days time span of foreign currency exchange rate shows that it has pushed the United States Cross – Listed IPOs to remain in low regime, it has allowed the IPOs to be in high regime for 2 days too. Probability values and duration values of both currencies (local currency exchange rate and foreign currency exchange rate) are exactly same,

which mean that both currencies have participated equally for the United States Cross – Listed Stocks to produce low or high. And thus the Cross – Listed IPOs move in accordance with the local currency and foreign currency changes. As indicated the probability value (p – lowest = 0.479), there are 47% chances that parental stock market has pushed the United States Cross - Listed IPOs to produce low return and the probability value (p - highest = 0.464) shows that there are 46% chances that the parental stock market has been supportive for the United States Cross – Listed IPOs to produce high return. Time duration of parental stock market which has pushed the United States Cross – Listed IPOs to remain in low regime by approximately 2 days, and it has allowed the IPOs to remain in high regime by 2 days. Alternative Investment Market (AIM) pushed the United States Cross - Listed IPOs to produce low return by 50% as indicated by the probability value (p – lowest = 0.500), and it has been supportive for the United States Cross – Listed IPOs to produce high return by 50% as shown in the probability value (p – highest = 0.500). Time duration values of alternative investment market are also same with the parental stock market. Alternative investment market has pushed the United States Cross – Listed IPOs to be in low regime by approximately 2 days, and it has pushed the IPOs to be in high regime by 2 days. While talking about the stock markets' spillover on United States Cross – Listed IPOs, it is analyzed that more or less, both stock markets have pushed or supported the United States Cross – Listed IPOs equally; whether they have forced to produce low return or they have supported to produce high return. By concluding the overall results; it is said that United States of America Cross - Listed IPOs remained very much stable and are affected equally by both currencies and both stock markets during the given period of time. Both currencies and both stock markets fluctuations equally disturbed the United States of America Cross - Listed IPOs. In other words, it can be said that both currencies and both stock markets are unable to disturb United States Cross – Listed IPOs from their positions.

DISCUSSION:

Many things / factors can cause spillover effects from one country to another country, from one region to another region, from one nation to another nation, from one culture to another culture, from one currency to other currencies, from one country stock market to other countries' stock markets. Traditional era has been passed. Now we are living in globalized era. Technology has become an integral part of every society. Everything is being interlinked; whether it is within the country premises or across the countries. Now the changes or modifications in one culture can affect other cultures within a few time period, the amendments in a company policies may have instant effects on other companies' businesses. Accordingly, the ups and downs in a currency lead to the ups and downs in other currencies, and the fluctuations in a stock market may cause fluctuations in other stock markets. So we have become more dependent in today's globalized era. The interdependence of currencies, stock markets, and economies is causing the spillovers effects. It is affecting positively as well as negatively.

In this study, the spillover effects of currencies (local or foreign) have been analyzed, which are causing stock values of cross – listed initial public offerings (IPOs) of companies belonging to

different regions / countries of the world. Six countries (Australia, Canada, United States of America, British Virgin Islands, Ireland and Bermuda) have been selected intentionally because these countries are developed and they have strong economies. Ten companies from each country / region are selected. The selected companies have strong roots in their home countries, and are participating a major portion in countries' economies. Thus they are also cross – listed in London and working under the Alternative Investment Market (AIM) of London Stock Exchange (LSE). Although the companies have strong footprints in their home countries, but it is analyzed in the study that as they go abroad and cross – list their initial public offerings (IPOs) in the cross – country stock market; they are affected from the spillovers raising from the local currency and foreign currency fluctuations. Up to the some extent, the size of the cross – listed companies has also affected the initial public offerings (IPOs) of the sample companies in cross – country stock market.

