Relationship between Foreign Macroeconomic News Announcement Surprise and Equity Market Return: A Case Study of the United States News Announcement with Hong Kong Stock Exchange During Period 2004 To 2013

Mr. Jiayu Huang

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Business Administration in Finance
Graduate School of Business
Assumption University
Academic Year 2015

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Abstract

This research paper aims to study the influence of US scheduled macroeconomic news announcement surprise on Hong Kong Exchange market monthly index return instead of the news announcement itself.

Eleven US macroeconomic indicators and five Hong Kong Exchange market index during year 2004 and year 2013 have been collected. The news surprise is calculated by using actual announced value minus market expectation. Multiple regression Model is applied then to test relationship between those announcements surprise and index return with Ordinary Least Square method.

Consumer Price Index (CPI), Import Price, and Unemployment rate surprises are most influential as they are significantly related to index return of Hang Seng Index (HSI). HSI Finance sub-index (HSF), HSI Properties sub-index (HSP), and HSI Commerce & Industry sub-index (HSC). The next important announcement is Industrial Production which was affecting HSI, HSF, and HSC. ISM PMI and GDP only have valid effect on HSF and HSI Utilities sub-index (HAT) relatively. The rest of the announcements fail to be significant on the Hong Kong stock market. Hence, this paper approved US news surprise information have significant effect on monthly return, which is different from most previous researches that tested only daily return right after announcement in other markets.

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Chapter 1

Generalities of the Study

This chapter is going through general introduction of this research paper, as how it does relate to previous studies and current equity market situation, as well as the purpose of this research. Then it briefs about multiple linear regression models used for capturing relationship between movements of equity market in Hong Kong and its explanatory macroeconomic news surprise variables in US. Background and information regarding these dependent and explanatory variables are demonstrated through Hong Kong stock exchange market and scheduled US macroeconomic announcements surprise. Afterward, matters related to research like scope, limitation, significance would be reviewed.

1.1 Introduction to the Study

In the global subprime mortgage financial crisis from US during 2007 and 2009, most countries were hit seriously. Without exception, Hang Seng Index in Hong Kong stock exchange market suffered 15,832 points loss from end of 2007 until end of 2008. Its recovery began slowly from beginning of 2009. This showed that Hong Kong equity market has been exposed and connected to US economy. Tao and Xiaojing (2009) supported this opinion by studying equity return in Hong Kong with significant empirical results. Hong Kong, one of international financial centers located in Asia, the most open economy in the world, and closely related to

China which is second largest economy, is worthy enough to take a deep look at possible factors affecting it.

Equity market is one major component in financial market, enterprises selling partial ownership in exchange of capitals for business development, and investors looking for investing opportunity and return from prospective corporations with capitals available. In the Market Efficient Hypothesis theory, it suppose equity market should work fast enough to absorb new information immediately that left no chance of extra return by possession of different kind of new information (Fama, 1991). However, even the author (Fama, 1991) who is also inventor of the EMH theory, acknowledged to extreme version of this theory is not feasible, that, it is impossible for the current markets price include all information available, and no any private or insider information exist, consequently, no one could outperform the market. Beside the argument about whether the market is efficient or fast enough to let investors have no extra return, this theory still approved the opinion that market is moved with information available. Macroeconomic variable was believed to be a significant source of information influenced on pricing of equity market (Chen', Roll, & Ross, 1986). In research of Chen, Roll, and Ross (1986), all macroeconomic activities were counted as endogenous variable to general economy, which further affected pricing asset in equity market.

Relationship between financial market movement and scheduled public macroeconomic news announcements had been approved by many studies like in bond market (Jones, Lamont, & Lumsdaine, 1998), stock market (Li, & Hu, 1998), (Graham, Nikkinen, & Sahlstrom, 2003), treasury market (Bollerslev, Cai, & Song, 2000) and also different financial markets as stock, bond, foreign exchange market (Andersen, Bollerslev, Diebold, & Vega, 2007).There is a novel

idea about what actually the new information to markets is. Traditionally, it is the statistic news just announced by authority or organization like bureau of labors, Federal Reserve etc., and then markets reacted based on its perception of those announcements. Nowadays, as a financial market is developed and becomes mature, there is always forecast and expectation regarding pre-scheduled announcements from markets ahead. Those investors and market participants would make investing decision based on their opinion about what economy seemed to be. Hence, market price would already contain those anticipations. In case announced news was just the same as what had been thought, market should show no action to that announcement, because this was nothing new to markets. This no difference case is just assumption, which rarely exists in reality, even if it did happen sometimes. Based on this assumption, new information is not what is announced but something different from what market expected (Gupta, & Reid 2013). This new type of news information is described as, surprise, shocking, unexpected, or unanticipated. Markets price would be adjusted regarding to what was not expected, either higher or lower. For example, investor might think inflation would be low in previous month, and managed assets with this thought, yet it turned out to be higher, so they would rearrange assets again toward how it differed from what was forecasted.

This new definition and related research about new information sees no sign to reject announcement itself as new information, but widen perspective of factors could influence market movement and together with extent of market reaction for unexpected information. Adequate researches about relationship between scheduled macroeconomic announcements surprise and financial markets looked for and examined which unexpected announcements significantly moved financial markets like the equity market. Changes of the equity market yet affect returns and performance of investors and fund managers directly who probably applied index-investing

strategy. Hence, it is essential for those investors, fund managers, economist, and policy maker etc., to know what new information has been affecting the financial markets, in order to make reasonable decisions.

In modern times under trend of globalization, it could hardly find any markets standing alone without being affected by global economy (Albuquerque & Vega, 2008), except those in underdeveloped and closed countries. It makes sense that no any single market or country could be affected by all other open markets or countries, and it is also academically impractical for scientific tests of significance. In many previous researches, US market and economy was frequently used as proxy of external force upon domestic market (Nguyen, 2011). It is nearly a common opinion sharing about leadership of US markets in global economy, not just because it has the largest GDP in the world, but also it has influence on other markets from its market movements (Nikkinen, Omran, Sahlström, & Äijö, 2006).

Available previous studies provided reference and possible unexpected macroeconomic factors that would move the market in a certain degree. Statistically significant relationship between those new public information and financial markets has been found among different regional markets, financial markets, and also specific industries. Balduzzi, Elton, and Green (2001) examined impact of surprise variable from macroeconomic announcements upon US treasury market. The examination results suggested significance of those impacts; consequently confirmed new public information did incorporate into securities price. Brazys, and Martens (2014) found out 8% of bond return on the days with news release in US bond market contributed by the US macroeconomic announcements surprise. Within different news variables Brazys, and Martens (2014) tested, employment reports and the FOMC target rate proved to be

most influential news. Albuquerque and Vega (2008) tested and approved the significant relationship between US macroeconomic news surprise and US and Portugal stock market. Nikkinen, Omran, Sahlström, and Äijö (2006) assumed global equity markets were integrated under leading of US economy. To approve this assumption, movement of 7 regions with a total of 35 countries stock markets regarding to unexpected US macroeconomic news announcements had been tested. Finally, several announcements are found to be statistically important to stock markets such as NAPM reports, Employment Situation and Cost Index, and Consumer Price Index. With these influential announcements, 4 regions out of 7 regions tested shown as affected by US economy condition as long as integrated; these regions are G7 countries, European countries other than G7, developed Asian countries, and emerging Asian countries. Ewing (2002) focused on how listed financial companies in the stock market separately correlated with unexpected macroeconomic news announcements, which was called macroeconomic shock in the research paper. NASDAQ Financial 100 Index was chosen as proxy of the financial companies in US. Significance of unexpected news about real output, risk, monetary policy, and inflation had been tested and confirmed. Füss, Mager, and Zhao (2014) also ran this kind of research on real estate industries in US by studying return of REIT (real estate investment trust). In this case, Housing Price Indexes and monetary policy showed significant effect on real estate industries, while GDP and personal income validated in subsectors like industrial and office. With similar concept, Buttner, Hayo, and Neuenkirch (2012) and Nguyen (2011) studied US unanticipated news announcements on local stock markets of CEEC-3 (Czech Republic, Hungary, and Poland) and Vietnam correspondingly. Besides, Fang, Lin, and Parbhoo (2008) and Gupta and Reid (2013) investigated the effect of local unexpected macroeconomic news on

local stock market in Australia and South Africa respectively. All these explanatory variables would be explained in details in chapter 2.

Purpose of this paper is to study impacts of unanticipated macroeconomic news announcements on equity market movements, and also to test which macroeconomic news shock could possibly affect the general stock market of Hong Kong. After that, there will be a better insight about external factors that influence Hong Kong stock market which is in an open economy as long as it remains a financial window of Chinese financial sectors. This helps market participants like investors both local and international, and policy maker, when they try to have better understanding of how this marketing is going on, and before they make efficient and rational investing and policy decision. On the other hand, it also reveals how Hong Kong equity market is open currently, and in what extent it attached to global economy movements. All eleven explanatory variables chosen and tested in this research were referred from previous studies and also their availability on database. Accordingly, these macroeconomic announcements variables are (1) Consumer Price Index, (2) Producer Price Index, (3) Housing Statistics, (4) Industrial Production, (5) Institute of Supply Management PMI, (6) Nonfarm Payroll, (7) Retail Sales, (8) Unemployment Rate, (9) GDP, (10) Import Price Index, (11) Balance of Trade. These announced indicators would be compared against their numbers with forecast value in order to get the surprise variables.

1.1.1 Introduction to the Hong Kong Economy

Information about Hong Kong economy is briefly introduced below.

Hong Kong was just a fishing village island in area of current Guangdong (Canton) province of China, ceded to the Great Britain (GB) in year 1841 and returned to China as special administrative region in year 1997 under "one country, two system" policy, which gave 50 years of high degree of autonomy in all matters except foreign and defense administration. During the colonial period, the British brought modernization like infrastructure there that didn't exist in China at the same time around 1860. (http://www.nationsencyclopedia.com/economies/Asia-and-the-Pacific/Hong-Kong-COUNTRY-HISTORY-AND-ECONOMIC-DEVELOPMENT.html , retrieved at 23/2/2015). However every economic boom in Hong Kong always came with immigration trend from mainland of China. During 1950s, a lot of capital not just financial but also labor force and skill brought to Hong Kong by Chinese refugee, due to war and political instability in mainland China. These inflows of capital helped economy growth, and most were in manufacturing industry. Before that, Hong Kong was just a trading place (entrepôt). (http://eh.net/encyclopedia/economic-history-of-hong-kong/ , retrieved at 23/2/2014). Although Hong Kong economy was growing well, most important booming came after 1979 since China adopted the open door economy policy (Sung, & Wong, 2000). This open door policy in China dramatically increased trading and investing opportunity for Hong Kong. Most of Hong Kong FDI outflow went to China, and it did affect the growth positively. Besides that, Hong Kong also became financial harbor for multinational companies whose objective was entering Chinese mainland market. Another milestone for Hong Kong economy was the sovereignty returned to China from the GB. This made Hong Kong Economy part of China economy, which changed Hong Kong economy structure and stimulated growth (Sung, & Wong, 2000). Also, because labor cost increased, most manufacturers moved north to mainland China along with capitals, since then, service industry has became major components in Hong Kong, as the financial center.

Nowadays, there is no doubt about the importance and position of Hong Kong economy to the world, based on its achievement. According to the latest data on end of year 2013 from the World Bank, Hong Kong was 39th largest GDP in the world with 274 billion us Dollars (constant current international USD), and also even higher ranking of income per capita at 21st in the world with 38,420 US dollar. (http://databank.worldbank.org/data/views/reports/tableview.aspx , retrieved at 28/2/2015). Yet, Hong Kong was recognized most free market as it ranked top in the Index of Economic Freedom. (http://www.heritage.org/index/country/hongkong , retrieved at 28/2/2015). This Index was created by Heritage Foundation in order to measure how much and less the government stays away from manipulating economy growth. To be one of the most open markets, its tariff has been average 0 percent, and still overall tax burden was around 13.7 percent of domestic income, that combined from standard income tax rate of 15 percent, and top corporate tax rate 16.5 percent. Plus with the transparent and efficient government, Hong Kong attracted a lot of FDI, which approved with 4th largest FDI inflow according to UNCTAD World Investment Report (http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=937 , retrieved at 28/2/2015). With nearly no public debt, abundant foreign reserves, and well regulated system, it enjoys financial stabilities. Due to all these factors and skilled labor, Hong Kong financial market is highly developed as one of financial centers in global market. As a financial hub between China and other countries, it even boosts its significance and capacity. In addition to its openness facilitating its economic advance, it also exposed Hong Kong to global market's volatility.

1.1.2 Hong Kong Stock Exchange

Stock trading took place in Hong Kong long time ago about the middle of 19th century. In year 1891, the first formal stock market of Hong Kong was established in the name of the Association of Stockbrokers, which became known as Hong Kong Stock Exchange in 1914. Another exchange called the Hong Kong Stockbrokers' Association was set up in year 1921, merged with the Hong Kong Stock Exchange in year 1947 after the close of the Second World War. Along with economy growth, three more exchanges were established: the Far East Exchange in 1969, the Kam Ngan Stock Exchange in 1971 and the Kowloon Stock Exchange in 1972. Aiming for better regulation, these four exchanges combined into an incorporation known as the Stock Exchange of Hong Kong limited in year 1980. Starting from 2 April 1986, the Exchange employed the computer-assisted system for trading. The Hong Kong Securities Clearing Company Limited established in 1989 has been responsible for central clearing and settlement system. But this system started operation in year 1992.
(https://www.hkex.com.hk/eng/exchange/corpinfo/history/history.htm , retrieved at 28/2/2015)

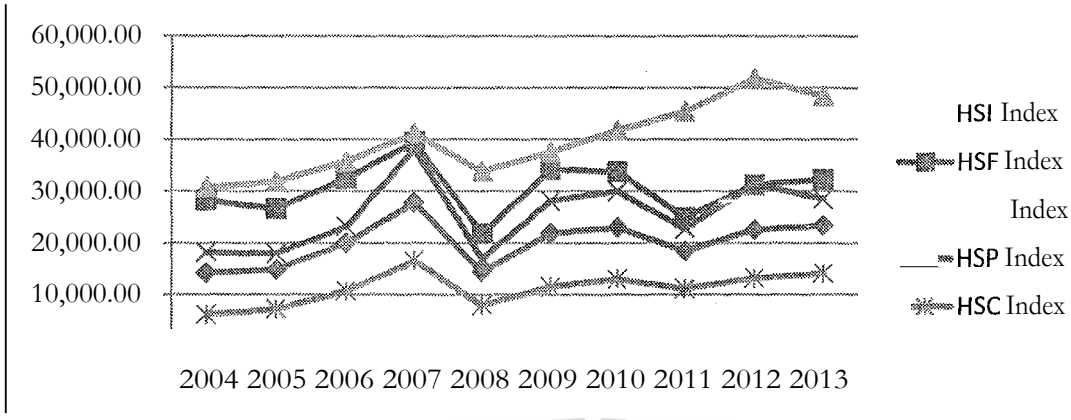
At end of year 2013, Hong Kong stock exchange was 6th largest stock with 1,643 listed companies, and total capitalization of 3,100.7 billion US Dollar. It was also in 2nd place of world stock exchange market for IPO raised. During 2013, 110 companies had been listed newly with total equity amounted 48.27 billion US Dollar. There are two listing boards on Hong Kong exchange, which are Main Board and the Growth Enterprise Market or GEM. Companies on main board should fully pass all requirement of listing, and most are mature companies. GEM lowered listing requirements in order to provide equity opportunity for those fast growing companies; those are potential to be listed on main board in future.

(http://www.hkex.com.hk/eng/stat/statrpt/factbook/factbook2013/fb2013.htm , retrieved at 28/2/2015). As the HKEx 2013-2015 mission statement stated "We aim to be global exchange of choice for our China clients and our international clients seeking China exposure." (https://www.hkex.com.hk/eng/exchange/corpinfo/mission/mission.htm , retrieved at 28/2/2015). China has long been major parts of Hong Kong Exchange market. Within all 1,643 listed companies, 797 companies were from mainland China, and their market capitalization occupied 57 percent in total. (http://www.hkex.com.hk/eng/stat/statrpt/factbook/factbook2013/fb2013.htm , retrieved at 28/2/2015) This just approved the financial hub role of Hong Kong for mainland China. Yet, it shows how close the linkage between Hong Kong and China economy was.

1.1.3 Hang Seng Index

Even though the Hang Seng Index has been available since year 1969, it is currently issued by Hang Seng Indexes Company limited, a subsidiary owned by Hang Seng Bank, which was established in year 1984. HSI is a free float-adjusted index, generally treated as the barometer of Hong Kong Stock market, as it counted the most liquid and largest listed companies' stock in HXEx main board. Thus, it functioned as the benchmark or gauge to show how the overall market is moved. Currently, it constituted 50 stocks, and in order to avoid the issue and single stock domination, it capped only 15% weight of each stock. Under the Hang Seng Industry Classification system, the HSI separated into four sub-indexes to exhibit each major sector performance in the stock market. These four sub-indexes are Finance, Utilities, Properties, and Commerce & Industry. In terms of Constituents number, financial sector counted almost half of them at 45.42%. (http://www.hsi.com.hk/HSI-Net/HSI-Net , retrieved at 28/2/2015).

Figure 1.1 Hang Seng Index and its sub-sector indexes, 2004-2013



Created by author using data from Bloomberg Terminal.

1.2 Statement of the Problems

Freedom and openness of Hong Kong economy and its financial market could be either advantage or disadvantage. On the positive side, it brought tremendous economy growth in the past; the free and open economy has also been recognized as Hong Kong's core competency in international market. However, Hong Kong was directly exposed to global economic volatility because of its dependence on international trades and capitals. This was apparent during the **subprime** financial crisis from US and Europe in year 2007. (http://economists-pick-research.hktdc.com/business-news/article/Economic-Forum/Hong-Kong-s-Economic-Prospects-amid-the-Subprime-Crisis/ef/en/1/1X000000/1X004WT.I.htm , retrieved at 28/2/2015)

According to nature of economy Hong Kong, information outside was supposed to be reflected in its equity market first. Multiple linear regressions is used for taking detailed looks into the equity market performance under news information influence from US economy, whose global leading role was approved in previous studies. The multiple linear regressions model

tested impact of each proposed news surprise factor while keeping other factors constant. This is helpful to understand effect of each individual factor, which was rarely coming alone. This research only tested how return on general stock index is affected by the news information but it is not giving any clue about effect on any specific stocks.

New information in this research is different from traditional definition, which is the actual announced value of each macroeconomic indicator. Some researches believed the market should have adjusted the price with that market expectation like those consensus forecast in advance. The only new information is when the announcement is officially announced, which should be different from previous expectation. That is the announcement surprise. (Gupta and Reid, 2013)

However, relationship between unexpected macroeconomic news announcements and financial markets have been studied and confirmed by many previous studies. Like the effects on treasury market (Balduzzi, Elton, & Green, 2001). US news on financial companies in NASDAQ (Ewing, 2002), US and Japan news on advanced Asia pacific stock market (Kim, 2003), US news on global stock market separated in 7 regions (Nikkinen *et al.*, 2006), on US real estate industries (Fuss, Mager, & Zhao, 2014), and also on different countries as Australia (Fang, Lin, & Parbhoo, 2008), Vietnam (Nguyen, 2011), South Africa (Gupta and Reid, 2013). These studies generally confirmed validity of this theory. But sampling area and markets studied were different, and news announcements tested were not always same. Test result unapproved all news announcements picked for test in previous researches. Thus, previous studies didn't necessarily assure the significance in Hong Kong financial markets.

Purpose of this research is about effect of eleven US scheduled macroeconomic news announcements surprise of the Hang Seng Index and its sub-sector index return on Hong Kong

stock market from 2004-2013. The index return is the monthly index change of relative month from previous month. This research paper is intending to look for answers to research questions as follow:

1. Is there a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

2. Is there a significant relationship between the US Producer Price index announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

3. Is there a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

4. Is there a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

5. Is there a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

6. Is there a significant relationship between the US Retail Sales announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

7. Is there a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Index during and its sub-sector index year 2004 and year 2013?

8. Is there a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

9. Is there a significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

10. Is there a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

11. Is there a significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013?

1.3 Research Objectives

What this research paper is trying to do is to find out the relationship between unexpected US macroeconomic news announcements and index return on Hang Seng Index and its sub-sector index in Hong Kong stock exchange market from 2004 to 2013. The major researching aim of this paper is to test if those macroeconomic news announcements surprise have a significant relationship with index return from objectives below.

1. To test whether the US Consumer Price Index announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

2. To test whether the US Producer Price Index announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

3. To test whether the US Housing Statistics announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

4. To test whether the US ISM PMI announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

5. To test whether the US Nonfarm Payroll announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

6. To test whether the US Retail Sales announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

7. To test whether the US Unemployment Rate announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

8. To test whether the US GDP announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

9. To test whether the US Import Price Index announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

10. To test whether the US Balance of Trade announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

11. To test whether the US Industrial Production announcement surprise has a significant relationship with index return of the Hang Seng Index and its sub-sector index during year 2004 and year 2013.