Australian cross – listed initial public offerings (IPOs) have been seen mostly affected by the both currencies; local currency exchange rate and foreign currency exchange rate, and both stock markets; parental stock market and alternative investment market (AIM). They are highly volatile initial public offerings (IPOs) as analyzed in the study. The reason is that the local currency of Australia and Australian Stock Exchange is not supportive to its cross – listed stocks. Australia is an agricultural country and most of its economy is dependent on agricultural production. Although the Australian agricultural industry is backbone of the country's economy and it is participating a major role in country's development, but it seems to be country centralized; and it is not focusing on its cross – listed stocks which can generate further profits in form of foreign direct investment (FDI) for the country. Size of the Australian cross – listed initial public offerings (IPOs) is also another factor which is causing high volatility in cross – listed stocks. Seventy percent of Australian cross – listed companies are from engineering sector and real estate sector, whose size is not much huge, rather they are smaller than other countries' cross – listed companies. That is why they have absorbed a greater influence from local currency exchange rate, foreign currency exchange rate, parental stock market and alternative investment market (AIM). Because the agricultural industry is the main source of economic production in the country, and the companies who are in agricultural production businesses; are listed in home country stock market. So that they are not supportive to the companies who are in engineering business or real estate business and are cross – listed.

Like the Australian cross – listed initial public offerings (IPOs); Bermuda cross – listed initial public offerings (IPOs) are also highly volatile. Besides the high volatility of stock, it is analyzed in the study that Bermuda Cross Listed initial public offerings (IPOs) have produced mostly high returns. The reason is that the local currency and foreign currency have pushed the Bermuda cross – listed initial public offerings (IPOs) in positive direction. Another reason to produce high returns is that most of the Bermuda cross – listed companies are from insurance sector and information technology sector. These companies also have strong footprints in the parental stock market and producing high returns. Much of the Bermuda economy is supported by the

information technology based companies. So the information technology based companies which are listed in New York Stock Exchange (NYSE), they are supportive to the cross – listed information technology based companies. Because these companies are in same business and are growing very rapidly, the upward shift in home country stocks effects positively to cross – listed stocks and leads to produce high returns. Another factor which has pushed the Bermuda cross – listed initial public offerings (IPOs) to produce high returns is the local currency relationship with foreign currency. Bermuda is linked with the United States, and thus it is using the United States Dollar (USD) as its local currency. So as compare to the other currencies Bermudian currency is not much affected from the currency exchange rate. For the Bermuda cross – listed initial public offerings (IPOs) local currency and foreign currency is same which is United States Dollar (USD). Although return on the United States Dollar (USD) has been calculated by taking its log, and the changes in United States Dollar (USD) have also been considered while collecting data for Bermuda Cross – Listed Initial Public Offerings (IPOs). Although the local and foreign currency is supported to the Bermuda cross – listed initial public offerings (IPOs), rather they are volatile. The reason behind high volatility is that the information technology based companies are more sensitive as compare to other companies. Mush of the investment is required to start or run an information technology based business. So as the local currency or foreign currency supports these kind of companies; they produce high and high returns after recovering their investments. But on the other hand as local currency or foreign currency fluctuations are not supportive to them; they feel greater influence because of their sensitivity, and thus they produce very low returns. These sensitive businesses might be at their extreme level in both positive or negative scenarios if they are disturbed by affecting factors. So it is analyzed in the study that Bermuda Cross – Listed stocks can produce very high returns if the surroundings are friendly to them, otherwise they can cause a major loss for the home country (in form of Foreign Direct Investment) if the surroundings are harmful to them.

As per the study results, British Virgin Islands Cross – Listed Initial Public Offerings (IPOs) are less volatile in comparison with Australian Cross – Listed Initial Public Offerings (IPOs) and Bermuda Cross – Listed Initial Public Offerings (IPOs). Although effecting factors (local currency exchange rate, foreign currency exchange rate, parental stock market index and alternative investment market index) have influenced the British Virgin Islands cross – listed initial public offerings (IPOs) greatly, but they remained stable during the given period of time, and are not much affected by the influencing factors. The reason of less volatility of British Virgin Islands cross – listed initial public offerings (IPOs) is that most of the British Virgin Islands' economy is based on the information technology corporations and shareholding companies. As explained in Bermuda Cross – Listed initial public offerings (IPOs) that the companies who are in business of information technology; are more sensitive than other kind of businesses. The somehow rise in high volatility of British Virgin Islands cross – listed initial public offerings (IPOs) is caused by the sensitivity of information technology based corporations who are cross – listed in alternative investment market (AIM). The other shareholding companies who have a good portfolio across the globe; they remained stable during the given period of time