1.4 Scope of the Research

In this research paper, it focused on how the monthly index return of Hang Seng Index and its sub-sector index in Hong Kong Stock Exchange would be affected by eleven monthly US macroeconomic announcements surprise. Sub-sector index of Hang Seng Index include Finance, Utilities, Properties, and Commerce & Industry. The eleven US announcement indicators surprise are Consumer Price Index, Producer Price Index, Housing Statistics, Industrial Production, Institute of Supply Management PMI, Nonfarm Payroll, Retail Sales, Unemployment Rate, GDP, Import Price Index, Balance of Trade. Test sampling period would cover from beginning of year 2004 and end of year 2013. Even though there are many different indexes for Hong Kong Stock Exchange; it only studies the main Hang Seng Index because it

exhibited general movements of overall market. There are certainly more than eleven scheduled indicators about US macro-economy announced every month, but the research only sampled these eleven variables, because they were tested and approved in other markets. All the historical data about Hang Seng Index, US macroeconomic announcements and its forecast were retrieved from **Bloomberg** Terminal.

This is a worldwide research as it embraces the Hong Kong in the Far East, and the US in the North America. In these modern times, distance no longer poses as a problem because of high technology for instant information transfer. However, this paper tests whether those quickly transferred information could be reflected in Hong Kong securities market, and subsequently, how it could affect returns on the market in general.

1.5 Limitations of the Research

Generally there are two types of limitation for the research, which is limitation of data and limitation of the model applied. Description of each type is stated as below:

1.5.1 Limitations of the Data

This research paper only chose the Hang Seng Index and its sub-index in the Hong Kong Stock Exchange from year 2004 to 2013 based on the study object. There is far more than just 1 index about Hong Kong stock market like Hang Seng Composite size Index, Hang Seng China Enterprises Index, HSI Volatility Index etc., . However, the object of this research is only to

examine the return and performance of general market. So the other detailed indexes were excluded. Comparing to the simplicity of stock market index, scheduled US macroeconomic announcements are more complicated. It is more difficult when the consensus forecast is involved. Although Bloomberg Terminal is resourceful with almost all data, it lacks some forecast data of announcements, making the research to include all possible variables in ten years sampling period. However, since this paper intends to test monthly reaction of stock return under those announcements surprise, the possibility to get significant empirical test results seems less than those real daily data.

Due to those limitations on data, this research could not cover the whole Hong Kong stock market, or it might not be fit with other markets. Yet, those chosen independent variables of unexpected US macroeconomic announcements could not be full proxy of the overall US economic impact it imposed on Hong Kong stock market. Practically, it may be impossible to include all factors that could affect stock market in any single paper; therefore, many other factors were not included, which is limitation to this research as well.

1.5.2 Limitations from the Model

As this research paper used the multiple linear regression models for empirical test, it would be constrained by limitation of this model as well. For all those limitations from the Multiple Linear Regression Model, it should be in common for all studies that used this model. To test something with multiple linear regressions validly, relationship between dependent variable and each independent variable should be linear; otherwise, regression analysis doesn't work. Not just

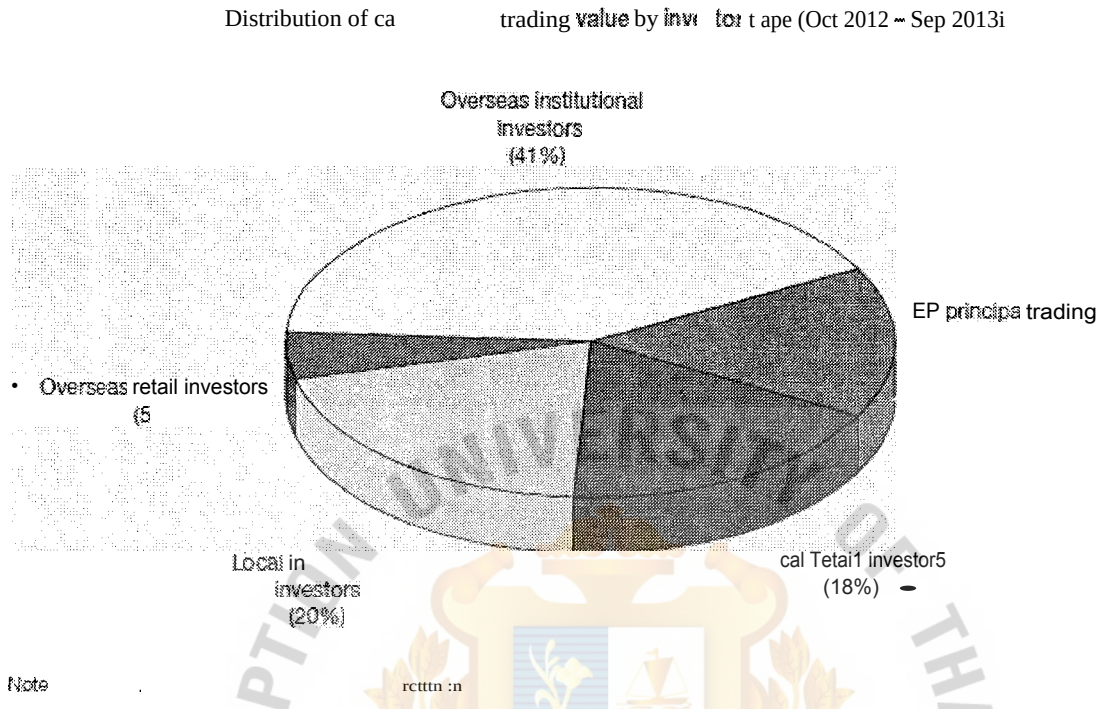
multiple linear regressions, but all regression models can be used only for studying the relationship of changes between independent variables and dependent variable, which cannot give conclusion that change of dependent variable come from independent variables completely. This is because it is not feasible to include all factors in one single research. Multicollinearity would be possible to happen in multiple linear regressions, in which two or more independent variables are correlated. Usual solution for this issue is to keep one of those variables and remove the others. But, the explanation of test results could be ambiguous.

1.6 Significance of the Study

This research makes an attempt to find out whether factors about US macroeconomic news surprises are affecting the return of Hang Seng Index in Hong Kong stock exchange. In this regard, the study will take a deep look at the connection and relevance between those two markets. The direct investors, financial director of listed company, policy maker in Hong Kong Stock market and academics could find useful of this research result.

In general, there are three major types of investors in Hong Kong Stock exchange as retail investors, institutional investors, and principal trading. In all retail and institutional investors, they can be divided as local and oversea investors. According to figure 1.2, total overseas investors counted 46% of trading value in cash market, and local investors counted only 38%.

Figure 1.2 Distribution of Hong Kong Stock cash market trading value by investor types



Sourced from Hong Kong Exchange Fact Book 2013

Retail investors are those individuals who are trading shares with personal account, but institutional investors are organizations trading in big volume. Both types of investors like individuals and fund managers, who have been using investing strategy called index-investing by following major indexes in different equity market, return performance of index would directly affect their investing return. This research will help them emphasize on the right information before making investing decision. Another function of index is benchmark for evaluating investment performance. Better understanding of determinant of the benchmark return, would give better idea about extent of least return to be called good investment.

Hong Kong is financial hub for Chinese market to the world, and also it is one of the most open economies directly exposed under external influence. Due to this specialty, this research

could be valuable for academics whose future literature studies are focused on impacts of other countries upon Chinese market, through Hong Kong. Because more than half of listed companies on Hong Kong Stock exchange are from China, their business and operation are located within the mainland market too.

1.7 Definition of the Terms

1.7.1 Announcements surprise is the difference between previously forecasted value of the scheduled macroeconomic announcement and its actual announcement. This difference is recognized as truly new information to market. (Gupta and Reid, 2013)

1.7.2 Balance of Trade is the record of difference dollar value between import and export within one country. It is announced and updated monthly. (Buttner, Hayo, & Neuenkirch, 2012)

1.7.3 Consumer Price Index is the changes in price of a selected group of goods and services paid by consumers living in city, released by Bureau of Labor Statistics every month. (Ewing, 2002)

1.7.4 Current account is the total dollar value of capital inflow to a country. Usually, it is total amount of Balance of Trade, plus net income from overseas, and also the net transfers. (Nguyen, 2011)

1.7.5 Equity market is more commonly known as stock market. This is a market place for exchanging equities which is one of the securities instrument. This instrument is the claim or right on the issuing companies' earning and assets. (Mishkin, 1998)

1.7.6 **Gross domestic product (GDP)** is the monetary value of a country's total output generated within its territory, the output include both goods and service. Even if there are different calculation approaches, the most general one is consumption plus government spending, plus investment, and plus net export. This is commonly used as indicator for a country's economic status. (Dawson, 2006)

1.7.7 **Housing statistics** is the forward indicator about future sentiment of the housing industries regarding current new home sales and home builders' opinion for next 6 months market prospect. This is a kind of survey prepared and issued monthly by US national association of home builders. (http://www.nahb.org/reference_list.aspx?sectionID=819 , retrieved at 28/2/2015)

1.7.8 **Hang Seng Index (HSI)** is the flagship index of Hong Kong Stock exchange calculated with method of Free Float-adjusted index. It is composite of 50 most liquid and capitalized stocks on main board and divided into 4 sub-sector index under HS Industry Classification, as finance (HSF), Utilities (HSU), Properties (HSP), and Commerce and Industry (HSC).

1.7.9 **Industrial Production** is the measurement of the total volume of output produced by the industries. In US industries, included in this index are manufacturing, mining, and utilities. This is generally recognized as performance of fundamental or real economy. (Albuquerque & Vega, 2008)

1.7.10 **ISM PMI** stands for Institute of Supply Management Purchasing Manager Index. PMI is the trade mark for this index; does not limit coverage only about purchasing price, instead, this covers the whole supply chain. This is the monthly report conducted by institute of supply

management by sending questionnaires to those high rank executives in manufacturing industries. Questions would be asked about their opinion of general economy look out, whether it is going to be expanding or declining. (Balduzzi et al., 2001)

1.7.11 **Import Price Index** is the monthly basis FOB price changes of imported goods by US consumers. If CPI only contained price change information domestically, plus with Import Price Index, analysts could be able to have overall price information in the US market. (Nikkinen et. al., 2006)

1.7.12 **Multiple Linear Regressions** is a statistical tool used for studying linear regression relationship between one dependent variable and multiple independent variables. (Watsham, 1997)

1.7.13 **Nonfarm Payroll** is about the total number of paid workers in reported period. This number is generally about whole market, thus, it excluded some special employments like, General Government worker; Private household; Volunteer in non-profit organization; and farming. The first 3 employments might be excluded because of its economic inactivity, and exclusion of farming is due to its seasonal fluctuation. (Nguyen, 2011)

1.7.14 **Producer Price Index** is the monthly price change of producers and wholesalers paid for their production and service. Although it includes almost all physical goods manufacturing, it still does include some service segments. Simply put, it is the measurement about cost of supply. (Gupta, & Reid, 2013)

1.7.15 **Retail Sales** is the estimation of monthly total sales in retail industries. This is the sales number from the end consumers. This is estimated from the sampled retail firms' sales, as it is

impossible to record and check every single retail shops. This index is important for countries like US whose major contribution of GDP comes from consumption. (Buttner et al., 2012)

1.7.16 **Unemployment Rate** is the number of people who is currently with no job but available and looking for a job, out of the total labor force within a country. (Fang et al., 2008)

1.8 Abbreviations

1.8.1 **CEEC-3**- Central and Eastern European Countries, (Czech, Poland, Hungary)

1.8.2 **EMH**- Efficient Market Hypothesis

1.8.3 **FDI**- Foreign Direct Investment

1.8.4 **FOMC**- Federal Open Market Committee

1.8.5 **GB-** the Great Britain

1.8.6 **GDP-** Gross Domestic Product

1.8.7 GEM-Growth Enterprise Market

1.8.8 **HSF –** Hang Seng Finance Sub-index

1.8.9 **HSI -** Hang Seng Index.

1.8.10 **HKEx –** Hong Kong Exchange

1.8.11 **HSC –** Hang Seng Commerce & Industry Sub-index

1.8.12 **HSP –** Hang Seng Properties Sub-index

1.8.13 HSU – Hang Seng Utilities Sub-index

1.8.14 **IPO**- Initial Public offering

1.8.15 **NAPM**- National Association of Purchasing Manager

1.8.16 REIT- Real Estate Investment Trust

1.8.17 UNCTAD- United Nation Conference on Trade and Development

1.8.18 UK- the United Kingdom

1.8.19 US- the United States of America

Chapter 2

Review of Related Literature and Studies

In this chapter, some previous researches and studies related to and about this topic would be demonstrated, which is how fundamental economic information affects stock market performance. Most dependent variables and independent variables used for testing validity of the hypothesis in those preceding papers are explained in details in following parts. Dependent variables are movement in Hong Kong Stock Market, and independent variables are macroeconomic information about US economy. More specifically, those macroeconomic tested here are surprise information from those expected, when the real data are announced. Subsequent section summarized literature review research papers, which support similar concept examined in this paper.

2.1 Discussions of Dependent Variable

2.1.1 Return on Equity market

Generally, stock market or equity market is the market place where companies exchange their ownership in forms of shares with capitals from investors.

Return from stock market can be dividend payout, and capital gain, which means selling stock shares at higher price than when they were bought. Hence, shares price change in stock market is determined by investors. Kim (2003) stated in the paper, that influential factors of stock market

information, which can be further divided as public and private information. Fama (1991) pointed price adjustment in securities markets should happen immediately as new information arrival, in order to get rid of arbitrage chances. Ewing (2002) further support this idea as found out, that macroeconomic news variables did affect equity market. He also tried to find out how much and which macroeconomic news were transmitted into movement of financial sectors in NASDAQ. And confirmed all financial market participants could be influenced with those stocks market movements. Gupta and Reid (2013) pointed out another function of stock market as a place where monetary policy maker can check out result of their new policies, even stock market is not the only financial market would response to those policies, but it is in one of them. In this same paper, authors measured performance of equity market with the criterion as stock indices. Meanwhile stock index is also important in index investing and other financial products like other derivatives. Fu and Ng (2001) concluded the general stock price in Hong Kong was totally adjusted with market news, and Hang Seng Index was used as representative of the stock market. Nguyen (2011) approved hypothesis that macroeconomic news information in some countries could affect other countries' stock market as spillover effect. Nikkinen *et al.,* (2006) illustrated this same idea as international equity market is globalized. Further explanation is shares in local stock market can be owned by both local and foreign investors; even though scale might be different across countries. We have used same method for calculating stock return from Büttner *et al.,* (2012), which is simply logarithms with the each stock index we study, and then get difference between 2 continuous periods.

2.1.2 Hang Seng Index

Hang Seng Index is the flagship index for investors to figure out how the Hong Kong Stock market is going. Despite there are many detailed Indexes focus on specific areas, the Hang Seng Index (HSI) is still the one most quoted for overall performance of Hong Kong market. Kim (2003) studied its relationship with US and Japan macroeconomic announcement surprise and the significant results from his research had been approved again by Nikkinen *et al.,* (2006) with FIST. Under the major HSI, there four sub-sectors indexes classified by the industries. They are Finance (HSF), Properties (HSP), Utilities (HSU), and Commerce & industries (HSC). All 50 stocks in HSI are categorized into these four sub-sectors depends on which industries those listed companies are in. HSF includes companies like, banks, insurance or any financial services companies. HSP is mostly made of real estate and construction companies. HSU represents companies like water, electricity and gasoline providers to end users. HSC contains all companies that excluded from the other three sectors.

2.2 Definition and Theories related to Independent Variable(s)

Reports about different perspectives on each economy from authoritative organizations are most direct way to know how that economy is performing. Those reports would be announced in scheduled timing as index or indicators toward market participants, including policy makers.

News surprise was defined in many past researches as the difference between actual data announcement and the expected number thought by market participants. Or generally speaking, this is how economy performed differently from what the people thought. Gupta and Reid (2013)

explained it in detail as those forecast about each indicators were conducted by professionals or senior executives in specific industries.

Consensus Forecast from Bloomberg is used in this test. Flannery and Protopapadakis (2002) confirmed Consensus Forecast is better than econometrical model for generating expected number because it revealed newest information to those market participants. In some way Bartolini, Goldberg, and Sacarny (2008) pointed if new information would be incorporated into price adjustment, the only real news is the gap between expectation and announcements, because those economy condition should be reflected in current price with those expectation already.

US macroeconomic indicators discussed in following part are almost all monthly announcements about the US available in Bloomberg terminal. However, not all of them would are included into theoretical framework, and would be screened out again based on previous researches and related literature.

2.2.1 Unemployment Rate announcement Surprise

Unemployment is called Jobless in some senses, as it shows the person available for a job but has no job now, is actively looking for a job during a period. While the Unemployment Rate gives the percentage number of those unemployed person in the total labor force, which the total labor force includes people who have or do not jobs. Boyd, Hu, and Jagannathan, (2005) support the opinion that, it is good news for stock market when unemployment turned to be higher than expected during bad economic situation. This is because positive surprise, which happens when actual announced value is higher than expectation, in unemployment usually, leads to future interest rate deduction in order to boost economy, which is good for stock market. Fang *et al.*,

(2008) stated Unemployment Rate as an important economic indicator for current economy health checking and future economy performance guiding. As long as this indicator is one of the oldest and well documented indicators, investors are paying intense attention on it, based on these reasons. Still their research found significant statistic impact of Unemployment Rate surprise news on Australian financial market, and explained it is because this news change expected cash flow, discount rate, and risk premium, which all these factors used for calculation stock returns.

2.2.2 Change in Non-Farm Payrolls announcement surprise

Non Farm Payrolls is the total numbers of currently paid workers or employees in general, but exclude four areas of employment: 1. General Government worker (those work as administration for the federal, state, or local government); 2. Private household; 3. Volunteers in non-profit organization; 4. Farming employee. Exclusion of farming job is due to its nature of seasonality, number of workers will fluctuate with season of planting and harvesting. Report released from U.S. Bureau of Labor Statistics about this indicator would be the changing number comparing to previous month. In other words, it tells how many new jobs had been created for the research period. The surprise is when announced change of Nonfarm Payroll is higher or lower than expectation of market. There might be more or less jobs created in the economy than market expected, and that is called positive or negative surprise respectively. Nguyen (2011) categorized non-farm payrolls in real economic variables group and tested its surprise affect on Vietnamese stock return, which approved positive relationship between non-

farm payrolls and conditional return in Vietnamese stock market. The movement of this indicator would have effect on future interest rate decision from policy maker.

2.2.3 Change in Manufacture Payroll announcement surprise

Manufacturing Payroll is one of segmentation in total Non-Farm Payroll. It focuses on new jobs created in industries of producing, like the parts, automotive, machinery, and mining. Reason to state it alone, is because this index will be the most obvious or outstanding during economic recession, and then it is very useful when deciding whether economy is currently in recession. As manufacturing industry exists before Service industry, it also enjoys better function of future statistical prediction for economy because of it has more data available from historical data. Surprise of this indicator showed economy was actually fallen to recession or expanding faster than investors' thought. This indicator specifically illustrates employment situation in manufacturing industries. Better this kind of employment, stronger growth of this industry is. When the employment and manufacturing were good, the general economy should be good as well, and there were more potential demands in consumption. Therefore, stock market would react positively with positive surprise of this announcement (Chen *et al.,* 1986).

2.2.4 Factory Orders announcement surprise

Another name of Factory Orders is the Manufacturers' new orders. This is combination of Durable and Non-Durable goods orders report at approximated ratio of 55/45, authored by U.S.

Census Bureau in first week of every month. It counts new orders received by goods manufacturer or producer in unit of dollar or percentage change within the reference period. Generally, this indicator gives some hints on trend of demand and expansion/contract of markets. Estimated number of this index is used for calculation Gross Domestic Production. Durable Goods order would be announced one or two weeks before complete factory order report, which then make Factory Orders only provide information of Non-durable goods and revision of Durable Goods in prior weeks, in some sense. This early release of Durable Goods makes Factory Orders kind of predictable, as Non-Durable Goods is minor group in total. Balduzzi *et al.,* (2001) tested factory order announcement surprise on bond price in the USA, empirical results shows it did have affect on the 10 years long bond. This announcement surprise carries information about future demand in the economy. This indicates a bright economic outlook, which would lead higher return in equity market (Chen *et al.*, 1986).

2.2.5 Capacity Utilization announcement surprise

In a broad view, Capacity Utilization is percentage number that shows how much the sustainable maximum capacity of the country had been transferred to be goods and services within a period and area. This is published by Federal Reserve at middle of every month and including three main industries as manufacturing, mining, and utilities. This number is result of seasonally adjusted output index divided by total capacity. Output index come from another Federal Reserve monthly announcement that is Industrial Production, which would be explained in detail as another independent variable in this report. Regarding Capacity, which means the estimated continual and realistic maximum output, a plant or a country can reach. Taking into

details of this index, it illustrates picture of structure development of industries of economy. Positive surprise of this announcement indicates more portion of capacity of this country was utilized, and higher cash flow should come after. And negative surprise shows there are more capacity was idle and economy ran slow. In this case, there would be less cash available for investing in equity market. Albuquerque and Vega (2008) included capacity utilization into real activity indicators in order to test how that USA macroeconomic news affect both USA and Portugal stock market, and confirmed capacity utilization news had valid statistic effect on both USA and Portugal stock market, nonetheless, those effects would disappear very quickly after announcement.

2.2.6 Industrial Production announcement surprise

This index counts total volume of output produced by firms in different industries. In the United States, Federal Reserve includes manufacturing, mining, and utilities. Industrial Production is released at the same time as capacity utilization, as it is the factor for calculation of capacity utilization. Another information can be seen from this index is how well does each industry grow. Especially when looked at changes of different months, it exhibit growth rate of industries. Positive surprise of this announcement demonstrates total production output was growing faster than expected, so real economy is on the right way to generate more cash flow which could be invested in equity market later. In contrast, negative surprise shows even worse economy than expected, investors could withdraw from the stock market. Albuquerque and Vega (2008) recognized Industrial Production as one of indicators monitor real economic activity. And the research confirmed relationship between Industrial Production and stock market by testing sample in USA and Portuguese. Further explained reason for this effect came from positive cash

flow triggered by the positive good news surprise. This is because when real economy condition was better than expected, cash flow condition of firms would be positive or better accordingly, which could be from company sales or other financing source like loan.

2.2.7 Durable Goods Orders announcement surprise

It provides information about how many new orders placed to producer for the durable goods, also called hard goods, in related calendar period. Durable goods are defined as goods that will not be purchased frequently, and can be used for long time or have life time of three years or more. Mostly, they are more expensive than Non Durable Goods. These orders represent those that will be immediately delivered or in future but not too long. Consequently, this index measured how many works factories have in a period, therefore, disclose some tips about future activity, as factory may need more or less workforce, and how much production capacity left. Durable Goods order is part of Factory orders released by The Census Bureau of the Department of Commerce. When factories received more or less orders than previous expectation, it is the positive or negative surprise information respectively. Albuquerque and Vega (2008) tested surprise effect of durable goods order as one of consumption indicators to USA Portugal stock market and concluded the effect of surprise after news announcement; it only lasts 1 hour for stock price adjusting. As part of GDP, higher consumption always goes with better general economy, which is approved as good news that influence stock market positively (Chen *et al.*, 1986).

2.2.8 Consumer Price Index (CPI) announcement surprise

In this study, the CPI chosen is the CPI for Urban Consumers. It is the changes in price of a selected group of goods and services paid by consumers living in city, released by Bureau of Labor Statistics every month. The Selected group of goods is also called market basket of goods and service, which represents items that are purchased most often by household. This basket list has come from survey of families throughout whole country about what they were actually buying, and then weighted them base on importance of items to families purchasing habit, which resulted from survey. This is one of the most popular economic index, as the change of price is important to calculate and showing inflation status. It's also valuable for business, government, and central banks taking this number into consideration before making any decisions. Consumer Price Index's another widely recognized function is the reveal of cost of living. It tells how much you would need to get those goods and services commonly consumed in lives of household. Ewing (2002) tested Consumer Price Index news surprise as unanticipated inflation rate and found evidence showed, that, this surprise made uncertainty about future stock price, as long as restricting lending and borrowing and also change expected future production. More specifically, it found financial sector in NASDAQ responded negatively to Consumer Price Index surprise of inflation shock called in this report, nevertheless, this effect can last month long.

2.2.9 Producer Price Index (PPI) announcement surprise

The Producer Price Index gives changes of prices suppliers selling to producer or wholesaler comparing to prior month in percentage. This index covers most of physical goods-producing

industry and also some services segment. Different from Consumer Price Index, that counts buying price paid by consumers, but Producer Price Index measures how much sellers sold to producers. It's believed Producer Price Index can be used for predicting Consumer Price Index, which is released later, and then foresee some sign of future inflation, This is because price of goods from factory to wholesaler or consumer will definitely be affected by price of input of producers. When announced PPI is higher than expectation, positive surprise usually leads to higher expectation of CPI, which would be announced just few days later. This is also the reason many investors focus on CPI but ignore PPI. Gupta and Reid (2013) tested surprise effect of Producer Price Index news on industry specific South African stock market index return, which the results are weak to approve significance of Producer Price Index. In their two methods of test, one is event study and the other is Bayesian Vector Auto-regression (VAR), event study showed no statistical significance of Producer Price Index on stock market returns. Bayesian VAR did come out with valid relationship between PPI and stock return; however, it is still in small magnitude, as long as the effects disappear very fast and short after news announcement and surprise detected.

2.2.10 Institute of Supply Management Purchasing Managers Index (ISM PMI) announcement surprise

Institute of Supply Management Purchasing Managers Index was formerly known as National Association of Purchasing Manager (NAPM). Institute of supply management will send out questions to members purchasing and executives in supplying throughout whole country in order to form a report to conclude current business activities within manufacturing industries.

Purchasing Manager Index is used as PMI trade mark only because context from this index is not just about purchasing function but overall supply management. PMI is the mixed index with five equally weighted sub indexes of new orders, employment, supplier delivery and inventory. Fifty percent is critical point in this report about manufacturing business condition. Expansion will be concluded as above 50 percent, and decline as below it. In long term speaking, critical point is 43.2 percent. If the index holds above this point for awhile, means general economy is increasing, and decreasing if it's under this number. Difference between fifty and forty three point two also has meaning of strength of growing or declining. Positive surprise is certainly good news for the market, because it confirmed general economy was going well. Negative surprise is opposite, that warns investors to be more careful about investment as economy was not doing as well as expected. Nikkinen *et al.,* (2006) found significant and positive relationship between the ISM PMI surprise information and stock markets in Transition countries.

2.2.11 Institute of Supply Management Manufacturing on Business Price announcement surprise

This is the sub index from Institute of supply management manufacturing report. Apart from Institute of Supply Management manufacturing PMI index, the Price index specifically monitors month to month changes of price the producer was paying for supplies. These supplies exclude purchasing of crude oil but include source from import. Due to this character, this index can be used for predicting Producer Price Index, and then revealing how the industry is thinking about future inflation. The positive surprise of this announcement exists when actual inflation is higher than expectation, and negative surprise is when actual inflation is lower than expectation. This

announcement surprise was proved to be influential on G7 countries, Europe, Asia emerging countries, and Latin America by Nikkinen *et al.,* (2006).

2.2.12 Chicago Business Barometer (Chicago PMI) announcement surprise

The Chicago Business Barometer Index is the capture of how the US economy is going on currently from reports by surveying with poll of local supply chain professionals and managers. Numerically, it is changes of status of different business activities compared to prior month. These different activities represented by different indicators like, Production, New Orders, Order backlogs, Inventory, Employment, Supplier delivery, and price paid. Beside these indicators similar to Institute of Supply Management PMI, it has other indicators regarding to buying policy for supplier performance and lead time. This report is done by MNI indicator in partner with Institute of Supply Management, Chicago. This index is mainly affecting financial market than overall macro-economy; this is because it is released one day before Institute of Supply Management PMI. Investors can take action by prediction future Supply Management PMI based on announced Chicago Business Barometer Index. When actual announcement is different from previous expectation, there is surprise information to market and investors. Brazys, and Martens (2014) approved the Chicago Purchasing Manager Index news surprises' valid statistic relationship with the US Bond market. Because this announcement is followed by ISM PMI very soon, there is no evidence shown its relationship with equity market return.

2.2.13 Import Price Index announcement surprise

Generally, Import Price Index measured the price changes of the goods and services bought by people who live in the United States, but produced by other countries, based on FOB price from departure port. This is one of indices in International Price Program of Bureau of Labor Statistics objected for price information about international trade of the United States, on monthly basis. Together with Consumer Price Index and Producer Price Index, Import Price Index gives an overall picture of price changes in the whole United State economy. This is important index as its multiple functions like inflation measurement, effect to exchange rate, future price forecasting, guide line for fiscal and monetary policy. Announcement surprise is when actually announced value differed from previous expectation of market. Nikkinen *et al.,* (2006) found US Import Price Index surprise news could only affect stock market in Asia emerging region with 10% significance level, while other markets in this research like US, Europe, Latin America, and even Asia developed area show no statistic validation toward difference between expectation and announcement for this news.

2.2.14 Total Vehicle Sales announcement surprise

This index is the total value in million dollars of light motor vehicles sold in the United States in reported month, and provided by Wards' Automotive Reports. This index is one component of Personal Consumption Expenditure price Index, which is about consumer spending on goods and services in country. Vehicle sales are under Durable Goods Index. However, this index is reported and studied separately due to its importance on economy. This is because motor vehicle

purchasing takes big portion of consumer spending in the US. It shows trend of spending of consumer. The announcement surprise is when there are more or less sales of motor vehicle than previous expectation. It is good sign for economy when consumer showing positive spending attitude. Thereupon, inflation is possible to come afterward. Maybe it is because its information already contained in Durable Goods order, there is no significant previous researches found to support its relationship with stock market return.

2.2.15 Retail Sales Index announcement surprise

The full name of this indicator is Retail and Food Service Sales, one of the Monthly Retail Trade Report conducted by U.S. Census Bureau, and released around 13th of each month. This report is estimate of total sales happened in retail industry in the country, from Monthly Retail Trade Survey to sampling retail firms. Retails mean the trade in small volume directly to consumer. Because this number shows directly how much consumer paid for goods and services, it measures spending and consumptions, it makes one of component in Gross Domestic Production calculation. So far consumption is significant in the United State's GDP, retails sales is vital to be monitored for the current economy state. The announcement surprise exists when there are more or less retail sales than previous market expectation. This announcement directly relates to consumption and general economy, thus it also affect cash flow available for investment in equity market. Evidence from research of Büttner *et al.*, (2012), that stock return in both Hungary and Czech market would be lowered if there is positive surprise in Germany retail sales news, or they are negatively correlated to this news, as statistical test result in this paper showed.

2.2.16 Balance of Trade announcement surprise

It is the dollar value difference between total import and export transaction of a country within a period. This is one of components to Balance of Payment, which is statement that includes all economic transaction of one country to other countries. When the country is importing more than exporting, it is called trade deficit and trade surplus when exporting is bigger. Because this is all about trading with different countries, it has direct effect on one country's currency exchange rate. Research conducted by Buttner *et al.,* (2012) studied how were impact of US and German macroeconomic news surprise on stock market in Czech, Hungary, and Poland. Result from his paper supported opinion that stock market react to new information as gap from market expectation after actual data release (surprise), but also showed, the news can be from other influent economy, not just US. It this case, stock market in Czech and Hungary tended to decrease as capital flow out, because of positive surprise in German trade balance news.

2.2.17 Merchant Wholesale Inventories announcement surprise

This is one of sectors from Wholesale Trade Report of US Census Bureau and, usually published one and half month later. This is to show the inventories level held by merchant wholesalers in the United States, and the changes from month to month. In other words, this gives numbers and changes of finish goods stocks ready for immediate delivery, instead of producer, wholesalers are the one own and hold them. Information behind this indicator can be short term trend of economy, and demand, as well as input for Gross Domestic Production calculation. When the actual announcement differs from market expectation, the difference is

surprise information to investors. Brazys, and Martens (2014) fail to approve impact of news surprise from Merchant Wholesale inventory on US bond market return as statistic test result in his paper showed no significance between them.

2.2.18 Business Inventories announcement surprise

Full name of this indicator is the Manufacturing and Trade Inventories, but also called Business Inventory. This figure is the sum of all inventories or stocks kept by manufacturing, wholesaling and retailing firms during one month. Changes in this indicator can be meaningful when anticipating future production demand, and selling, confidence of retailers, wholesalers, and manufacturers. Balduzzi et al., (2001) presented the work about business inventory announcements surprise on US government bond market together with other US macroeconomic news. Some of that news approved to be valid in empirical report as macroeconomic news do have affect on bond pricing: however, business inventory was not significant in this sample test.

2.2.19 Housing Statistics announcement surprise

Housing statistics is also in name of Housing Market Index, is one of indices report of National Association of Home Builder. Every month the NAHB will send survey to its members who built around 80 percent of new homes in the United States, to ask them how is their thinking about current new home sales and the situation could happen in next coming six months (http://www.nahb.org/reference_list.aspx?sectionID=819 , retrieved at 14/1/2015). Generally, it

discloses sentiment of those market participants toward this home building industry. Positive surprise of this announcement is that actual outlook of single family house building sector within six months was higher than investors thought. This could boost confidence of investors about the construction sector and also general economy, because the construction could not perform well if macro economy was not good. This index is also closely correlated with other index new housing starts, which would be announced sooner or later than Housing Market Index. Nguyen (2011) proved its relationship with Vietnamese stock return significantly and negatively.

2.2.20 Housing Start announcement surprise

Full name of Housing start is new privately-owned housing started. This means number of new houses that owned privately and permitted for building, started its construction in reference month. More detailed definition about begin of construction from US Census is when ground breaking for footing of building starts. The new start also includes the buildings which are totally re-constructed with existing foundation. This number can be informative, starts of construction relates various industries like manufacturing, and banking etc. it is the same as the total Vehicle Sales, construction will only grow during positive economy times. Positive surprise of this announcement could be good news to the market, because it shows there are more spending and consumption from construction sector flow into real economy. Füss et al., (2014) confirmed pricing movement of equity REIT (real estate investment trusts) composite Index and S&P 500 did relate to news surprise of real estate related indicator like Housing start. However, negative surprise in housing start news, was presented as good news in real estate sector, because it leads

less supply of home for sales and then home price could increase. This is approved by the statistical test with significant results in both REIT and S&P 500 Index.

2.2.21 New Home Sales announcement surprise

New Home Sales is the monthly number of new home which is or was just built for sale, had been sold during the reported month. The sale is counted when the sale contract is signed or deposit is accepted, no matter what stage of construction of the home was, for example, before; during; or complete. This is sort of delayed indicator for the demand, because it reported the number happened in prior month. Still, it can be studied for checking current demand trend, which normally include 3 month data, and extracting some tips about current business condition. Füss et al., (2014) pointed out positive surprise, which is when actual sales data was higher than forecast, in new home sales was good news, while it had very strong influence on general stock market, not just real estate sector. He explained the reason as real estate was fundamental factor used for evaluating all relative properties.

2.2.22 Leading Index announcement surprise

The Conference Board Leading Economic Index sometimes abbreviated as LEI, is the report conducted to anticipate near future economic condition. It is about the position of upcoming economic period in the business cycle, whether it is going to be expansion, recession, peaks, or troughs. To serve purpose of advanced economic health checking, this index mixed from 10

indices that seem to be influential on near future economy like Housing permit, new orders, and average weekly hours. Positive surprise of this announcement indicates that overall outlook of business stakeholders for current and future economy is higher than previous expectation. This is good signal to market for them to invest more. However, Nguyen, (2011) failed to find any significant relationship between this announcement surprise and Vietnamese stock return.

2.2.23 Consumer Credit announcement surprise

Consumer Credit can be referred as Consumer debt, because it is the amount of money borrowed by consumer. Total Consumer credit is the report from the Federal Reserve representing total outstanding credit executed by consumers within reported month. The total credit can be broken down to two types as resolving and non-resolving. Resolving is like credit card with limit of credit it can use for personal expense, and pay back later with exactly how much used. The other type non-resolving, is the fixed total amount of money borrowed at beginning, as well as repayment schedule, and for example the automobile and education load. Release of this report is not influencing as some other indicators, because it announces around 5 weeks after the reference month. During this period, other earlier released index can reveal similar information already. Positive and negative surprise of this announcement shows the actual credit borrowed by consumers was higher or less than expectation. It could effectively affect economy as higher this number is, more consumption made by consumers. Albuquerque and Vega (2008) illustrated his research about Portuguese and US stock market movement triggered by announced economic news differentiation in these two countries in detail. Consumer credit is one of the real activity category indexes in this paper. This paper finally concluded

consumer credit news surprise had been influential to both US and Portuguese stock market together with other variables as real economic activities indicators.

2.2.24 Gross Domestic Product (GDP) announcement surprise

The GDP is most common indicator for showing a country's economic condition and size. It is mostly presented in percentage number as growth rate from previous year. Therefore, it can be understood as the growing pace of one economy. In general the GDP is the total monetary or dollar value of goods and services produced within US or one country. Although, announcement of GDP is quarterly data, but there is official estimate and revision announced every month. Surprise of this announcement exists when market expectation is either higher or lower than the announcement value from government statistics. Positive surprise states when actual GDP number announced is higher than market expectation, it means economy grew better than investors thought. Thus, asset price should be changed with arrival of this new surprising information. Kim (2003) found this kind of relationship between US GDP surprise information and return in equity market of Singapore, while other tested market like Australia, Japan, and Hong Kong were not affected so.

2.2.25 Other Markets likely to be affected by Macroeconomic announcements surprise

Because equity market is part of financial market in the whole economy, it cannot be isolated in practice even if it is studied separately for convenience of theoretical approval, based on

different assumptions. Therefore, those fundamental information or news surprise would not influence equity market only but also on other financial market when news information realized with the announcement. Balduzzi et al., (2001) confirmed those effects on Bond price movements in US treasury market from several US macroeconomic announcements. Results of Brazys, and Martens (2014) test just supported same relationship between bond market and macro economy status. Exchange rate market as another member of financial market got same impact from macro economy as equity and bond market. Research in currency market conducted by Buttner et al., (2012) approved this correlation between economic announcements surprise and exchange rate of currency in Poland, Hungary and Czech in sample period against US Dollar. It is approved in many previous studies; factor affect equity market is mainly interest rate, which could be recognized as discount rate. Thus, anything that affect interest rate should at least indirectly affect equity market. Monetary policy like Federal fund rate, interbank rate, and money supply showed significant effect on financial market as illustrated in study of Füss et al., (2014). Even if this study focus on how US economy information affecting equity market in other countries, fairly amount of research showed news in some other important economy did same function as US economy even different at extent. For example, German news on Poland, Hungary, and Czech in research of Buttner et al., (2012), Japanese news on Asia Pacific market from Kim (2003). Fang et al., (2008) even tested Australian news influence on domestic market. Apart from that news about macro economy in US or developed economy, these countries' equity market itself did show correlation with some other markets as well. Albuquerque and Vega (2008) confirmed this concept as empirical result between US stock market and Portuguese stock market.

2.3 Previous Studies

In Efficient Market Hypothesis (EMH), market should be able to adjust the price according to any news coming in. Hence, news should be new information the market does not know yet. Because economic condition is somewhat illustrated by different kinds of indices, and still expectations of those indices are all available before official announcement, nowadays, true new information would not be just the news itself anymore, but also difference of actual data number with prior expected number. This topic is not new to finance research field but still not much relevant research had been done compared to impact of the indices announcement itself to the stock market. Here are those papers discussed this subject before.

Balduzzi et al., (2001) studied US Government Bond markets performance as Pricing movement, bond spread, and transaction amount with intraday data. While trying to check out factors affect bond market movement, which are supposed from macroeconomic index announcements. Difference in news release and prior market forecast is called as Surprise, and used as the independent variable in this paper and its statistical test. This test used the Ordinary Least Square regression to find the relationship or sensitivity between Bond Market performance and Macroeconomic News Surprise. In results of this paper, it showed several bond as 3-month Bill, 2 years note, 10 years notes, and 30 years bond were really under influence of 17 macroeconomic news surprise announcements. Speed of the adjustment had been tested as well, which revealed price adjustment would be started within 1 minute as news arrive, and the whole adjusting process will be finished within 15 minutes as price would be back to normal level.

Ewing (2002) had a deep look at financial sector in stock market, and tested relationship between the stock market sector returns and macro economy. Author tested NASDAQ Financial

100 Index's reactions to macroeconomic news, by using a new method generalized impulse response analysis. Results under this method showed details about the relationship like how long and how much was the reaction of financial sector in stock market to macroeconomic news surprise arrival. Another contribution of this paper is adding reference for future studies about determinant of financial sector in stock market.

Kim (2003) worked to approve leading role in global market of those major economy like US and Japan. To achieve author's object, how the macroeconomic news information in US and Japan affected advanced Asia Pacific stock markets was tested. Empirical test model applied in this research was MA EGARACH (1, 1), aimed to find out relationship between mean stock index return and conditional volatility of those advanced Asia Pacific stock markets and macroeconomic information from US and Japan. In test results, significance of news surprise information effect from both big economies on other advanced Asia Pacific stock market was approved. Furthermore, this paper even separated how bad and good news affected market differently.

Nikkinen et al., (2006) examined how the global equity markets were attached together, regarding their reaction toward macroeconomic news announcements about US economy. Because of international trade activities, market size, foreign investment, and structure of each market are different; importance of that US news could be different to each market, or by regions. This paper used GARCH to test volatilities of 35 local equity markets in grouping of 6 regions, around 10 regularly announced US macroeconomic news. Conclusion of this research revealed the developed area like G7, developed European countries, and Asia did have correlation among

them regarding to US news. At the same time, Latin America and transition economy countries showed no sign of connection to this same news source.