and are not disturbed by the influencing factors. By looking at the table 3 in data and results; it is clearly seen that there is a great pressure from the influencing factors to the British Virgin Islands cross – listed stocks. That is why, the British Virgin Islands Cross – Listed initial public offerings (IPOs) have produced mostly low returns, but overall they remained stable and are not highly volatile. Another reason of less volatility of British Virgin Islands cross – listed initial public offerings (IPOs) is the local currency of the country. United States Dollar (USD) is the local currency of the British Virgin Islands, and thus the exchange rate of the local currency is not harmful for the cross – listed initial public offerings (IPOs). It is shown in the table 3 that the foreign currency exchange rate has greater influence to the British Virgin Islands Cross – Listed initial public offerings (IPOs) as compare to local currency exchange rate. It also can be said that the United States Dollar (USD) is a stable currency and it fluctuates after a long period of time. By summarizing the overall results, it is analyzed that two things have supported the British Virgin Islands cross – listed initial public offerings (IPOs); its local currency and shareholding companies. Or in other words, they have saved the British Virgin Islands cross – listed initial public offerings (IPOs) from the affecting factors.

When talking about Canadian Cross – Listed initial public offerings (IPOs), they are less volatile just like British Virgin Islands cross – listed initial public offerings (IPOs). It has been seen in the table 4 of data and results that there is a great pressure from all selected influencing factors (local currency exchange rate, foreign currency exchange rate, parental stock market index and alternative investment market (AIM) index) to the Canadian Cross – Listed initial public offerings (IPOs). Looking at the probability values of all influencing factors it is analyzed that they all have tried to influence the Canadian Cross – Listed initial public offerings (IPOs) greatly and pushed the initial public offerings (IPOs) to produce low returns. A great pressure is absorbed by the Canadian Cross – Listed Initial Public Offerings (IPOs), but yet they remained stable during the given period of time and are not much more fluctuated from their positions. The reason behind the stability of Canadian Cross – Listed initial public offerings (IPOs) is that the economy of the Canada is very strong and controlled. The policies for the business community are well established. The corporations who have major participation in the country's development; are equally watched (whether they are doing business within the country premises or they are running overseas businesses). Most of the cross – listed companies are from insurance sector and construction sector. These corporations / companies have been seen stable from last 3 decades. Although they have produced mostly low returns during the given period of time, and they have absorbed a great pressure from the influencing factors, but they faced the influencing factors and not get affected by them. Another reason for the Canadian Cross – Listed initial public offerings (IPOs) to be less volatile is that the currency of the Canada is also a stable currency. So the local currency exchange rate fluctuations are least effective to the Canadian Cross – Listed Initial Public Offerings (IPOs). Moreover, the stable insurance corporations and construction companies along with stable local currency have collectively faced the pressure arising from influencing factors (local currency exchange rate, foreign currency exchange rate,

parental stock market index and alternative investment market (AIM) index), and defended the Canadian Cross – Listed initial public offerings (IPOs) to be affected by the influencing factors.

Irish Cross – Listed initial public offerings (IPOs) are very less volatile as shown in the table 5. They remained very stable during the sample period of time. Other four effecting factors (local currency exchange rate, foreign currency exchange rate, parental stock market index and alternative investment market (AIM) index) have influenced the Irish Cross – Listed initial public offerings (IPOs) equally in both; to produce low returns or to produce high returns. So they have produced low returns or high returns in equal ratio which is fifty percent (50%). Comparing the Irish Cross – Listed initial public offerings (IPOs) with all previous countries (Australian Cross – Listed initial public offerings (IPOs), British Virgin Islands Cross – Listed initial public offerings (IPOs), Bermuda Cross – Listed Initial public offerings (IPOs), and Canadian Cross – Listed initial public offerings (IPOs), they have produced mostly high returns, and the time durations of Irish Cross – Listed initial public offerings (IPOs) to be in high regime is more than others. Most of the Irish Cross – Listed companies are insurance companies and engineering base companies. These companies have strong footprints in their home country and are very stable from last 5 decades. These companies grow with steady speed but their stock prices do not decrease for long term. That is why, Irish Cross – Listed companies are very less volatile and are not affected by the influencing factors. Irish government is also business oriented. By considering the business as battle in today's economic world; it has focused mainly on business community. The Irish government has laid down the policies for business community, which are very friendly for the businessmen. They also motivate the business community to promote their business units across the world, and their banking system financially supports the businesses. Another reason for less volatility of Irish Cross – Listed initial public offerings (IPOs) is the strong local currency. Euro is also a stable currency after the United States Dollar (USD). So the local currency exchange rate is also supportive for Irish Cross – Listed Initial Public Offerings (IPOs) to remain stable.