Albuquerque and Vega (2008) scrutinized how impact of local and abroad fundamental or macroeconomic news surprise made stock market in US and Portugal move together. This study aimed to approve co-movement in these two markets was from fundamental economic news by including high frequency return data in both markets. However, empirical data fail to tell effect of relationship between two markets' news and co-movement. Instead, it showed significance of role about US news on Portuguese local stock market return, when excluding US stock market return in the regression.

Fang et al., (2008) discussed how the macroeconomic news surprise affected Australian financial market. And separately studied sample data by economic period as expansion and contraction. Author chose to test few macroeconomic indexes which he believed can really represent economy condition and guide upcoming direction of financial market and interest rate level. The univariate exponential GARCH, or in short EGARCH, had been used for checking return volatility in Australian financial market. Valid statistic relationship was found between news surprise information and equity and debt market. Nonetheless, debt market showed more sensitivity to news information. Therefore, it supported the saying macroeconomic news affect interest rate directly.

Buttner et al., (2012) analyzed how the surprised macroeconomic news from US and Euro area, affect financial market in Czech, Hungary, and Poland. Financial markets under test included 3 month interest rate, stock market index, and exchange rate. The model of GARCH was applied for tracking effect of that macroeconomic news on daily return of financial market. Results of

this analysis agree with the opinion that Euro area news was getting more and more important in financial market for these 3 countries, while importance of US news was decreasing.

Nguyen (2011) studied how US macroeconomic news surprise information spread and affect stock market in Vietnam. Several scheduled US macroeconomic announcements had been chosen as the independent variables, then using MA-EGARCH (1, 1) model to test how these economic information from US affect Vietnam stock market Index. Finding of this paper confirmed significance of US macroeconomic news surprise on performance of Vietnamese stock market. Nevertheless, the US stock market itself represented by S&P 500 Index, also affect this local market.

Gupta and Reid (2013) analyzed extent of responses of several industrial sectors in the South African stock market to some unexpected or surprise macroeconomic news announcement and monetary policy, by looking at corresponding industry section indices. Author tested the immediate reaction of those stock indices after announcements, and then deepens this study with Bayesian vector autoregressive (BVAR) analysis into continuous effect of that news shock on stock market. Pricing variables in those macroeconomic data as CPI and PPI approved its significance on affecting industries stock indexes. However, this effect only held very short time, almost right after announcements surprise realized.

Füss et al., (2014) searched for the new information that would be absorbed into price forming of those real estate companies in stock market. Hence, author compared the volatilities and returns changes of overall US stock market and the REIT (real estate investment trust) when unanticipated macroeconomic indicators number arrived market. This research used Bivariate VECH GARCH (1, 1) framework to track relationship between volatilities, return of both US

stock and REIT and the macroeconomic news and monetary policy surprise. Finally, REIT and US stock market approved with correlated relationship in empirical test. Main factors that moved the vitalities and return of both REIT and Stock market were housing price related news and monetary policy. Meanwhile, some of fundamental indicators like PPI and personal income etc, showed significant effect on these two markets during financial crisis period.

Brazys, and Martens (2014) worked on relationship between the US news information and Treasury or Bond market in US. A novel methodology had been used in this study of treasury return and news. With this methodology, author aimed to find not only correlation between news and return, but also importance of different news. He also summarized the 24% movement of bond market return came from economic news information on days there were new release. Importance of news information would be different in different economic period. In recession period, news information would be more important while Volatility Index kept low. Contrast in expansion period, that news became less important.

Table 2.1: Summary Table of Previous Related Studies

Author(s)	Year	Methodology	Finding
Balduzzi, Elton, and Green	2001	This paper used OLS multiple regression model to test the relationship of macroeconomic surprise information on bond price change. Sample data set covered from 1st July 1991 until 29th September 1995. And 26 macroeconomic news indicators included in this research, while there were 4 types of bond as 3m bill, 2 years note, 10 years note, and 30 years bond.	Nonfarm Payroll, initial jobless claims, PPI, consumer confidence, NAPM Index, housing starts, new home sales, and durable goods order were showing significant effect on price movement of all 4 maturity bond types within 5% level. Some other announcements affect different bonds differently, but there are 9 announcements that didn't have any effects on Bond pricing.
Ewing	2002	Vector Autoregressive model and Generalized impulse response function had been applied for the searching of financial segment in stock market movement associated with unanticipated macroeconomic news	Significant results presented as monetary policy and inflation news were showing negatively affect the listed financial companies while real economy output factors showing positive sign. However, extent of influence differed with these 3 categories

		announcements. Sample data of testing start from January 1988 until September of 2000.	variable as monetary policy and inflation tended held long, but real out effect diminish within month.
Kim	2003	This paper analyzed influence of US and Japan macroeconomic news announcements surprise on the advanced Asia Pacific stock market movements as stock index return and conditional volatility with empirical model of MA EGARCH (1, 1). Sample data of macroeconomic index ranged from January 1991 to May 1999 for US news, early 1991 until mid of 1999 for Japanese news. All dependent variables as stock index sample for all 4 countries included between January 1991 and May 1999.	Generally, real economy and inflation indices from both US and Japan were significantly affecting advanced Asia Pacific markets return and return uncertainty even though direction and extent of each unexpected individual announcement influence was different. Finally, the author approved US and Japanese news was tightly monitored by investors in those advanced Asia Pacific stock market.
Nikkinen, Omran, Sahlström,	2006	GARCH model was used for estimating volatilities in each tested grouping region, and then	There was no any single news that showed significance effect on all regions, but GDP and Import-

and Äijö		Cross-Sectional regression analysis used for finding out relationship between macroeconomic announcements surprise and stock market volatilities in different region. 35 countries' stock indices were grouped in 7 regions, and sample data cover from July 1995 to March 2002. Macroeconomic announcements were referred to major economy indicator in Bureau of Labor For statistics classifications, there are 10 of them.	export price Index showed no any significance on any regions. Still, Transition economy countries and Latin America showed no any valid relationship toward any US major economy indicators.
Fang, Lin, and Parbhoo	2008	The univariate exponential GARCH (EGARCH (1, 1)) was used in this paper for generating return volatilities. And tested how the news surprise affect uncertainty in the stock and bond market in Australia.	CPI was the only variable negatively changing stock market return at 5% significance level. Unemployment Rate news surprise did not show significance in empirical test of this paper. So did Money supply.

		Australian Ordinary Index, 90 days bank bill, and 10years government bond selected as dependent variable to represent financial market. Observation of data counting was from January 1990 until December of 2004.	
Nguyen	2011	Author tested correlation of the Vietnamese stock market return and volatilities toward macroeconomic news surprise from US with MA-EGARCH (1, 1). The research sample data was from August 2000 to September 2009.	Non Farm payroll, Unemployment Rate, GDP, Industrial Production affected return and volatilities adversely as they increase return and decrease variance. Housing statistics and retail sales just did this job with contrast direction with above 4 variables as decrease return and increase variance. Yet, PPI and Trade balance affected the variance positively, and trade balance negatively.
Büttner, Hayo, and Neuenkirch	2012	2 steps of method was used as Autoregressive-distributed lag model with 6 lags in General	Not much news seemed affecting money market in 3 transition economy countries. EU

		GARCH (1,1) was for generating model data, and adding other news variable on days when there were announcements. In this way, author found out relationship between those news and return in money, stock, and currency exchange market. This test covered whole period during year 1999 until 2006.	Business climate Index, German retail sales, and German Industrial Production did show significance on affection those stock markets return. US news was only affecting exchange rate of these countries with retail sales. Other variables influenced this market were from Europe or Germany as , German Unemployment Rate, GDP, Trade balance, retail sales and also EU Consumer confidence.
Gupta and Reid	2013	Authors used two methods to test prompt reaction of South African stock market to macroeconomic news surprise with event study and Bayesian Vector Autoregressive analysis (BVAR) for the on-going effect. Period of study included data from May 2002 to January 2011.	CPI was important and significantly affects stock market return. Monetary policy also affected the market in event study. Both CPI and PPI showed significance in BVAR test, but to only less extent and incorporated by market very quick and short.
Brazys	2014	The univariate regression was	In conclusion, 39 out of 55

		used for testing the macroeconomic news surprise on the treasury market in US, specifically bond price movements. However, this author also introduced a novel method in order to compare its results with the basic surprise regression model. Sample data was from 30th October 1996 to 28th March 2013. 55 announcements about US macro economy which the author believed were generally watched by investors from Bloomberg.	macroeconomic announcements showed valid effect on 10years treasury future at 10% level. Most significant announcement is the ISM Manufacturing. Price announcement like CPI and PPI were also showing highly important in the results.
Hiss, Mager, and Zhao	2014	Author used Bivariate Diagonal VECH GARCH (1, 1) model with additional dummy variables which were economic and monetary news surprise to test how those surprise variables	Construction spending showed strongest impact on return of both REIT and S&P 500. Housing start and New home sales were also significant but weaker. GDP was only affecting REIT on daily data.

		correlated with volatilities and extra return in REIT and the overall US stock market. The sample set was ranged from January 2000 to December 2009.	At variance view, FOMC affected both index volatilities, and New Home sales also did, but moved 2 indexes in different way. Still, Housing start changed REIT and Initial Jobless claim moved S&P 500.

Chapter 3

Research Framework

In this chapter, it is going through the process of theories modeling, conceptual framework generating, and how research model in this paper is reached. After that, hypotheses tested would be presented as last part. First section is materials or papers used to construct this current theory and how those independent variables worked together with dependent variables. According to these theoretical demonstration, following section would be conceptual framework as illustration of structure of this paper, how different variables linked together. Next section shows model used in this study based on theory constructed, which would be used for validity test of those hypotheses raised. Last section summarizes all hypotheses tested to approve relationship between independent variables and dependent variables.

3.1 Theoretical Framework

Before reaching conceptual framework in next part of this chapter, this part is going to introduce theoretical framework in this study paper. Theory in this paper believes difference between forecast and actual announcement about macroeconomic condition of leading economy country is shocking or surprising news to the equity markets. And this new unexpected information would affect not just local but other foreign countries. Hereby, it hypothesized US macroeconomic news surprise would impact the equity return in Hong Kong stock market. Theory here is developed based on previous studies in chapter 2. Those researches referred are listed in detail below:

Balduzzi et al., (2001) used Ordinary Least Square multiple regression model to tested relationship between US bond market and Macroeconomic news surprise. Dependent variables in this paper included 3-month bill, 2-year note, 10-year note, and 30-year bond. Independent variables are surprise factor of 26 macroeconomic announcements, and surprise is calculated as actual announcement number minus median of forecast number from MMS. Those 26 US announcements are Civilian Unemployment, Consumer Price Index, Durable goods order, Housing stars, Index of Leading Indicator, Initial Jobless claims, Merchandise trade balance, Non-farm payrolls, Producer Price Index, Retail Sales, Import Price Index, Export price Index, Capacity utilization, Industrial Production, Business inventories, Construction spending, Consumer confidence, Factory orders, NAPM Index (National Association of Purchasing Manager- currently change to ISM PMI), New home sales, Personal consumption, Personal income, Treasury Budget, Ml, M2, and M3 Median.

Kim (2003) studied how Macroeconomic news from both US and Japan affected advanced Asia Pacific equity market. This is detailed study of those effects from scheduled news release. Parsimonious MA EGARCH (1, 1) model was used for empirical test correlation between return and volatility in those studied markets and macroeconomic announcements from US and Japan. Thus dependent variables in this paper would be daily stock index and conditional volatility in All Ordinaries of Australian market, Nikkei 225 of Japanese market, Hang Seng of Hong Kong market, Straight times of Singaporean market. Independent variables are those unexpected scheduled Macroeconomic news release in US and Japan. Unexpected release is the difference between median of consensus forecast from Money Market Service and actual announced number. Macroeconomic announcements are picked in this paper as proxy of economic activities, inflation situation. Still those announcements needed to be unbiased in consensus expectation

before chose, which means those forecasted number should not persistently deviate in any direction of those actual announced number. US release included here are Balance of Payment, real GDP growth rate, Retail sales growth rate, Unemployment Rate, Producer Price Index, and Consumer Price Index. Japanese announcements included Trade balance, Current account, Unemployment Rate, Money supply growth rate, Wholesale price Index inflation, and Consumer Price Index. Only US GDP is the quarterly announced, and all others are monthly reported.

From research of Nikkinen et al., (2006), it tested how market return volatility in 35 countries' stock indices reacted to US Macroeconomic news surprise all together. For purpose of empirical test, all 35 countries stock indices were divided into 7 regions, and each region represent one dependent variable. These regions and variables are G7 countries, European countries, Asian countries, developed Asian countries, emerging countries, Transition countries, Latin American countries. Firstly volatility of each region was estimated with GARCH model. Then relationship between volatility in each region and US macroeconomic announcements was tested by Cross-Sectional regression analysis. Pick of those US Macroeconomic announcements were mainly referred to classification of Major Economic indicators from Bureau of Labor statistics. Significance of those chose announcements were proved with previous research as Bollerslev, Cai, and Song, (2000) and Graham, Nikkinen, and Sahlstrom (2003). Those macroeconomic news independent variables tested in this paper were Consumer confidence, Consumer Price Index, Employment Cost Index, Employment situation, Gross Domestic Product, import and export price indices, NAPM (National Association of Purchasing manager- changed to be ISM PMI) Manufacturing, NAPM Non manufacturing, Producer Price Index, and retail sales. Most of these announcements are monthly release, except Employment cost Index and Gross Domestic Product are quarterly.

Nguyen (2011) analyzed effects of US macroeconomic news on the Vietnamese stock market, as the belief of one major economy news affect foreign countries. Effects of that US macroeconomic news release were tested with reaction of the Vietnamese stock Index in MA-EGARCH (1, 1) model. Dependent variables in this paper are conditional mean return and conditional variance of daily closing data in Vietnamese stock market Index range from August 2000 to September 2009. Independent variables are the surprise or difference between Bloomberg economy forecast median and actual release of 12 important US macroeconomic indicators which were separated into 4 groups. Non-farm payroll, unemployment level, GDP, Housing statistics, Industrial Production, leading indicators and retail sales were grouped as real economic variables. Consumer Price Index and Producer Price Index were grouped under price variables. Current account and Balance of Trade were grouped as trade variables. Final group was the Federal Reserve's target rates as monetary policy variable.

Gupta and Reid (2013) investigated how industry specific stock index in South Africa affected by scheduled economic announcements of the South Africa with Ordinary Least Square multiple regression models in event study. All those news announcements in this paper are news surprise instead of announce number itself. This surprise is from actual release minus median of consensus forecast from Bloomberg. Independent variables in this test included both macroeconomic variables as Consumer Price Index, Gross Domestic Product, Producer Price Index, and Current account and monetary variable like official repurchase rate. Dependent variables were stock return calculated as first log different of 10 South African stock market indexes. These indexes were general index as the South African All Share, and Top 40, and with other industry specific index as Mining, Financing, Finance and Industry, General Industrials, Gold mining, Basic industrials, Resources, and Retailers Index.

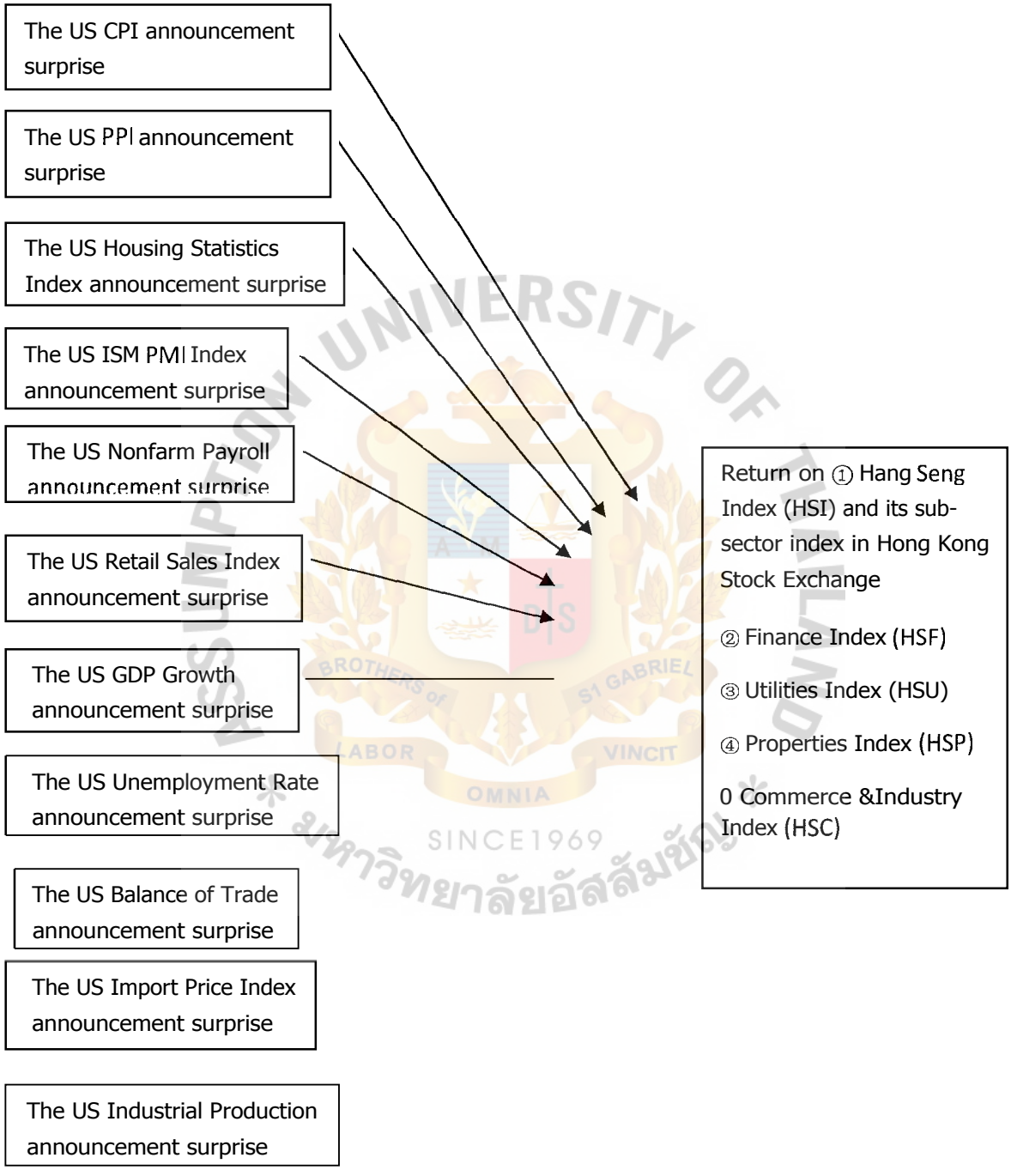
3.2 Conceptual Framework

With all research papers in chapter 2 and the theoretical framework, it is possible that there is relationship between movements of equity market and surprise information from scheduled economic announcements. Based on those previous references, this paper is going to study specifically how monthly macroeconomic announcements surprise information factor in US have been affecting the return of Hong Kong equity market.

Dependent variables would be the return on Hang Seng Index (HSI) and its four sub-sector indexes as, Finance (HSF), Properties (HSP), Utilities (HSU), and Commerce & Industries (HSC). Selection of those US economic announcements or Independent variables are based on significant variables in previous empirical tests. Accordingly, they are Consumer Price Index, Producer Price Index, Housing statistics, Industrial Production, Institute of supply Management PMI, Nonfarm Payroll, Retail Sales, Unemployment Rate, GDP, Import Price Index, and Balance of Trade.

Figure shown below exhibits conceptual framework:

Figure 3.1 Conceptual Framework



3.3 Research Model

In the text book, the statistical way of explanation for movement of one factor or in statistical term of dependent variables, this comes from movements of another factor which is statistically independent variables, called regression analysis. Therefore, for study on how unexpected macroeconomic news announcements affecting movements of equity market, Multiple Regression model is suitable here. This model was used by Nikkinen et al., (2006) in test reaction of global stock market regarding arrival of unanticipated economic news announcements. Gupta and Reid 2013 also used multiple regression models to analyze movements of South African stock market index with macroeconomic news surprise in event study.

With all independent variables and dependent variables exhibited in conceptual work, research model include all those variables in form as below:

$$\text{Re} = \alpha + \beta_1 CPI + \beta_2 PPI_t + \beta_3 HMI_t + \beta_4 ISM_t + \beta_5 NFP_t + \beta_6 RS_t + \beta_7 UNEMR_t + \beta_8 GDP_t + \beta_9 IMP_t + \beta_{10} BOT_t + \beta_{11} INDP_t +$$

Where:

Ret = monthly return of stock Index i

a = constant term or intercept

…, 1311 = regression coefficients

c = error term

t = month t

i = Hang Seng Index and its sub-sector indexes as Finance, Properties, Utilities, and Commerce & Industries.

CPI = the US Consumer Price Index announcement surprise

PPI = the US Producer Price Index announcement surprise

HS = the US housing statistics announcement surprise

IP = the US Industrial Production announcement surprise

ISM = the US Institute of supply management PMI announcement surprise

NP = the US Nonfarm Payroll announcement surprise

RS = the US retail sales announcement surprise

UR = the US Unemployment Rate announcement surprise

GDP = the US gross domestic product announcement surprise

IPI = the US Import Price Index announcement surprise

BT = the US balance of Trade announcement surprise

Note: the announcement surprise is calculated by using actual announced indicator number minus foregoing forecasted number.