At the end, the United States of America Cross – Listed Initial Public Offerings (IPOs) have been seen as least volatile as indicated by the table 6. These initial public offerings (IPOs) have been seen least volatile from all cross – listed initial public offerings (IPOs) stated above. The reason behind the stability of United States of America Cross – Listed initial public offerings (IPOs) is the local currency of the country. The United States Dollar (USD) has been seen as very stable currency among all other currencies of the world. The international trade is also being done in exchange of United Stated Dollar (USD). So it has the great importance among the currencies. Looking at the table 6, it is analyzed that all influencing factors (local currency exchange rate, foreign currency exchange rate, parental stock market index and alternative investment market (AIM) index) have supported / pushed the United States of America cross – listed initial public offerings (IPOs) equally in both sides; to produce low returns or to produce high returns. Its mean that the influencing factors are supportive to United States of America cross – listed initial public offerings (IPOs) by fifty percent, and they are also harmful to the

initial public offerings (IPOs) by fifty percent. Another reason for the United States of America cross – listed initial public offerings (IPOs) to be stable is that; most of the companies in United States are in engineering business or information technology business. Engineering based companies are considered as very stable companies as stated above. On the other hand information technology based companies are considered as very sensitive companies. They produce high returns if the surroundings are friendly to them; they get affected and produce low return if surroundings are not friendly to them. In the case of United States of America cross – listed initial public offerings (IPOs) it has been seen that these companies have produced high returns in the given period of time. It also can be said that United States information based companies are very rich by human capital, so that they remained stable and not get affected by influencing factor.

CONCLUSION:

The objective of this study is to examine the spillover effects of local and foreign currency of cross - listed IPOs. The sample of 60 companies which have undergone through secondary listing in Alternative Investment Market (AIM) is taken and these companies are further categorized into six countries from where they belong to. To analyze the spillover affects; Markov - switching model is applied to differentiate between lowest regime and highest regime; and to seek the return and spillover affects during the period of 2001 - 2018. The findings of this study suggest that Australian Cross - Listed IPOs are highly volatile and are influenced by local and foreign currency along with Alternative Investment Market (AIM) and parental market spillover effects. Bermuda Cross - Listed IPOs are also highly volatile but they have produced mostly high returns. The reason to produce high returns is greater influence of its local currency and parental stock market returns, while foreign currency and AIM have less influenced the Bermuda Cross - Listed IPOs. Cross - Listed IPOs of British Virgin Islands are less volatile. They are mainly supported by their local currency and parental stock market return, that's why they remained stable during the given time period and did not get affected by foreign currency and Alternative Investment Market (AIM) effects. While taking about Canadian Cross - Listed IPOs, they are less volatile but they have absorbed a greater influence from both local and foreign currencies and both stock markets; Alternative Investment Market (AIM) and parental stock market, however they are not influenced by both currencies and both stock markets, and remained stable. Irish and USA Cross - Listed IPOs are least volatile. They both have absorbed spillover effects from both local and foreign currencies and both stock markets; Alternative Investment Market (AIM) and parental markets, but they did not get disturbed and remained in normal states during the period of 2001 - 2018. Fluctuations in both currencies and both market returns could not affect their stable position in secondary market.

The study reveals various important implications for the local as well as foreign investors. By taking into account the study result, they can come to know the consequences of their investments which may result from the currency spillovers; while making investment in a cross – listed entity / company. Empirical results of the study have suggestions for the policy makers /

managers that they must utilize their resources on portfolio investments locally and internationally. Because of the linkages among global financial markets and other equity markets, the spillover effects may arise due to an unpredicted event in any of the equity market; which can be harmful to other financial markets. The research outcomes can be helpful to the government authorities to forecast risk of their cross – listed entities / companies resulting from the spillovers of local and foreign currency fluctuations. The level of the money supply can be increased due to devaluation in the local currency, which may be caused by fluctuation in foreign currency.