Based on this multiple regression model, we could find correlation of each macroeconomic news surprise with return on the stock market. Then we can anticipate stock return changes with input of those independent variables.

3.4 Research Hypotheses

To test whether the relationship between independent variables and dependent variables is significant, this paper employed 55 null hypotheses and 55 alternative hypotheses.

Significance level chosen in these test are at 0.05 and 0.10 level respectively. Thus, for that probability less than 0.05 or 0.10, null hypotheses would reject, conversely, for higher than 0.10, null hypotheses could not be rejected. By following those probability results, relationship between independent and dependent variables would be determined.

Below are the hypotheses for this paper:

H1o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H1a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H2o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H2a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H3o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H3a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H4o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H4a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H5o There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H5a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H6o There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H6a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H7o There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H7a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng index during year 2004 and year 2013.

H8o There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H8a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H90 There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H9a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H10o There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H10a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Hl to There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H1 la There is a significant relationship between the US Industrial Production and index return of the Hang Seng Index during year 2004 and year 2013.

H12o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H12a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H13o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H13a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H14o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H14a There is a significant relationship between the US Housing statistics announcement

- surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H15o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H15a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H16o There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H16a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H17o There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H17a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H18o There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H18a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H190 There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H19a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H20o There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H20a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H210 There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Song Finance Sub-index during year 2004 and year 2013.

H21a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H22o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H22a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H23o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H23a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H24o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H24a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H25o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H25a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H26o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H26a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H27o There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H27a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H28o There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H28a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H290 There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H29a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H30o There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H30a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H31o There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H31a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H32o There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H32a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H33o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H33a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H34o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H34a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H35o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H35a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H36o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H36a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H37o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H37a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H38o There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H38a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H390 There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H39a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H40o There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H40a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H41 o There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H41 a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H42o There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H42a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H43o There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H43a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H44o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H44a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H45o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H45a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H46o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H46a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H47o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H47a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H48o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H48a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H490 There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H49a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H50o There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H50a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H51o There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H51a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H52o There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H52a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H53o There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H53a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H54o There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H54a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H55o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H55a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 3.1 Operationalization of Variables

Concept	Conceptual Definition	Level of Measurement
US CPI announcement Surprise	Consumer Price Index measured the cost level of end users faced. And the surprise of this indicator happens when actual announced CPI is higher or lower than previous expectation from market, the difference becomes new information to investors regarding the inflation level.	Ratio
US PPI announcement Surprise	Producer Price Index measured the cost level of manufacturers and wholesalers faced. And the surprise of this indicator happens when actual announced PPI is higher or lower than previous expectation from market, the difference becomes new information to investors regarding the manufacturing inflation level.	Ratio
US Housing Statistics announcement Surprise	Housing Market Index measured the outlook and condition of US single-family house sector. When actual announced value of this indicator is higher or lower than previous expectation from market, the difference becomes new information to investors regarding the Housing sector status in US.	Ratio
US ISM PMI announcement Surprise	ISM PMI is the survey send to top and purchasing executives in manufacturing companies, ask them rating current and near future US general economy. The score at 50 means expansion. When actual announced value of this indicator is higher or lower than previous expectation from market, the difference becomes new information to investors regarding current and near future business cycle of US economy.	Ratio
US Non-Farm Payroll announcement Surprise	It is the total number of paid worker in business in US, measured the general condition of employment. Surprise of this indicator means actual employment condition may be better or worse than market previously expected.	Ratio
US Retail Sales announcement Surprise	Retail Sales Index measured the movement of retail sales sector in US; this can be reference for the consumers' consumption level. Surprise of this indicator means the consumption in US may grow better or worse than previous market expectation.	Ratio
US GDP Growth announcement Surprise	The Gross Domestic Product shows the total size of whole US economy, and its growth. Surprise of this indicator means the economy was either growing faster or slower than market thought.	Ratio
US Unemployment Rate announcement Surprise	Unemployment Rate reflected the ration of available labor force that do not have job from the total labor force. It well demonstrates condition of current economy, as this number should be low when things go well. Surprise of this indicator shows there are more or less people have no jobs than market forecasted.	Ratio

US Balance of Trade announcement Surprise	This reveals the difference between export and import. Surplus means US export more goods than import, otherwise it is called deficit. Surprise of this indicator means the Import/export situation of US is different from market expected.	Ratio
US Import Price Index announcement Surprise	Import Price index measured cost level of imported goods. For domestic manufacturers, higher this index is, better for them. Surprise of this indicator means actual price level of imported goods is different from market forecasted.	Ratio
US Industrial Production announcement Surprise	Industrial Production is the total goods volume produced by domestic manufacturer. This is also a gauge for general condition, whether it is expanding or contracting. When the actual volume produced is not same as investors thought, the difference become surprising information to investors.	Ratio
Return of Hang Seng Index	Mathematically, it is difference between current month index and previous month. This shows the return level of the whole Hong Kong Stock market.	Ratio
Return of Hang Seng Finance Sub-Index	This shows the return level of the financial sector stocks in Hong Kong Stock market and Hang Seng Index	Ratio
Return of Hang Seng Properties Sub-Index	This shows the return level of the real estate and construction sector stocks in Hong Kong Stock market and Hang Seng Index	Ratio
Return of Hang Seng Utilities Sub-Index	This shows the return level of the utilities sector stocks in Hong Kong Stock market and Hang Seng Index	Ratio
Return of Hang Seng Commerce & Industry Sub-Index	This shows the return level of the commercial and industrial sector stocks in Hong Kong Stock market and Hang Seng Index	Ratio

Chapter 4

Research Methodology

This chapter goes through process and methods used for running this study, while explaining how it was done. First part introduced information and background of data source and type of research used in this paper. Second part explained statistical treatment of data sampled in detail and prepared for running test. Third and last part of this chapter describes analyzing of data and mathematical calculation processes in equation.

4.1 Research and Data Collection

Causal research is applied for this study. Regarding to Zikmund (2003), causal research is the kind of research method that examines cause-and-effect relationship between two factors like explanatory and dependent variable in statistics. In this case, multiple linear regression models ran for testing how those surprise news information affect on Hong Kong Stock market.

Same as most financial studies, sample data used in this paper is time-series and secondary. Secondary data is data collected before for other cases and currently available for latter projects (Zikmund 2003). Even if some of these data are not free, however, it is still economical both financially and timing comparing to primary data. In financial research, it concerns magnitude of data. It is rather impractical to collect complete primary data set by any single person or institution. Even though it is technically feasible, both monetary and timing cost would make it inefficient.

Based on all these factors, secondary data should be the best choice for this research. Data sample period in this study covered 10 years from beginning of year 2004 until end of year 2013. Index about Hong Kong stock exchange market and 11 US macroeconomic indices during this 10 years period have been recorded, and analyzed. Due to some missing data and mismatching of time between different data clusters, whole data sets had been arranged again according to test requirements based on reality.

All data of stock index and macroeconomic indices used and referred in this paper were sourced from the financial software tool Bloomberg terminal, product of Bloomberg Professional service available in Assumption university library.

Bloomberg is a well-known data base company of financial Information technology, its core product Bloomberg Terminal is widely used for business and academy in finance industry. This terminal provides real time data of economic and financial indicators for all major economies. Not just real time data, its vast historical data is also valuable for analysis purpose and Vrugt (2009) approved Bloomberg's consensus forecast is unbiased and efficient for both study and investment.

Most previous studies referred in this paper used daily data like equity index return or volatility. However, author of this paper found monthly data more appropriate with this research regarding related market situation. Because of market efficiency hypothesis, it is very difficult to capture marginal profit with those high frequency data like daily return, while there would be possibility of infrequent bias in case of some missing data in whole sample data set. It might be too little for reaching statistical significance, too.

4.1.1 Hong Kong Stock Exchange index and Variable Data Collection

Until end of year 2013, there were 1,615 companies listed on Hong Kong Stock Exchange, and all companies are segmented into different industry groups by Hang Seng Industry classification system, which includes Energy, Materials, Industrials, Consumer Goods, Consumer Services, Telecommunications, Utilities, Financials, Property & Construction, Information Technology, and Conglomerates. Beyond this overall classification, and aforementioned 11 industries, there were 31 sectors and 89 even more detailed subsectors.

Hong Kong Stock Exchange is the second largest in Asia and 6th in global rank with its total market capitalization. In 1,615 companies listed on this exchange market refer to data in 2013; around 48% of them came from mainland China, 5% from other countries. Those remained were local companies in Hong Kong, approximately 47%. Reason for picking this market is not just because it is developed open market in Asia Pacific with large market capitalization, but also for its connection with current world 2nd largest economy. China has been the fastest growing economy in last decade, but still has limited foreign capitals access into its local market, and Hong Kong is believed as window of some Chinese companies channeling foreign capitals, this function was approved as largest portion of overall market capitalization from Mainland China.

From population of all 1,615 companies, we chose Hang Seng Index during 2004 to 2013 as sampling to see overall movements in market. There are 50 stocks included in Hang Seng Index, which were selected based on their total market capitalization, and representation of corresponding subsector and markets. Therefore, Hang Seng Index has been commonly used as representative of general Hong Kong Stock market.

4.1.2 Monthly US macroeconomic announcements variables and collection

Many previous studies mentioned in chapter 2 like Kim (2003) and Nikkinen et al., (2006) proved importance of US economic condition on global financial market. As exhibition of its economic condition, numerous economic statistics indices news announced in different periods like weekly, monthly, quarterly, and annually. Those announcements or unexpected announcements in this study would be treated as new information and transmitted into market price. Because this research focuses on monthly movement of equity market, population of news variables would be all monthly US economic announcements. Among all those announcements, 12 announcements sample are chosen to study their impact on Hong Kong equity market in this paper. This set of samples is based on previous studies about Asian equity markets done by different other authors. These sample announcements are Consumer Price Index, Producer Price Index, Housing Statistics, ISM PMI Index, Non-farm Payroll, Retail Sales Index, Unemployment Rate, GDP growth, Import Price Index, Balance of Trade, Current Account, and Industrial Production. To match with dependent variables, that is Hong Kong Stock exchange market in this case, sample period of these macroeconomic announcements were covered from beginning of 2004 until end 2013 as well.

Table 4.1 Summary of Data Used in Research

Data	Time Period	Data Source
• Monthly Hang Seng Stock Index • Monthly US Macroeconomic News Forecast and Announcements of Consumer Price Index, Producer Price Index, Housing Statistics, ISM PMI Index, Non-farm Payroll, Retail Sales Index, Unemployment Rate, GDP growth, Import Price Index, Balance of Trade, and Industrial Production	31 January 2004 to 31 December 2013	Bloomberg Professional Terminal

4.2 Statistical Treatment of Data

Because multivariate regression model is applied in this research, T-test would be used for all hypotheses raised in this study within 95% confidence level regarding other previous studies. Definition of multivariate regression states the correlation of each independent variable only meaningful when holding other independent variables in same equation constant, and this is just matched with T-test as it tests only single slope coefficient, otherwise, it would be F-test. Within 95% confidence level, relationship between independent variables and dependent variable is significant only when p value is less than 0.1 or 10%. In other words, explanation of independent variables about dependent variable is valid within confidence level that is exhibited with p value less than 0.1. As in all previous studies this study would also categorize test results as 0.05 and **0.1** which further explains strength of that relationship significance. In contrast, when p value

turns out to be more than 0.1, relationship between independent variables and dependent variable in that hypothesis just proved to be insignificant by T-test.

All monthly data in 10 years are grouped into 1 single variable, which means there would be 240 monthly data in each single multiple linear regression equation for dependent variables. Each representing Hong Kong Stock index studied is a separate individual multiple linear regression, and there are eleven independent variables we study their impact on each dependent variable, which are Consumer Price Index, Producer Price Index, Housing Statistics, ISM PMI Index, Non-farm Payroll, Retail Sales Index, Unemployment Rate, GDP growth, Import Price Index, Balance of Trade, Current Account, and Industrial Production.

Before we can process estimation of relationship between independent variables and dependent variables in multiple linear regression models, there are several statistics tests we need to conduct for making sure data collected match with assumption of this multiple linear regression model, and then chose appropriate regression estimation method. Those tests are Stationary test, White test (Heteroskedasticity), Serial correlation test, and Multicollinearity test.

4.2.1 Stationary test

Because data used in this paper is time-series data, there is a potential issue for using regression model called spurious correlation. That is if the significance of independent variables correlation toward dependent variable is higher than the factual significance, then p value in the test would also be higher than what it, in fact, should be. Thus, results from that test would not be valid. This issue would happen when trends of independent variables are same as dependent

variables. Causes of this issue in time-series variables are when data is non-stationary. (Nelson, & Plosser, 1982)

Time-series data is stationary when it keeps constant mean and variance along with change of time. Conversely, mean of variance of non-stationary data keep changing as time passes by. In conclusion, the data is stationary only when all conditions below are met:

1. Mean of variable does not change over time
2. Variance of variable does not change over time
3. Length of the lag is only factor affecting correlation coefficient between X_t and X_{t-k}, no other variables.

Simplest way of checking nonstationarity is looking at diagram of graph of that series of data, if the graph is visually showing dynamically increasing mean, it is non-stationary. However, this is not very accurate and there is another statistical way for checking. In this way, key criteria to check nonstationarity are looking at whether the variables have unit root. If variables in an equation have unit root, it or they would be affected by previous value plus error term constantly. It rather functions as an autoregressive equation.

Standard method for testing unit root is the Dickey-Fuller test (Dickey & Fuller, 1979). This method tests on hypothesis of whether there is unit root in variables:

Ho: 131=0

Hi: $\beta_1<0$

p_i is the correlation of previous value of the variable as formula below:

Where V_t is the stochastic error term. And $\beta_1 = \gamma - 1$.

We can reject null hypothesis when $\beta 1$ is significantly less than 0 at one-sided significance level of 0.05.

In case of failing rejecting null hypothesis, and the variables proved to be non-stationary, there are 2 ways for correction as per:

- Use first difference of the variable
- Use Log difference of the variable

In this paper, author used log difference of variables for those are non-stationary based on theories of previous studies.

4.2.2 Multicollinearity test

When there is valid strong linear functional relationship between or among 2 or more independent variables within one single model, then coefficients estimation results of those variables would be significantly influenced, validity of estimation could be actually false. This problem is called Multicollinearity, and can be exhibited mathematically as in (Silvey, 1969):

$$X11 = \alpha_0 \quad \alpha_1 X_{2i}$$

However, this does have tolerance for significant Multicollinearity as it is fine if variables are correlated with each other within certain content which would not affect estimated correlation relationship between independent variables and dependent variables significantly.

Main problem coming along with Multicollinearity is the larger variance and standard error. As the multiple linear regression measures effect of 1 unit increase in one independent variable on dependent variable while keeping all other variables unchanged, in case of 2 or more independent variables correlated, possibility of having coefficient estimation error would be higher. This is because multicollinear variables would move together during coefficient estimation. As long as standard error gets larger, t-score in t-statistic would decrease because standard error is the denominator in t-score calculation.

To test the Multicollinearity, author used the method named High Simple Correlation Coefficients method (Studenmund, 2006). This method would check all simple correlation between each independent variable in one equation. For any correlation value higher than 0.8, those 2 variables would be treated as multicollinear variable.

For those recognized multicollinear variables, one of the correlated variables would be withdrawn from the model and equation. The decision, of which one should be withdrawn, would be based on theoretical character of these variables.

4.2.3 Serial Correlation Test

In order to have best results from Multiple Linear Regression by Ordinary Least Square method, the equation needed to be sure of no Serial correlation issue. When two or any error terms in set of sample have simple correlation coefficient not equal to zero, then it is said those error terms are serially correlated, and this equation has serial correlation (Watson, & Durbin, 1951).

There are two types of serial correlation, one is happening in correctly specified function, and this comes from property of sample error data distribution, which cannot be corrected by researcher. Error term value in this equation can be partially from previous period observed value. Most frequently and usually seen as First-order serial correlation, is demonstrated in below equation:

$$\epsilon_t = \rho\epsilon_{t-1} + u_t$$

Where c error term in equation

p functional relationship between observed error terms.

u classical error term

There is no serial correlation if p is zero in this equation.

Another type of serial correlation, sometimes called impure serial correlation, is when its causes are from incorrectly specified function like omitted variables or wrong functional form. This type of serial correlation mostly can be corrected as it is from human error.

In omitted variables case, research forget to add significant independent variable into the equation, then its influence would be shown in error term. Therefore, error term in that equation could be serially correlation based on distribution of missed variables.

$$Y_t = \beta_0 + \beta_1 X_{1t} + Et$$

Where $\epsilon_t - \beta_2 X_{2t} + Et$

In functional form case, incorrect model was used for estimation, and difference between theoretical correct function and wrongly picked function would lead to positive impure serial correlation. For example, linear regression has been used in case where polynomial function would be more appropriate.

The equations or models containing serial correlation would have larger variance even if its distribution is still unbiased. Still standard error generated by Ordinary Least Square method would be biased. Following with biased standard error, t-score from t-statistics would be unstable and incorrect. Finally, hypothesis testing results would be biased and invalid, due to serial correlation in the equation.

Breusch-Godfrey Serial Correlation LM (Lagrange Multiplier) Test (Hyun, Mun, Kim& Jeong, 2010) was used for all linear regression equation in this paper for checking if they have serial correlation. In case of any equation found to have serial correlation, Newey-West Standard Errors (Newey and West, 1987) would be used for correction of those serial correlation found in the equation.

4.2.4 **Heteroskedasticity** Test

To have Ordinary Least Square working best for Multiple Linear Regression, the error term with constant variance over time period and sample is one of those requirements to be met before regression estimation. When this requirement is met, it is called homoskedasticity, means variance of error term in that function is unchanged, and Ordinary Least Square can be suitable (White, 1980).

In converse case, when Variance of error term in that equation is not constant, and change as time or data observation change, there would be Heteroskedasticity. This can be shown as equation below:

$$VAR(\epsilon_i) = \quad ^2 \quad = 1, 2 \ldots, N)$$

This equation exhibited variance of error term depends on which sample and observation it is. This case is often occurred when largest value and smallest value is very different in dependent variables. Another possible cause of heteroskedasticity could be data collection quality change during one sample period.

In simple demonstration, heteroskedasticity can be divided into 2 types as narrow and wide distribution, and generally called discrete heteroskedasticity.

Most common model of heteroskedasticity could be written as equation below:

$$VAR(\epsilon_i) = \sigma^2 Z_i^2$$

Where:

Z is the proportionality factor. Variance of error term changes partially according to square of Z_i.

Similar to serial correlation problem, heteroskedasticity make Ordinary Least Square method not having minimum variance estimation any more. Because it makes dependent variables volatile, consequently affect independent variables as well, due to Ordinary Least Square estimation procedure.

Heteroskedasticity would also make estimation of standard error biased, and mostly underestimated it. Underestimated standard error would overestimate t-score then. Correspondingly, possibility of rejecting null hypothesis would be even higher than it actually should be, irrelevant variables could be very possibly kept in the equation.

White test is used in this paper for testing whether there is heteroskedasticity in all equation calculated. In this White test equation, squared residual would be dependent variable, and all independent variables from original equation, squares of all those independent variables, and cross products of all those independent variables from original equation with each other would be independent variables. Statistically, equation can be written as (White, 1980):

$$\begin{aligned} \hat{V}^2 &= \alpha_0 + \alpha_1 X_{1t} + \alpha_2 X_{2t} + \alpha_3 X_{3t} + \alpha_4 X \\ &+ \alpha_5 X_{2i}^2 + \alpha_6 X_{3t} + \alpha_7 X_{1t} X_{2t} + \alpha_8 X_{1t} X_{3t} \\ &+ \alpha_9 X_{2t} X_{3t} \end{aligned}$$

After estimation of above equation, chi-square test would be used for hypothesis test decision. In case any of the equation found with heteroskedasticity, the method White heteroskedasticity-consistent standard errors & covariance (Heteroskedasticity-Corrected Standard. Error) would be

used for remedy. This method just corrects or re-adjusts standard error of original equation but do nothing as about its estimated coefficient.

4.2.5 Multiple Linear Regression model

Regression analysis is a method used for estimating amount of change in one quantitative relationship between dependent variable and independent variables, which is also called explanatory factors. In linear regression, the relationship would be plot as straight line in graph, where all most closet estimation plots were placed around. Multiple linear regressions were assumed to be most appropriate models for this research paper. This is because it tests relationship between dependent variable and several independent variables. Coefficient (β) in the model represent how much would dependent variable change with one unit change of that independent variable change, while keeping other independent variables in same equation constant.

With the nature of multiple linear regressions, it gives research ability to test impact of each independent variable on dependent variable while keeping it away from effects of other independent variable, which, this situation is hardly possible in reality. Those coefficient approximated in equation tells directly about relative significance of each independent variable upon dependent variable.