LIMITATIONS AND FUTURE RESEARCH:

Research covers the area of spillover effects in respect of local and foreign currency. Study has been done on the cross – listed IPOs of sixty companies that belong to six different regions / states. To analyze the spillover effects ten companies from each region / state are selected randomly. Limitations of the study and future research could be categorized as:

First, companies from each region / state are selected at random, which is the combination of various sectors including engineering, shareholdings, information technology, real estate, etc. one can make enhancement by working on a specific sector to gauge the exact magnitude of spillover effects of that certain sector.

Second, research consists of event study. Three years from the company is listed in secondary market are taken by considering 20 April 2019 as a last day. Researchers have the opportunity to take the data from the date by which a company is Cross – Listed in secondary market; the Alternative Investment Market of London. So that the complete history values of the cross – listed company could be known and the level of spillover effects absorbed by the company throughout its life could be examined.

Third, due to limited resources, the sample countries / states belong to the continent of Europe and Australia. Africa, Asia and other continents are available for the researchers to extend the study at mass level and examine the spillover effects globally.

REFERENCES:

Ali, A. (n.d.). The spillover effects of innovative ideas on human capital *. 333–360. https://doi.org/10.1111/rode.12344

Bairagi, R. (2017). Impact of foreign direct investment volatility on economic development in the Indian subcontinent. World Economy, 40(12), 2832–2853. https://doi.org/10.1111/twec.12496

Baule, R., Frijns, B., & Tieves, M. E. (2018). Volatility discovery and volatility quoting on markets for options and warrants. Journal of Futures Markets, 38(7), 758–774. https://doi.org/10.1002/fut.21900

Bettendorf, T. (2018). Spillover effects of credit default risk in the euro area and the effects on the Euro : A GVAR approach. (September), 1–17. https://doi.org/10.1002/ijfe.1663

Bhar, R., & Nikolova, B. (2007). Analysis of mean and volatility spillovers using BRIC countries, regional and world equity index returns. Journal of Economic Integration, 22(June), 369–381.

Chan, C., Wang, M., & Chen, H. (2017). The Volatility Spillovr Effect between index options and their underlyying markets: Evidence from the US, the UK, and Taiwan. (1), 700–733. https://doi.org/10.1111/ajfs.12185

Christafore, D. (2018). Neighbourhood inequality spillover effects of gentrification. (June), 1–16. https://doi.org/10.1111/pirs.12405

Dawson, P. J., & Sanju, A. I. (2017). Volatility Effects of Index Trading and Spillovers on US agricultural futures markets: Amultivariate GARCH Approach. https://doi.org/10.1111/1477-9552.12216

Dedi, L., & Yavas, B. F. (2016). Return and volatility spillovers in equity markets: An investigation using various GARCH methodologies. Cogent Economics & Finance, 4(1), 1–18. https://doi.org/10.1080/23322039.2016.1266788

Finta, M. A., Frijns, B., & Tourani-Rad, A. (2017). Contemporaneous Spillover Effects between the U.S. and the U.K. Equity Markets. Financial Review, 52(1), 145–166. https://doi.org/10.1111/fire.12116

Fischer, N. K., Hoyer, W. D., & Wolframm, C. (2019). What if something unexpected happens to my brand? Spillover effects from positive and negative events in a co-branding partnership. (October 2018), 1–15. https://doi.org/10.1002/mar.21210

Ghouse, G., & Khan, S. A. (2017). Review of Financial Economics Tracing dynamic linkages and spillover effect between Pakistani and leading foreign stock markets. Review of Financial Economics. https://doi.org/10.1016/j.rfe.2017.08.001

Goodwin, T. H., & Goodwin, T. H. (2017). Business-Cycle Analysis With a Markov-Switching Model. *0015*(August).

Huang, Y.-L. (2014). Testing Markov switching models. Applied Economics, 46(17), 2047–2051. https://doi.org/10.1080/00036846.2014.892201

Hwang, J.-K. (2014). Spillover effects of the 2008 financial crisis in Latin America Stock markets. International Advances in Economic Research, 20(3), 311–324. https://doi.org/10.1080/13504851.2016.1150939

Jebran, K., & Iqbal, A. (2016). Dynamics of volatility spillover between stock market and foreign exchange market: evidence from Asian Countries. Financial Innovation, 2(1). https://doi.org/10.1186/s40854-016-0021-1