Not just within this paper, but for all linear regression models applied, explanatory factor or independent variables should be chosen based on its relationship toward dependent variable and

also their theoretical background. Then, all relationship estimation of independent variables with dependent variable would be worked out by the multiple regression models (Watsham, 1997).

Equation below would be used for estimating $\hat{\beta}_1 \ldots \beta_k$

$$y_i \quad \beta_0 \qquad + \beta_2 \; 2i \; \cdots \; \beta_k \; ki \; \cdots \; i$$

The letter "i" is the number of tests from 1 to n, this formula could be broken down as per matrix form below:

$$\begin{pmatrix} \\ Y2 \\ \\ y_n \end{pmatrix} \begin{vmatrix} \beta_0 + \beta_1 \; 11 \; \cdot \; \beta_2 \; 21 + \ldots + \beta_k \; k1 \\ \beta_0 \; \cdot \; \beta_1 \; 12 \; \cdot \; \beta_2 \; 22 \quad \cdot + \beta_k \; k2 \\ \\ \beta_0 \; \cdot \; \beta_1 \; 1n \; \cdot \; \beta_2 \; 2n \; \cdot \ldots \cdot \beta_k \; kn \end{vmatrix}$$

And

$$\begin{pmatrix} y_1 \\ y_2 \\ \\ y_n \end{pmatrix} = \begin{vmatrix} 1 \; 11 \; x_{21} \cdots \; k1 \\ 1 \; 12 \; 22 \; \cdots \; k2 \\ \\ 1 \; x_{1n} \; x_{2n} \cdots \; kn \end{vmatrix} \begin{pmatrix} \beta_0 \\ \text{A} \\ \\ \beta_k \end{pmatrix} \begin{pmatrix} 1 \\ u_2 \\ \\ \end{pmatrix}$$

After combination of these 2 matrixes, we could reach an abbreviatory as per:

$$Y = Y(3 + \text{u}$$

Referring to previous studies Ordinary Least Square method is suitable for running this multiple linear regression because it estimates coefficient at minimum sum of squared residuals,

which means difference between estimated value and actual value would be limited at least level. Below is the demonstration of squared sum of residuals:

$$SSR = \sum_{i}^{n} u_i^2 = \sum_{i}^{n} (y_i - \hat{\beta}_1 - \hat{\beta}_k x_{ki})^2$$

With the Ordinary Least Square method, set of can be generated with equation below:

$$[X' X]^{-1} X' Y$$

Where:

$\hat{\beta}$ covers all β_s value range from $\hat{\beta}_0$ until

Estimation process with above equation would be 5 steps. Firstly we would get monthly return of each stock index return, and standard deviation was obtained then. Final step is about estimation of the Beta which is coefficient. Details are as per:

1) Computation of monthly Hong Kong Stock index return.

2) Computation of standard deviation of those computed monthly stock index return.

3) Computation of the macroeconomic announcements surprise of all 12 US monthly macroeconomic announcements.

4) Estimation of the relationship between stock index return and all those macroeconomic announcements surprise with multiple linear regression models.

5) Analysis of results from above estimation.

4.3 Data Analysis

All data collected and studied for this research range from beginning of year 2004 until end of year 2013. They would be used for testing and analyzing general movement of Hong Kong Stock Exchange Market during this 10 years period. The computer program is used for statistical computation of all data collected, and analysis is conducted based on this computation. Thus numeric data about dependent variable and independent variables had been arranged and input into computer program in order to run the tests.

According to previous study results, multiple linear regressions were commonly applied for examining relationship between financial market return and news information about economy. Likewise, this paper would use the same model to test hypotheses raised in last chapter of Research Framework.

The estimation method of Ordinary Least Square was used to run the multiple linear regression analysis in this paper. This is because this method provides best fit equation with least variance between estimation and actual value. As long as calculation process was done with computer program, pool data would be input into the program for calculation by choosing this method (Studenmund, 2006)

4.3.1 Monthly Stock Market Return Estimation

In this paper, monthly stock market return measured change of Hang Seng Index in Hong Kong Stock Exchange Market. This kind of stock index provided how the general market was

going, and still sometimes used as portfolio investment benchmark. To be specific, the index return was the change of stock index value at end of each month from the value at end of last month.

$$Ret_{i,t} = \ln(Index_t) - \ln(Index_{t-1})$$

Where:

Ret = return of selected Stock index at month t

$Index_t$ = the selected stock index of month t

$Index_{t-1}$ = the previous month stock index of $Index_t$

Ln = natural logarithm

t = month t

i = Hang Seng Index and its 4 sub-sector indexes as Finance, Properties, Utilities, and Commerce & Industries

However, this type of time-series data with long term trend would encounter with non-stationary issue. Thus, instead of using index value directly, the author used Natural logarithm of those index values for calculation to avoid the non-stationary issue.

4.3.2 Computation of independent Variables.

In this paper, independent variables are announcements surprise, not the announcement indicators value in itself. Based on previous studies and research framework, the announcement surprise is the difference between actual announced value and market consensus expectation. The median of professional expectation forecast from Bloomberg used as representatives of market expectation. (Gupta and Reid, 2013)

Formula of announcements surprise is shown as per:

$$St, = A\ t, _{i} - M_{t\,i}$$

Where:

S = Macroeconomic indicator Announcement surprise at month t

A = Actual Macroeconomic announcement value announced at month t

M = Median of Bloomberg consensus forecast of macroeconomic announcement at month t.

t = month t

i = Represents 11 US macroeconomic announcements as CPI, PPI, Housing Statistics, Industrial Production, ISM PMI, Nonfarm Payroll, Retails Sales, Unemployment Rate, GDP, Imported Price Index, and Balance of Trade,

For Example when calculate surprise of CPI, the actual announcement value at month t would be used to minus median of forecast about CPI at month t from Bloomberg.

4.3.3 Statistical Significance of Result

After all calculation mentioned above and running of multiple linear regressions analysis, final step should be testing significance of these estimation and model with hypotheses. As mentioned at beginning of chapter 4, t-statistic test would be conducted for hypotheses tests of those multiple linear regression. Furthermore, t-test in this study is two-tailed as long as value of variables could be either positive or negative. Then the dependent variable change of stock market return in this paper would be run through this test for justifying whether this model and estimation results are significantly true or not.

Multiple Linear Regression model:

$$y_i = \beta_1 x_{1i} \quad \beta_2 x_{2i} + \ldots + + \beta_k x_{ki} + u_i$$

This equation can only give estimated information about strength of relationship between y and x, but validity of equation in this case would be test by hypothesis of whether 13 is zero or not. As null hypothesis assumed β equals to zero, which means there should not be any significant relationship between x and y, equation of two-tailed t-test is exhibited as below:

$$t\text{—}statitic = \frac{\hat{\beta}_1 - 0}{SE(\beta_1)}$$

Where:

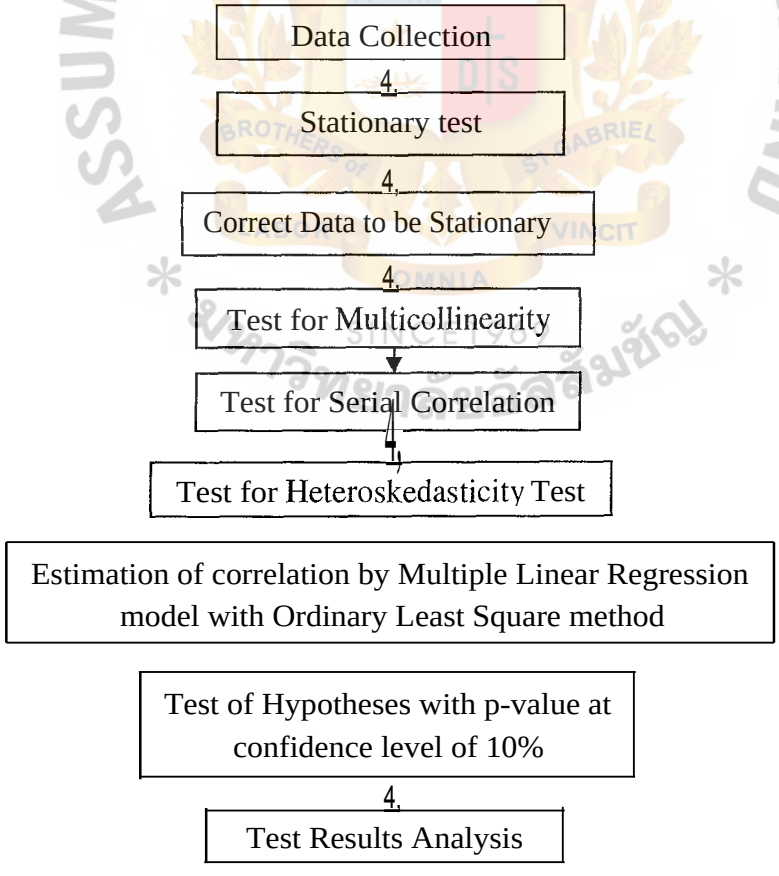
= estimated value of actual 13_1

$SE\beta_1$ Standard error of estimated

Because all calculation was done by computer program, method used for deciding whether rejecting null hypothesis would be p-value, instead of comparing t-value and critical value from t-table. In which the p value is the probability for rejecting null hypothesis in one test, by comparing to pre-set confidence level of significance in the research (Studenmund, 2006)

Just for reminding, this paper chose confidence level of significance at 0.1 or 10%. When p value is equal or less than 10%, null hypothesis can be rejected. Nonetheless, the smaller the p value is, the more significant, the estimation result is.

Figure 4.1 Summary of Statistical Data Treatment Process



Chapter 5

Data Analysis

This chapter presents all statistical data, including both independent and dependent variables. As mentioned previously, all variables and data are secondary from Hong Kong stock exchange and US macroeconomic announcements during 2004 and 2013. First part is about basic characteristics of each data set, like its mean, maximum, and minimum. Second part briefs about statistical data treatment before running empirical test, in order to have valid results. Third and final parts discuss each hypothesis with empirical results from running model analysis in computer program.

5.1 Descriptive Statistics

There are 5 indexes from Hong Kong Stock exchange collected as dependent variables, and 11 macroeconomic announcements from US. Because they are monthly data in 10 years from 2004 until 2013, observation of each single data set is 120. It is important to emphasize that all those macroeconomic announcements data are the surprise variables, not announced number itself. Therefore, all statistical explanation as mean, maximum, and minimum discussed later are about the surprise.

Table 5.1 Descriptive Statistics summary of US Macroeconomic announcements surprises

	Retail Sales Surprise (Percentage)	Unemployment Rate Surprise (Percentage)	Trade of Balance Surprise (Billion Dollar)	Import Price Index Surprise (Percentage)	Industrial Production Surprise (Percentage)	CPI Surprise (Percentage)
Mean	0.0083%	-0.02830%	0.161667	0.06250%	-0.06580%	-0.0017%
Median	0.0000%	0.00000%	0.3	0.00000%	0.00000%	0.0000%
Maximum	1.8000%	0.40000%	10.6	1.30000%	1.10000%	0.4000%
Minimum	-1.5000%	-0.50000%	-8.8	-1.90000%	-2.00000%	-0.4000%
Std. Dev.	0.5102%	0.15240%	3.617933	0.58930%	0.41410%	0.1390%
Skewness	0.042558	0.027756	0.199243	-0.434683	-0.900744	0.124073
Kurtosis	4.461785	3.691042	3.296088	3.661259	6.337943	3.549422
Observations	120	120	120	120	120	120

The statistics about retail sales change surprise averaged at 0.0083% means market expected changes were generally close to what were actually announced. Maximum surprise of the retail sales change was 1.8%, and minimum was negative -1.5%. Mean difference between market forecast and announcement of Unemployment Rate was at -0.0283%, this showed the market perspective was about better than real situation during sample period. Maximum difference of the Unemployment Rate surprise was 0.4%, and minimum surprise was -0.5%. Trade Balance surprise had mean difference at 0.161667 billion US dollar, and the maximum surprise was 10.6 billion while minimum was -8.8 billion US dollar. Import Price Index surprised averagely at 0.0625%, and maximum surprise was 1.3% together with minimum at -1.9%. Industrial Production surprise had average of -0.0658%, and it had maximum surprise of 1.1%, minimum

surprise of -2%. CPI surprise had mean at -0.0017% change. Its maximum surprise was 0.4% and minimum surprise was -0.4%.

Table 5.2 Descriptive Statistics summary of US Macroeconomic announcements surprises (a)

	PPI Surprise (Percentage)	Housing Market Index Surprise (Score)	ISM Price Paid Surprise (Score)	Non-Farm Payroll Surprise (Thousand)	GDP Surprise (Percentage)
Mean	0.0425%	-0.216667	0.315833	-12.15	-0.08000%
Median	0.0000%	0.0	0.5	-8.5	0.00000%
Maximum	1.7000%	7.0	11.5	188	1.70000%
Minimum	-1.2000%	-6.0	-19.5	-208	-1.70000%
Std. Dev.	0.4826%	2.425991	5.491108	71.59933	0.40030%
Skewness	0.305476	0.343063	-0.558258	0.137059	-0.230331
Kurtosis	4.329199	3.362239	3.83728	3.282329	8.396314
Observations	120	120	120	120	120

The statistics about PPI surprise change showed mean difference of 0.0425%, maximum difference 1.7% and minimum at -1.2%. Housing Market Index surprise had average of -0.216667 points, maximum surprise 7 points, and minimum surprise -6.0 points. Mean surprise of ISM Price Paid Index was 0.315883 points. Its maximum surprise was 11.5 points and minimum surprise was -19.5 points. Non-Farm Payroll surprise got mean at -12.15 thousands, maximum surprise at 188 thousand, and minimum surprise at -208 thousands. GDP surprise

showed mean different change of -0.08%, maximum surprise 1.7% and minimum surprise of -1.7%.

Table 5.3 Descriptive Statistics summary of Hang Seng Indices Return

	HSI Return	HSF Return	HSU Return	HSP Return	HSC Return
Mean	0.005141	0.001705	0.005542	0.005474	0.008155
Median	0.015226	0.009482	0.007853	0.010792	0.016485
Maximum	0.157634	0.168749	0.063044	0.194779	0.158592
Minimum	-0.254455	-0.308527	-0.200629	-0.317332	-0.224774
Std. Dev.	0.064111	0.070124	0.035504	0.082887	0.067106
Skewness	-0.814057	-0.911333	-1.808163	-0.554676	-0.823414
Kurtosis	5.156191	6.192873	11.05864	4.524242	4.479257
Observations	120	120	120	120	120

Because return was calculated with Logarithm difference; the number seems much smaller than the indexes. Mean return of most indexes were close, except Finance sub indexes were much lower. Hang Seng Index (HIS) had mean return of 0.005141, and Hang Seng Finance sub Index (HSF) had lowest mean return at 0.001705. Hang Seng Utilities sub Index (HSU)'s return was 0.005542 while Hang Seng Properties sub Index were just little below at 0.005474. Hang Seng Commerce & Industry (HSC) enjoyed highest return among these indexes at 0.008155. After comparing standard deviation, HSP had the most volatile return with standard deviation at 0.082887, while most stable index was the HSU with standard deviation of 0.035504. HSI, HSF, and HSC had close standard deviation with 0.064111, 0.070124, and 0.067106 relatively. All

indexes had negative skewness, which means return of all these indexes were more possible to have small gain and unlikely to have extreme loss.

5.2 Statistical Data Treatment

In order to have valid and best empirical test results, it is necessary to run several statistical tests about those sample data to make sure they are qualified for the model, and analysis method applied in this paper. Those tests were mentioned formerly in chapter 4. The coming part would then shows the results of those tests for verification.

5.2.1 Stationary Test

According to explanation in chapter 4, stationary of data would be tested with Unit root by method of Augmented Dickey-Fuller. T-statistic of each data set calculated by ADF would be compared with critical value for hypothesis below:

H_0: There is unit root in the data set

H1: There is no unit root in the data set

When t-statistic is greater than critical value, H_o cannot be rejected. Conversely, if t-statistic is less than critical, Ho would be rejected, hence the data is stationary. Results of test are shown below:

Table 5.4 Summary of Stationary test

	T-Statistic	Critical Value at 1% Level	Critical Value at 5% Level	Critical Value at 10% Level	Result
Retail Sales Change Surprise	-13.52852	-3.486064	-2.885863	-2.579818	Stationary
Unemployment Rate Surprise	-3.930744	-3.488063	-2.886732	-2.580281	Stationary
Trade of Balance Surprise	-9.235163	-3.486551	-2.886074	-2.579931	Stationary
Import Price Change Surprise	-11.86477	-3.486064	-2.885863	-2.579818	Stationary
Industrial Production Surprise	-9.673888	-3.486551	-2.886074	-2.579931	Stationary
CPI Surprise	-4.859642	-3.488585	-2.886959	-2.580402	Stationary
PPI Surprise	-12.93462	-3.486064	-2.885863	-2.579818	Stationary
Housing Market Index Surprise	-7.864241	-3.486064	-2.885863	-2.579818	Stationary
ISM Price Paid Surprise	-7.396044	-3.487046	-2.88629	-2.580046	Stationary
Non-Farm Payroll Surprise	-11.62689	-3.486064	-2.885863	-2.579818	Stationary
GDP Surprise	-11.06776	-3.486064	-2.885863	-2.579818	Stationary
HSC Return	-6.428788	-3.486551	-2.886074	-2.579931	Stationary
HSF Return	-10.19072	-3.486064	-2.885863	-2.579818	Stationary
HSI Return	-9.788571	-3.486064	-2.885863	-2.579818	Stationary
HSP Return	-11.0195	-3.486064	-2.885863	-2.579818	Stationary
HSU Return	-11.98289	-3.486064	-2.885863	-2.579818	Stationary

This table showed clearly all variables and data were stationary and can be applied to the empirical model accordingly.

5.2.2 Multicollinearity

High Simple Correlation Coefficient would be used to test Multicollinearity issue within sample data. After running this method, any variables that have correlation that is higher than 0.8 or lower than -0.8 with each other would be recognized as multicollinear. The test result proved all independent variables in this research had no Multicollinearity issue. Details are shown in the Correlation matrix table next page.

Table 5.5 Correlation Matrix of independent variables

	Non-Farm Payroll Surprise	ISM Price Paid Surprise	Housing starts Index Surprise	PPI Surprise	CPI Surprise	Industrial Production Surprise	Import Price Surprise	Trade Balance Surprise	Unemployment Rate Surprise	Retail Sales Price Surprise
Non-Farm Payroll Surprise	1.000	0.077	0.017	0.062	-0.055	0.049	0.025	-0.065	-0.003	0.022
ISM Price Paid Surprise	0.077	1.000	-0.042	0.308	0.251	0.003	0.312	-0.142	-0.085	0.110
Housing starts Index Surprise	0.017	-0.042	1.000	0.009	-0.056	-0.213	-0.151	-0.038	-0.003	0.035
PPI Surprise	0.062	0.308	0.009	1.000	0.389	0.057	0.377	-0.010	-0.027	0.032
CPI Surprise	-0.055	0.251	-0.056	0.389	1.000	-0.009	0.531	-0.063	-0.137	0.111
Industrial Production Surprise	0.049	0.003	-0.213	0.057	-0.009	1.000	-0.013	-0.132	-0.064	0.058
Import Price Surprise	0.025	0.312	-0.151	0.377	0.531	-0.013	1.000	0.209	-0.006	0.116
Trade Balance Surprise	-0.065	-0.142	-0.038	-0.010	-0.063	-0.132	0.209	1.000	-0.017	-0.077
Unemployment Rate Surprise	-0.003	-0.085	-0.003	-0.027	-0.137	-0.064	-0.006	-0.017	1.000	0.066
Retail Sales Price Surprise	0.022	0.110	0.035	0.032	0.111	0.058	0.116	-0.077	0.066	1.000

5.2.3 Serial Correlation

To decide whether Ordinary Least Square method could be used for running multiple linear regressions, the model and equation has to be no serial correlation problem. Different from previous to tests, this one is about equation not the variables alone. Breusch-Godfrey Serial Correlation LM test was applied for this serial correlation test in this paper.

Table 5.6 Serial Correlation Test result of each Hang Seng Index return with 11 US Macroeconomic announcements surprise

Equation	F-statistic	Prob. F(6,102)	Serial Correlation Issue
HSI Index Return:	0.644569	0.6943	No
HSF Index Return	0.85924	0.5276	No
HSU Index Return	0.672803	0.6718	No
HSP Index Return	0.282813	0.9439	No
HSC Index Return	0.570861	0.7527	No

Because there is no prob., value below 0.05, all equations about index return and macroeconomic announcements surprise have no serial correlation issue.

5.2.4 Heteroskedasticity

As in serial correlation; Heteroskedasticity should be tested before using Ordinary Least Square method as well. In this case, White test is used to decide whether the equation has Heteroskedasticity issue.

Table 5.7 Heteroskedasticity Test result of each Hang Seng Index return with 11 US Macroeconomic announcements surprise

Equation	F-statistic	Prob. F(11,108)	Heteroskedasticity Issue
HSI Index Return:	1.085826	0.3795	No
HSF Index Return	1.145579	0.3339	No
HSU Index Return	12.61064	0.000	Yes
HSP Index Return	0.502202	0.8981	No
HSC Index Return	0.731563	0.7061	No

When every prob. value of each equation is larger than 0.05 that equation can be said as no heteroskedasticity issue. With the test results shown above, almost all equations do not have this problem. However, the equation about HSU has 0.00 for all prob. value; it was found with heteroskedasticity issue. Hence, this equation would be adjusted with the method of White heteroskedasticity-consistent standard errors & covariance (Heteroskedasticity-Corrected Standard Error) when run equation.

5.3 Results of Hypothesis Tests

Regression analysis of Multiple linear regression is the model for testing significance of all hypothesis summarized in chapter 3, which is about impact of US macroeconomic announcements surprise upon Hong Kong Stock exchange index return. Equation again is exhibited below:

$$\mathrm{Re}t_t = \alpha + \beta_1 CPI_t + \beta_2 PPI_t + \beta_3 HS_t + \beta_4 IP_t + \beta_5 ISM_t + \beta_6 NP_t + \beta_7 RS_t + \beta_8 UR_t + \beta_9 GDP_t + \beta_{10} IPI_t + \beta_{11} BT_t + e_t$$

Hypothesis 1:

H1o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H1a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.8 Statistics of relationship between US CPI announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	CPI Surprise	-12.08591	-2.415593	0.0174

This table shows statistical results of Hypothesis 1. Because p-value is 0.0174 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus CPI surprise is negatively related with HSI return at coefficient of -12.08591

Hypothesis 2

H2o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H2a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.9 Statistics of relationship between US PPI announcement surprise and **HSI** index return

Dep. Var.	Indep. Var	Coefficient	t-Statistic	Prob.
HSI Return	PPI Surprise	0.014763	0.010694	0.9915

This table showed statistical results of Hypothesis 2. Because p-value is 0.9915 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between PPI surprise and HSI return is not significant with a coefficient at 0.014763.

Hypothesis 3

H3o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H3a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.10 Statistics of relationship between US Housing statistics announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	Housing Market Index Surprise	0.002013	0.826002	0.4106

This table showed statistical results of Hypothesis 3. Because p-value is 0.4106 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level

in this case. The relationship between Housing Market Index surprise and **HSI** return is not significant with a coefficient at 0.002013.

Hypothesis 4

H4o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H4a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.11 Statistics of relationship between US ISM PMI announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	ISM PMI Surprise	0.001604	1.424449	0.1572

This table showed statistical results of Hypothesis 4. Because p-value is 0.1572 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between ISM PMI surprise and HSI return is not significant with a coefficient at 0.001604.

Hypothesis 5

H5o There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H5a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.12 Statistics of relationship between US Nonfarm Payroll announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	Non-Farm Payroll Surprise	-8.06E-06	-0.097232	0.9227

This table showed statistical results of Hypothesis 5. Because p-value is 0.9227 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or **10%** confidence level in this case. The relationship between Non-Farm Payroll surprise and HSI return is not significant with a coefficient at -8.06E-06.

Hypothesis 6

H6o There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H6a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.13 Statistics of relationship between US Retail sales announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	Retail Sales Surprise	0.731039	0.624716	0.5335

This table showed statistical results of Hypothesis 6. Because p-value is 0.5335 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Retail Sales surprise and HSI return is not significant with a coefficient at 0.731039.

Hypothesis 7

H7o There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H7a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.14 Statistics of relationship between US Unemployment Rate announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	Unemployment Rate Surprise	-8.177322	-2.165159	0.0326

This table showed statistical results of Hypothesis 7. Because p-value is 0.0326 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus Unemployment Rate surprise is negatively related with HSI return at coefficient of -8.177322. -

Hypothesis 8

H8o There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H8a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.15 Statistics of relationship between US GDP announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	GDP Surprise	-1.298591	-0.92104	0.3591

This table showed statistical results of Hypothesis 8. Because p-value is 0.3591 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between GDP surprise and HSI return is not significant with a coefficient at -1.298591.

Hypothesis 9

H90 There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H9a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.16 Statistics of relationship between US Import Price announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	Import Price Surprise	2.247341	1.84649	0.0676

This table showed statistical results of Hypothesis 9. Because p-value is 0.0676 which is less than 0.10, null hypothesis would be rejected with 10% confidence level in this case. Thus Import Price surprise is positively related with HSI return at coefficient of 2.247341.

Hypothesis 10

H10o There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H10a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.17 Statistics of relationship between US Balance of Trade announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	Balance of Trade Surprise	0.0009	0.544396	0.5873

This table showed statistical results of Hypothesis 10. Because p-value is 0.5873 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Balance of Trade surprise and **HSI** return is not significant with a coefficient at 0.0009.

Hypothesis 11

H11o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013.

H11a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Index during year 2004 and year 2013.

Table 5.18 Statistics of relationship between US Industrial Production announcement surprise and HSI index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSI Return	Industrial Production Surprise	3.33911	2.374815	0.0193

This table showed statistical results of Hypothesis 11. Because p-value is 0.0193 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus Industrial Production surprise is positively related with **HSI** return at coefficient of 3.33911.

Hypothesis 12

H12o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H12a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.19 Statistics of relationship between US CPI announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	CPI Surprise	-12.01541	-2.220193	0.0285

This table showed statistical results of Hypothesis 12. Because p-value is 0.0285 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus CPI surprise is negatively related with HSF return at coefficient of -12.01541.

Hypothesis 13

H13o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H13a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.20 Statistics of relationship between US PPI announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	PPI Surprise	-0.691225	-0.4629	0.6444

This table showed statistical results of Hypothesis 13. Because p-value is 0.6444 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between PPI surprise and HSF return is not significant with a coefficient at -0.691225.

Hypothesis 14

H14o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H14a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.21 Statistics of relationship between US Housing statistics announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	Housing Market Index Surprise	0.002909	1.103835	0.2721

This table showed statistical results of Hypothesis 14. Because p-value is 0.2721 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Housing Market Index surprise and HSF return is not significant with a coefficient at 0.002909.

Hypothesis 15

H15o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H15a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.22 Statistics of relationship between US ISM PMI announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	ISM PMI Surprise	0.002908	2.387747	0.0187

This table showed statistical results of Hypothesis 15. Because p-value is 0.0187 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus ISM PMI surprise is positively related with HSF return at coefficient of 0.002908.

Hypothesis 16

H16o There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

1116a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.23 Statistics of relationship between US Nonfarm Payroll announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	Non-Farm Payroll Surprise	2.64E-05	0.294081	0.7693

This table showed statistical results of Hypothesis 16. Because p-value is 0.7693 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Non-Farm Payroll surprise and HSF return is not significant with a coefficient at 2.64E-05.

Hypothesis 17

H17o There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H17a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.24 Statistics of relationship between US Retail sales announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	Retail Sales Surprise	1.063108	0.8399	0.4028

This table showed statistical results of Hypothesis 17. Because p-value is 0.4028 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Retail Sales surprise and HSF return is not significant with a coefficient at 1.063108.

Hypothesis 18

H18o There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H18a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.25 Statistics of relationship between US Unemployment Rate announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	Unemployment Rate Surprise	-8.436806	-2.065211	0.0413

This table showed statistical results of Hypothesis 18. Because p-value is 0.0413 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus Unemployment Rate surprise is negatively related with HSF return at coefficient of -8.436806.

Hypothesis 19

H190 There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H19a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.26 Statistics of relationship between US GDP announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	GDP Surprise	-2.011943	-1.319257	0.1899

This table showed statistical results of Hypothesis 19. Because p-value is 0.1899 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between GDP surprise and HSF return is not significant with a coefficient at -2.011943.

Hypothesis 20

H20o There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.28 Statistics of relationship between US Balance of Trade announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	Balance of Trade Surprise	0.000374	0.209048	0.8348

This table showed statistical results of Hypothesis 21. Because p-value is 0.8348 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Balance of Trade surprise and HSF return is not significant with a coefficient at 0.000374.

Hypothesis 22

H22o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

H22a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013.

Table 5.29 Statistics of relationship between US Industrial Production announcement surprise and HSF index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSF Return	Industrial Production Surprise	3.587458	2.358812	0.0201

This table showed statistical results of Hypothesis 22. Because p-value is 0.0201 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus Industrial Production surprise is positively related with HSF return at coefficient of 3.587458.

Hypothesis 23

H23o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H23a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.30 Statistics of relationship between US CPI announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	CPI Surprise	-2.50332	-0.869229	0.3866

This table showed statistical results of Hypothesis 23. Because p-value is 0.3866 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between CPI surprise and HSU return is not significant with a coefficient at -2.50332.

Hypothesis 24

H24o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H24a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.31 Statistics of relationship between US PPI announcement surprise and HSU index return

Dep. Var.	Indep. Var	Coefficient	t-Statistic	Prob.
HSU Return	PPI Surprise	-0.019337	-0.021946	0.9825

This table showed statistical results of Hypothesis 24. Because p-value is 0.9825 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between PPI surprise and HSU return is not significant with a coefficient at -0.019337.

Hypothesis 25

H25o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H25a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.32 Statistics of relationship between US Housing statistics announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	Housing Market Index Surprise	0.00063	0.333104	0.7397

This table showed statistical results of Hypothesis 25. Because p-value is 0.7397 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Housing Market Index surprise and HSU return is not significant with a coefficient at 0.00063.

Hypothesis 26

H26o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H26a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.33 Statistics of relationship between US ISM PMI announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	ISM PMI Surprise	0.001811	1.601989	0.1121

This table showed statistical results of Hypothesis 26. Because p-value is 0.1121 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between ISM PMI surprise and HSU return is not significant with a coefficient at 0.001811.

Hypothesis 27

H27o There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H27a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.34 Statistics of relationship between US Nonfarm Payroll announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	Non-Farm Payroll Surprise	-3.16E-05	-0.760125	0.4488

This table showed statistical results of Hypothesis 27. Because p-value is 0.4488 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Non-Farm Payroll surprise and HSU return is not significant with a coefficient at -3.16E-05.

Hypothesis 28

H28o There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H28a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.35 Statistics of relationship between US Retail sales announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	Retail Sales Surprise	-0.230348	-0.333979	0.739

This table showed statistical results of Hypothesis 28. Because p-value is 0.739 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Retail Sales surprise and HSU return is not significant with a coefficient at -0.230348.

Hypothesis 29

H290 There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H29a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.36 Statistics of relationship between US Unemployment Rate announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	Unemployment Rate Surprise	-0.59267	-0.328225	0.7434

This table showed statistical results of Hypothesis 29. Because p-value is 0.7434 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Unemployment Rate surprise and HSU return is not significant with a coefficient at -0.59267.

Hypothesis 30

H30o There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

1130d There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.37 Statistics of relationship between US GDP announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	GDP Surprise	-1.262482	-1.806397	0.0736

This table showed statistical results of Hypothesis 30. Because p-value is 0.0736 which is less than 0.1, null hypothesis would be rejected with 10% confidence level in this case. Thus **GDP** surprise is negatively related with HSU return at coefficient of -1.262482.

Hypothesis 31

H31o There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H31a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.38 Statistics of relationship between US Import Price Index announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	Import Price Surprise	0.627456	1.03517	0.3029

This table showed statistical results of Hypothesis 31. Because p-value is 0.3029 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Import Price surprise and HSU return is not significant with a coefficient at 0.627456.

Hypothesis 32

H32o There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H32a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.39 Statistics of relationship between US Balance of Trade announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	Balance of Trade Surprise	0.000187	0.182331	0.8557

This table showed statistical results of Hypothesis 32. Because p-value is 0.8557 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level **in** this case. The relationship between Balance of Trade surprise and HSU return is not significant with a coefficient at 0.000187.

Hypothesis 33

H33o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

H33a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013.

Table 5.40 Statistics of relationship between US Industrial Production announcement surprise and HSU index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSU Return	Industrial Production Surprise	1.478439	0.817399	0.4155

This table showed statistical results of Hypothesis 33. Because p-value is 0.4155 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Industrial Production surprise and HSU return is not significant with a coefficient at 1.478439.

Hypothesis 34

H34o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H34a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.41 Statistics of relationship between US CPI announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	CPI Surprise	-15.5448	-2.352003	0.0205

This table showed statistical results of Hypothesis 34. Because p-value is 0.0205 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus CPI surprise is negatively related with HSP return at coefficient of -15.5448.

Hypothesis 35

H35o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H35a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.42 Statistics of relationship between US PPI announcement surprise and HSP index return

Dep. Var.	Indep. Var	Coefficient	t-Statistic	Prob.
HSP Return	PPI Surprise	1.280964	0.702434	0.4839

This table showed statistical results of Hypothesis 35. Because p-value is 0.4839 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between PPI surprise and HSP return is not significant with a coefficient at 1.280964.

Hypothesis 36

H36o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H36a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.43 Statistics of relationship between US Housing statistics announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	Housing Market Index Surprise	0.003403	1.057356	0.2927

This table showed statistical results of Hypothesis 36. Because p-value is 0.2927 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Housing Market Index surprise and HSP return is not significant with a coefficient at 0.003403.

Hypothesis 37

H37o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H37a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.44 Statistics of relationship between US ISM PMI announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	ISM PMI Surprise	-0.000434	-0.291542	0.7712

This table showed statistical results of Hypothesis 37. Because p-value is 0.7712 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between ISM PMI surprise and HSP return is not significant with a coefficient at -0.000434.

Hypothesis 38

H38o There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H38a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.45 Statistics of relationship between US Nonfarm Payroll announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	Non-Farm Payroll Surprise	-2.99E-05	-0.272644	0.7856

This table showed statistical results of Hypothesis 38. Because p-value is 0.7856 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Non-Farm Payroll surprise and HSP return is not significant with a coefficient at -2.99E-05.

Hypothesis 39

H390 There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H39a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.46 Statistics of relationship between US Retail sales announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	Retail Sales Surprise	-0.638278	-0.412915	0.6805

This table showed statistical results of Hypothesis 39. Because p-value is 0.6805 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Retail Sales surprise and HSP return is not significant with a coefficient at -0.638278.

Hypothesis 40

H40o There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H40a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.47 Statistics of relationship between US Unemployment Rate announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	Unemployment Rate Surprise	-8.674806	-1.738789	0.0849

This table showed statistical results of Hypothesis 40. Because p-value is 0.0849 which is less than 0.1, null hypothesis would be rejected with 10% confidence level in this case. Thus Unemployment Rate surprise is negatively related with HSP return at coefficient of -8.674806.

Hypothesis 41

H410 There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H41a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.48 Statistics of relationship between US GDP announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	GDP Surprise	-1.581499	-0.849148	0.3977

This table showed statistical results of Hypothesis 41. Because p-value is 0.3977 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between GDP surprise and HSP return is not significant with a coefficient at -1.581499.

Hypothesis 42

H42o There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H42a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.49 Statistics of relationship between US Import Price Index announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	Import Price Surprise	3.699449	2.301037	0.0233

This table showed statistical results of Hypothesis 42. Because p-value is 0.0233 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus Import Price surprise is positively related with HSP return at coefficient of 3.699449.

Hypothesis 43

H43o There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H43a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.50 Statistics of relationship between US Balance of Trade announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	Balance of Trade Surprise	0.001778	0.814445	0.4172

This table showed statistical results of Hypothesis 43. Because p-value is 0.4172 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Balance of Trade surprise and HSP return is not significant with a coefficient at 0.001778.

Hypothesis 44

H44o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

H44a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013.

Table 5.51 Statistics of relationship between US Industrial Production announcement surprise and HSP index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSP Return	Industrial Production Surprise	2.913189	1.568469	0.1197

This table showed statistical results of Hypothesis 44. Because p-value is 0.1197 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Industrial Production surprise and HSP return is not significant with a coefficient at 2.913189.

Hypothesis 45

H45o There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H45a There is a significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.52 Statistics of relationship between US CPI announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	CPI Surprise	-12.60088	-2.397346	0.0182

This table showed statistical results of Hypothesis 45. Because p-value is 0.0182 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus CPI surprise is negatively related with HSC return at coefficient of -12.60088.

Hypothesis 46

H46o There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H46a There is a significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.53 Statistics of relationship between US PPI announcement surprise and HSC index return

Dep. Var.	Indep. Var	Coefficient	t-Statistic	Prob.
HSC Return	PPI Surprise	0.598887	0.412944	0.6805

This table showed statistical results of Hypothesis 46. Because p-value is 0.6805 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between PPI surprise and HSC return is not significant with a coefficient at 0.598887.

Hypothesis 47

H47o There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H47a There is a significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.54 Statistics of relationship between US Housing statistics announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	Housing Market Index Surprise	0.000962	0.375754	0.7078

This table showed statistical results of Hypothesis 47. Because p-value is 0.7078 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Housing Market Index surprise and HSC return is not significant with a coefficient at 0.000962.

Hypothesis 48

H48o There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H48a There is a significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.55 Statistics of relationship between US ISM PMI announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	ISM PMI Surprise	0.000591	0.500042	0.6181

This table showed statistical results of Hypothesis 48. Because p-value is 0.6181 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between ISM PMI surprise and HSC return is not significant with a coefficient at 0.000591.

Hypothesis 49

H490 There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H49a There is a significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.56 Statistics of relationship between US Nonfarm Payroll announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	Non-Farm Payroll Surprise	-3.54E-05	-0.406735	0.685

This table showed statistical results of Hypothesis 49. Because p-value is 0.685 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Non-Farm Payroll surprise and HSC return is not significant with a coefficient at -3.54E-05.

Hypothesis 50

H50o There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H50a There is a significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.57 Statistics of relationship between US Retail sales announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	Retail Sales Surprise	0.825827	0.671764	0.5032

This table showed statistical results of Hypothesis 50. Because p-value is 0.5032 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Retail Sales surprise and HSC return is not significant with a coefficient at 0.825827.

Hypothesis 51

H51o There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H51a There is a significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.58 Statistics of relationship between US Unemployment Rate announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	Unemployment Rate Surprise	-9.198096	-2.31826	0.0223

This table showed statistical results of Hypothesis 51. Because p-value is 0.0223 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus Unemployment Rate surprise is negatively related with HSC return at coefficient of -9.198096.

Hypothesis 52

H52o There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H52a There is a significant relationship between the US GDP announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.59 Statistics of relationship between US GDP announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	GDP Surprise	-0.502267	-0.339099	0.7352

This table showed statistical results of Hypothesis 52. Because p-value is 0.7352 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between GDP surprise and HSC return is not significant with a coefficient at -0.502267.

Hypothesis 53

H53o There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H53a There is a significant relationship between the US Import Price announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.60 Statistics of relationship between US Import Price Index announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	Import Price Surprise	2.217351	1.734195	0.0857

This table showed statistical results of Hypothesis 53. Because p-value is 0.0857 which is less than 0.1, null hypothesis would be rejected with 10% confidence level in this case. Thus Import Price surprise is positively related with HSC return at coefficient of 2.217351.

Hypothesis 54

H54o There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H54a There is a significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.61 Statistics of relationship between US Balance of Trade announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	Balance of Trade Surprise	0.001296	0.746417	0.457

This table showed statistical results of Hypothesis 54. Because p-value is 0.457 which is greater than 0.05 and 0.10, null hypothesis cannot be rejected within 5% or 10% confidence level in this case. The relationship between Balance of Trade surprise and HSC return is not significant with a coefficient at 0.001296.

Hypothesis 55

H55o There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

H55a There is a significant relationship between the US Industrial Production and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013.

Table 5.62 Statistics of relationship between US Industrial Production announcement surprise and HSC index return

Dep. Var.	Indep. Var.	Coefficient	t-Statistic	Prob.
HSC Return	Industrial Production Surprise	3.455475	2.339334	0.0212

This table showed statistical results of Hypothesis 55. Because p-value is 0.0212 which is less than 0.05, null hypothesis would be rejected with 5% confidence level in this case. Thus Industrial Production surprise is positively related with HSC return at coefficient of 3.455475.

Chapter 6

Summary Findings, Conclusions and Recommendations

This chapter is the summary of the whole research results. First part is about summarizing statistical results from data analysis. Detailed discussions about these results are in the next part, and conclusion would be drawn based on all information found and discussed. Finally, recommendation on issues revealed in research is stated in the last part, together with advice for future studies.

6.1 Summary of Findings

This research studied relationship between return of five Hong Kong Stock market index and eleven US macroeconomic news announcements surprise in 10 years from 2004 to 2013 in order to find out connection of Hong Kong equity market to global leading economy, US' movement. Based on results of 55 hypotheses ran, return of all five indexes had significant coefficient to some of the eleven US announcements surprise variables, even strength of significance were different with different indexes. However, an empirical result is valid enough to conclude that, Hong Kong equity market is partially related to US macroeconomic condition.

Level of confidence is 0.05 and 0.1 or 5% and 10%; null hypothesis is rejected when the p value from calculation is smaller than it. Following tables are summary of each hypothesis result; they exhibited which news surprise factors were exactly affecting Hong Kong Stock market's index return.