Ke, J., Wang, L., & Murray, L. (2010). An empirical analysis of the volatility spillover effect between primary stock markets abroad and China. Journal of Chinese Economic and Business Studies, 8(3), 315–333. https://doi.org/10.1080/14765284.2010.493645

Leon Li *, M.-Y., William Lin, H.-W., & Hsiu-hua, R. (2005). The performance of the Markov-

switching model on business cycle identification revisited. Applied Economics Letters, 12(8), 513–520. https://doi.org/10.1080/13504850500119963

Liow, K. H. (2015). Conditional volatility spillover effects across emerging financial markets. Asia-Pacific Journal of Financial Studies, 44(2 Special Issue). https://doi.org/10.1111/ajfs.12087

Liu, Y. A., & Pan, M.-S. (1997). Mean and Volatility Spillover Effects in the U.S. and Pacific–Basin Stock Markets. Multinational Finance Journal, *1*(1), 47–62. https://doi.org/10.17578/1-1-3

Ma, Y. ran, Ji, Q., & Pan, J. (2019). Oil financialization and volatility forecast: Evidence from multidimensional predictors. Journal of Forecasting. https://doi.org/10.1002/for.2577

Mandal, B., & Liquor, W. S. (2019). The cross-border spillover effects of recreational marijuana legalization. https://doi.org/10.1111/ecin.12764

Mi, L., & Hodgson, A. (n.d.). Real estate ' s information and volatility links with stock , bond and money markets. 2012(ii), 1–27. https://doi.org/10.1111/acfi.12375

Mohammadi, H., & Tan, Y. (2015). Return and Volatility Spillovers across Equity Markets in Mainland China, Hong Kong and the United States. Econometrics, 3(2). https://doi.org/10.3390/econometrics3020215

Moon, G. H., & Yu, W. C. (2010). Volatility spillovers between the US and China stock markets: Structural break test with symmetric and asymmetric GARCH approaches. Global Economic Review, 39(2), 129–149. https://doi.org/10.1080/1226508X.2010.483834

Mouna, A., & Anis, J. (2016, January 5). Market, interest rate, and exchange rate risk effects on financial stock returns during the financial crisis: AGARCH-M approach. Cogent Economics and Finance, Vol. 4. https://doi.org/10.1080/23322039.2015.1125332

Narula, I. (2016). Dynamics of volatility behaviour and transmission: evidences from BRICS countries. Decision (0304-0941), *43*(1), 31–51. https://doi.org/10.1007/s40622-015-0119-8

Panda, P., & Deo, M. (2014). Asymmetric and Volatility Spillover Between Stock Market and Foreign Exchange Market: Indian Experience. IUP Journal of Applied Finance, 20(4), 69–82.

Singh, A., & Singh, M. (2017). Co-movement and spillovers: empirical evidence from BRIC equity markets. China Economic Journal, 10(3), 341–361. https://doi.org/10.1080/17538963.2017.1370158

Tsai, I. (2019). Market Integration and Volatility Transmission in the England's Housing Markets. The Manchester School, (April), manc.12272. https://doi.org/10.1111/manc.12272

Tule, M. K., Ndako, U. B., & Onipede, S. F. (2017). PT US CR. Review of Financial Economics. https://doi.org/10.1016/j.rfe.2017.03.003

Wagner, N., & Szimayer, A. (2004). Local and spillover shocks in implied market volatility:

Evidence for the U.S. and Germany. Research in International Business and Finance, 18(3), 237–251. https://doi.org/10.1016/j.ribaf.2004.04.008

Wang, Y., Pan, Z., & Wu, C. (2018). Volatility spillover from the US to international stock markets: A heterogeneous volatility spillover GARCH model. Journal of Forecasting, 37(3), 385–400. https://doi.org/10.1002/for.2509

Wong, H. T. (2018). Volatility spillovers between real exchange rate returns and real stock price returns in Malaysia. (May), 1–19. https://doi.org/10.1002/ijfe.1653

Zealand, N. (2018). The Co-Movement of Credit Default Swap Spreads , Equity Returns and Volatility : Evidence from Asia- Paci fi c Markets *. https://doi.org/10.1111/irfi.12237

Zhen, M., Rude, J., & Qiu, F. (2017). Price Volatility Spillovers in the Western Canadian Feed Barley , U . S . Corn , and Alberta Cattle Markets. *00*, 1–21. https://doi.org/10.1111/cjag.12146