Table 6.1 Results of Hypothesis Tests of Hang Seng Index

No.	Null Hypothesis Ho	Coefficient	Prob.	Result
1	There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	-12.08591	0.0174	Reject Ho
2	There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	0.014763	0.9915	Fail to reject Ho
3	There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	0.002013	0.4106	Fail to reject Ho
4	There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	0.001604	0.1572	Fail to reject Ho
5	There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	-8.06E-06	0.9227	Fail to reject Ho
6	There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	0.731039	0.5335	Fail to reject Ho

7	There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	-8.177322	0.0326	Reject Ho
8	There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	-1.298591	0.3591	Fail to reject Ho
9	There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	2.247341	0.0676	Reject Ho
10	There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	0.0009	0.5873	Fail to reject Ho
11	There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Index during year 2004 and year 2013	3.33911	0.0193	Reject Ho

There are four US announcements surprise found significantly related to Hang Seng Index. They are CPI, Unemployment Rate, Import Price, and Industrial Production. All these four factors have strong significance on HSI return, as their p value is low and close to 0.01, except the Import Price whose p value is at 0.0676, which is still not weak.

Table 6.2 Results of Hypothesis Tests of Hang Seng Finance Sub-Index

No.	Null Hypothesis Ho	Coefficient	Prob.	Result
	There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	-12.01541	0.0285	Reject Ho
2	There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	-0.691225	0.6444	Fail to reject Ho
3	There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	0.002909	0.2721	Fail to reject Ho
4	There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	0.002908	0.0187	Reject Ho
5	There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	2.64E-05	0.7693	Fail to reject Ho
6	There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	1.063108	0.4028	Fail to reject Ho

7	There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	-8.436806	0.0413	Reject Ho
8	There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	-2.011943	0.1899	Fail to reject Ho
9	There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	2.235264	0.0924	Reject Ho
10	There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	0.000374	0.8348	Fail to reject Ho
11	There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Finance Sub-index during year 2004 and year 2013	3.587458	0.0201	Reject Ho

There are totally five US announcements surprise approved to be significant influence factors on Hang Seng Finance sub-index return. They are CPI, ISM PMI, Unemployment Rate, Import Price, and Industrial Production. Only Import Price showed weak significance at 0.0924, the others are strong.

Table 6.3 Results of Hypothesis Tests of Hang Seng Utilities Sub-Index

No.	Null Hypothesis Ho	Coefficient	Prob.	Result
1	There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	-2.50332	0.3866	Fail to reject Ho
2	There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	-0.019337	0.9825	Fail to reject Ho
3	There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	0.00063	0.7397	Fail to reject Ho
4	There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	0.001811	0.1121	Fail to reject Ho
5	There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	-3.16E-05	0.4488	Fail to reject Ho
6	There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	-0.230348	0.739	Fail to reject Ho

7	There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	-0.59267	0.7434	Fail to reject Ho
8	There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	-1.262482	0.0736	Reject Ho
9	There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	0.627456	0.3029	Fail to reject Ho
10	There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	0.000187	0.8557	Fail to reject Ho
11	There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Utilities Sub-index during year 2004 and year 2013	1.478439	0.4155	Fail to reject Ho

There is only one US announcement surprise that is significantly related to Hang Seng Utilities sub-index return. It is the GDP. Its p value is at 0.0736, significance of hypothesis result is not very strong, but still valid.

Table 6.4 Results of Hypothesis Tests of Hang **Seng** Properties Sub-Index

No.	Null Hypothesis Ho	Coefficient	Prob.	Result
1	There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	-15.5448	0.0205	Reject Ho
2	There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	1.280964	0.4839	Fail to reject Ho
3	There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	0.003403	0.2927	Fail to reject Ho
4	There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	-0.000434	0.7712	Fail to reject Ho
5	There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	-2.99E-05	0.7856	Fail to reject Ho
6	There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	-0.638278	0.6805	Fail to reject Ho

7	There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	-8.674806	0.0849	Reject Ho
8	There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	-1.581499	0.3977	Fail to reject Ho
9	There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	3.699449	0.0233	Reject Ho
10	There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	0.001778	0.4172	Fail to reject Ho
11	There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Properties Sub-index during year 2004 and year 2013	2.913189	0.1197	Fail to reject Ho

There are a few US announcements surprises that have significant relationship with Hang Seng Properties sub-index return. They are CPI, Unemployment Rate, and Import Price. Both CPI and Import Price showed strong validity with p value around 0.02 while Unemployment Rate is weak at 0.0849.

Table 6.5 Results of Hypothesis Tests of Hang Seng Commerce & Industry Sub-Index

No.	Null Hypothesis Ho	Coefficient	Prob.	Result
1	There is no significant relationship between the US Consumer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	-12.60088	0.0182	Reject Ho
2	There is no significant relationship between the US Producer Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	0.598887	0.6805	Fail to reject Ho
3	There is no significant relationship between the US Housing statistics announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	0.000962	0.7078	Fail to reject Ho
4	There is no significant relationship between the US ISM PMI announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	0.000591	0.6181	Fail to reject Ho
5	There is no significant relationship between the US Nonfarm Payroll announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	-3.54E-05	0.685	Fail to reject Ho
6	There is no significant relationship between the US Retail sales announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	0.825827	0.5032	Fail to reject Ho

7	There is no significant relationship between the US Unemployment Rate announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	-9.198096	0.0223	Reject Ho
8	There is no significant relationship between the US GDP announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	-0.502267	0.7352	Fail to reject Ho
9	There is no significant relationship between the US Import Price Index announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	2.217351	0.0857	Reject Ho
10	There is no significant relationship between the US Balance of Trade announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	0.001296	0.457	Fail to reject Ho
11	There is no significant relationship between the US Industrial Production announcement surprise and index return of the Hang Seng Commerce & Industry Sub-index during year 2004 and year 2013	3.455475	0.0212	Reject Ho

There are four US announcements surprises that have significant relationship with Hang Seng Commerce & Industry sub-index return. They are CPI, Unemployment Rate, Import Price, and Industrial Production. Three of these factors showed strong significance, except Import Price is weak at 0.0857.

Overall, several US news surprise variable are confirmed to have impact on Hong Kong stock market index return, as CPI, **ISM** PMI, Unemployment Rate, GDP, Import Price, and Industrial Production. The remaining variables fail to find any significant relationship with index return in Hong Kong equity market as PPI, Housing Market index, Nonfarm Payroll, Retail sales, Balance of Trade.

6.2 Discussions and Conclusions

In spite of prolonged dispute about market efficiency between academics, it is still difficult to find solid evidence to reject the opinion that, asset price is determined by how the market perceived accessible and arriving information, then how it responded based on that perception. Thus, information is still critical to asset pricing in this case, information is not what was announced but difference of market expectation from that announcement. Along with the globalization, economy in most countries cannot stand by itself anymore; local market seems reacting to foreign news as well as the world is integrated with international trade and investment. This was even more obvious during economic crisis like subprime mortgages crisis in 2007. After this research, it approved information about US macro economy do have influence on Hong Kong equity market return even though not all news surprise factors tested have significant hypothesis results. Therefore, it can be said that US economy do affect, but only partially on Hong Kong equity market. Or in other words, Hong Kong equity market is reacting only to several perspectives of US economy.

CPI and Import Price can be grouped as pricing information or inflation. Because for countries importing a lot like US, Import Price can be important to CPI as well. Industrial Production

shows about current status of business cycle and economy growth. This indicator will finally reflect in Unemployment Rate and GDP. So these three factors can be grouped as real economy indicator. The last indicator **ISM PMI** (Institute of Supply Management Purchasing Manager Index) which is leading indicator shows how markets see economy in future, is different from others, in the sense that it is the only indicator significantly related to Hang Seng Finance sub-Index, but no other indexes did.

To sum up, investors in Hong Kong equity market reacted to general economy condition in US, but those who invested specifically in financial sectors also concern about forward-looking of US economy. Beside these statistical results, another reason may be one of causes to have this significant relationship. US was the biggest overseas investing country in Hong Kong equity cash market by trading value, counted 28% according to data in year 2013.

Detailed discussions of each individual variable studied are listed and explained below:

6.2.1 Consumer Price Index Discussion

The hypothesis results regarding US Consumer Price Index (CPI) surprise and Hong Kong stock market index return confirmed a significant negative relationship between them. This relationship is valid among all indexes sampled as Hang Seng Index, HSI finance sub-Index, HSI properties sub-Index, and HSI commerce & industry sub-Index. This means when US CPI or inflation rate is actually showed higher than forecasted, return in of Hong Kong Stock market, and those sub-sectors will suffer lost, except HSI utilities sub-Index, which showed no significant relationship to this news surprise. On the other hand, if inflation is lower than market

previously believed, return will be positive. Because coefficient resulted from the multiple linear regression model are around -12 and -15 (HSI -12.086, HSF -12.015, HSP -15.545, HSC -12.600), it means sensitivity of these relationships are high. This result is reasonable, as CPI is easily recognized as one of the most important and popular macroeconomic indexes toward most investors, academics, and policy makers are paying attention. With years of the Quantitative easing policy, inflation is one major concern under this policy. In research of Kim (2003) showed similar results that surprise of CPI announcement from US had significant impact on Asia Pacific market like in Australia, Japan, Hong Kong, and Singapore. In contrast, that relationship was positive rather than negative in this research. This may be because Kim (2003) tested with more frequent data as daily return, whereas it is monthly in this research. Fang, *et al* (2008) also found negative relationship between CPI surprise and stock index return, but that research was conducted within Australia by Australian CPI and stock index (All Ordinary Index).They thought when inflation were high it would cause higher interest rate as well as discount rate in equity market, so return would be affected too.

6.2.2 Producer Price Index Discussion

The US Producer Price Index (PPI) surprise has no significant effect on Hong Kong equity market return with all five Hang Seng Indexes tested. This is contrast to what Nikkinen *et al.*,(2006) found in the region of Developed Asia, which showed US PPI surprise had significant and positive relationship with equity return in this region. Still, significant but negative relationship between PPI and US bond market was found by Balduzzi *et al.*, (2001). PPI is the index measured price paid by producers and also wholesalers. It was previously called Wholesale

price Index. One very important function of PPI for investors is the reference of CPI. CPI is announced few days later after PPI, and it is believed, any cost change in manufacturers and wholesalers, would finally pass to consumer. This is because Balduzzi *et al.,* (2001) and Nikkinenet *al.,* (2006) tested daily return on announcement day, it made sense for their result with significance. Although this research looks at monthly return, CPI would be announced just few days after PPI, in this case, it is reasonable for the return moved along with CPI but not PPI. For those investors who focus on monthly return rather than daily return, CPI is a better index to watch than PPI.

6.2.3 Housing Market Index Discussion

The US Housing Market Index surprise has been found no significant relationship with Hong Kong equity market index return. Even Nguyen, (2011) found this index surprise was negatively affecting Vietnamese stock market return, and Brazys *et al.*,(2014)found it negatively influence return of US 10-years bond future 1 minute after announcement. Nonetheless, this research approved outlook of US housing building industries is not interested for those investors in Hong Kong equity market. This is an indicator specifically for single-family house construction sector, which is not as broad as other macroeconomic indicators like GDP, Inflation. This might be because Hong Kong equity market investors are only interested in information about general economy condition, but are not in some industry-specific information.

6.2.4 ISM PMI Discussion

The US ISM PMI (Institute of Supply Management Purchasing Manager Index) surprise has been found significant relationship with Hong Kong Stock market index return in Hang Seng Finance sub-Index only. But this relationship does not exist in other sub-Indexes and HSI. This demonstrates Finance sector in Hong Kong equity market is affected by sensitivity regarding US manufacturing industry condition. Yet, this indicator included information about growth and GDP condition of US as well. In case of positive surprise, means expectation about economic growth is better than was thought before. Despite HSI finance sub-Index is positively correlated to this surprise information, but their relationship is kind of weak due to its coefficient at 0.002908. Balduzzi *et al.,* (2001) approved the ISM PMI surprise changes would affect bond pricing in US Bond market. Even ISM PMI was announced mostly at same time with Construction spending, Balduzzi *et al.,*(2001) confirmed in his research, those price changes came from ISM PMI, not construction spending. Brazys *et al.*, (2014) found same result with sample of US bond future market.

6.2.5 Non-Farm Payroll Discussion

The US Non-Farm Payroll surprise is not significantly correlated to Hong Kong equity market index return in this research. No matter if this announcements was higher or lower than market expectation, the difference between them, has no impact on index return in Hong Kong. Nguyen (2011) got different answer as Non-farm Payroll had significant relationship on return of Vietnamese stock market. Balduzzi *et al.,* (2001) also found Non-Farm Payroll surprise was very

important announcement affecting bonds price in US market. The different answer from different research could be because of the market difference and data frequency used in studies.

6.2.6 Retail Sales Discussion

The US Retails sales change surprise doesn't have statistically significant impact on Hong Kong Equity index return. When retail sales changed different from what market expected, Hong Kong stock market seems like not reacting to that surprise. Büttner *et al.,* (2012) found the US retails sales change surprise did significantly move Poland and Hungarian stock market, even that correlation was not very strong. Moreover, this significant relationship disappeared since 2002 after these countries entered Euro zone. Instead, Germany retail sales surprise became important and significant to that ECC-3 countries stock market. This testified relationship between macroeconomic surprise and equity market return can be changed over time and economic condition.

6.2.7 Unemployment Rate Discussion

The US Unemployment Rate surprise is confirmed having significant relationship with Hong Kong equity market index return as Hang Seng Index (HSI) (-8.1773), HSI Finance sub-Index (-8.4368), HSI Properties sub-Index (-8.6748), and HSI Commerce & Industries sub-index (-9.198). All of these relationships are negative, which means if actual Unemployment Rate was lower than expected, investors can expect positive return. Conversely, if unemployment surprise is positive, it means announcement is higher than forecast, and return would be negative. This is

quite reasonable, because negative surprise means better economy condition than thought. This result is contrary to what Kim (2003) found in Advanced Asia Pacific stock market. Kim (2004) found Hang Seng Index was positively correlated to US Unemployment Rate. In his research, he believed negative surprise, better than expected employment status led to interest rate increase for potential inflation that will cause cash outflow from stock market. However, in this research with monthly return study, market and investors have more time to adjust price with this surprise information. In this case, investors in Hong Kong equity market could think better US economy would finally reflect in financial sectors gradually.

6.2.8 Gross Domestic Product Discussion

The US GDP surprise has been approved having significant negative relationship in Hong Kong equity market with HSI Utilities sub-Index return. This result conflicts with what Fuss *et al.,*(2014) found GDP surprise had positive relationship with US Real Estate Investment Trust (REIT) return. But Büttner *et al.,* (2012)'s research result in Czech stock market was consistent with negative relationship. Beside these two results, some other research failed to approve significance of this relationship like Kim (2003) in Advanced Asia Pacifica stock market, Nikkinen *et al.,* (2006) in seven regions' stock market in the world (G7, Europe, Asia Developed, Asia Emerging, Transition economies, and Latin America). As this study on Hong Kong market, HSI Utilities sub-Index includes companies of energy services providers like water, electricity providers. Demand of these companies is more stable than companies in other industries. One possible reason for this negative relationship could be, when general economy is better, capitals

tends to flow into other sectors that might provide better profits. In contrast, when economy worsens, Utilities industry could be a safe shelter for their capitals.

6.2.9 Import Price Discussion

The US Import Price surprise approved having positive significant relationship with Hong Kong equity market index return in most indexes tested, like in **HSI,** HSF, HSP, and HSC. When the price level of imported goods in US was higher than expected, Hong Kong stock market could benefit positively from that news surprise. Nikkinen *et al.,* (2006) found the same sign relationship in Asia emerging market. But Balduzzi *et al.,* (2001) failed to find any significant relationship of this news surprise in US Bond market. Normally, higher Import Price Index means higher global news that could be bad news for equity market, as high inflation would lead to high interest rate, and then stock price would be lower. But it also could be recognized as good news for local manufacturers in US. Thus Hong Kong equity market could possibly react accordingly.

6.2.10 Balance of Trade Discussion

The US Balance of Trade (BOT) surprise cannot be found with significant relationship with Hong Kong equity market index return. Because US BOT had been always negative during this research sample period, positive BOT surprise means fewer deficits, not the actual BOT surplus. Hence positive surprise means more cash inflow from export than import than expected. However, this test results shows US import-export status does not affect Hong Kong's equity

market. Despite, Kim (2003) found negative relationship of this news surprise in all Advance Asia Pacific stock market daily return except Australia, and Brazys *et al.*, (2014) approved negative relationship in US Treasury market. It has been long for US having deficit BOT and many professionals argues that is not bad sign in some situation. This news may affect those big trading partner of US like China, Japan and Europe, but Hong Kong barely depends its economy on export of goods and manufacturing, seems isolated from this news-surprise.

6.2.11 Industrial Production Discussion

The US Industrial Production surprise has been approved a positive significant relationship with Hong Kong equity market index return in Hang Seng Index, HSI Finance sub-Index, HSI Commerce & Industries sub-Index. Büttner *et al.,* (2012) could not find any significant relationship of this news surprise in Poland, Hungary, and Czech stock market, as they were more closely related to European news. But Nguyen (2011) found positive relationship in Vietnamese stock market like this research as well. Positive surprise of Industrial Production means the economy growing better than expected; this could give more confidence to investors in equity market. Although someone argues this may lead to potential economic overheating issue, this research confirms this issue is not feasible to monthly index return.

6.3 Recommendations and Further Researches

6.3.1 Recommendations

With all studies and hypotheses results, US macroeconomic announcements surprises have been verified to be significantly influential on Hong Kong's equity market. Consequently, local, foreign investors from US and UK, including both retail and institute investors, policy makers and company financial directors can benefit from this paper addition to those direct cash market investors in Hong Kong Stock market.

6.3.1.1 For those local investors, if they are not watching trend of stock market everyday and investing with short-term quick buy-sell technique, they should better pay more attention on news about the US, especially those news variables found significant relationship in this paper. They should not only focus on local news about Hong Kong. In case they do not have access to those professional forecasts, which is not free, at least they can get some hints from interview of some professionals, and not just listening to their advice about buying and selling decision, but their outlook on macroeconomic status. For those local institute investors, they have much better capital support and information availability; they should keep close watch at those valid news variables and adjust their investments in stock market. Even if this paper help find some influential factors from US; they still cannot ignore other factors from local and other areas. This is due to limitation of the multiple linear regressions Model.

6.3.1.2 For those overseas investors like US, UK, when they invest in Hong Kong, mostly it is just one investment in their portfolio. This is because investors rarely invest solely in one foreign country. It is for diversification purpose for this kind of investment. For these investors, they should be careful about which news to monitor when investing in different sectors. Nevertheless, this paper only applies to Hong Kong stock market, so when they invest in other markets, they may use this same model, but need to test again. This is because some news might be good for some countries, but bad for the others. Beyond those news variables approved, investors should also be sensitive to some big politics and Economic transforming. For example, the ECC-3 country was affected by US news surprise, but that effect gradually diminished since they entered Euro zone. The same scenario could surface in Hong Kong as it becomes more integrated with the Mainland China.

6.3.1.3 For those financial directors in listed companies in Hong Kong stock market, if their goal is to maximize the value for shareholders, it is not enough only to focus on internal operation; they should also pay attention on factors that would affect stock price. They should keep constant check on the US macroeconomic consensus forecast and current situation before making financing plan like new shares issuance, shares repurchase and dilution etc.,

6.3.1.4 The reason why Hong Kong equity market are affected by US macroeconomic news information, could be because of the US leadership of in global economy, and also the proportion of US investors in Hong Kong stock market. It is not difficult to find the tag

of international financial center for Hong Kong, but its major foreign investors come from US, UK, and some other European countries. For investors from other countries like Japan, Singapore, and Australia, there are in significant few. Hence, the policy maker in Hong Kong should make an effort to attract more investors from elsewhere, rather than US and UK. In this way, Hong Kong equity market can become diversified and influential widespread.

6.3.2 Further researches

The test result of this paper is differed from some other similar previous studies, and that difference could be from different causes; it would be valuable and interested for further studies based on those differences.

Firstly, many similar studies used high frequency data as daily return for test; this could be the reason why their test results were different with the monthly data of this paper. It could be very useful to compare the daily return and monthly return in the same sample period, market and variables. Investors can have better understanding about duration of holding one investment in stock market.

Secondly, studying this topic at different sample period could give more knowledge about Hong Kong equity market. Because there is constant changing in the world, that valid relationship can become invalid anytime. In this case, the possibility of biased result due to the specific business cycle of that country at time could be lessened.

Thirdly, it can be interesting to check how UK and China influence on Hong Kong equity market. UK is the second largest oversea investor source next to US. Yet, its special relation with Hong Kong in culture, business and politics could make it a big difference compared with US. The British bank HSBC has been even serving like central bank in Hong Kong for century. Most listed companies in Hong Kong Exchange market are from mainland China, and it is believed Chinese companies have been using Hong Kong equity market as their channels for foreign capitals and will do so, as long as the Chinese equity market is still not as developed as Hong Kong's. Hence, the prospect of how the Chinese fundamental economy condition could affect Hong Kong stock market could be meaningful and worthwhile food for thought to both business people and academics.

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