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THE ECB'S FINANCIAL STABILITY IMPACT ON CREDIT DEFAULT SWAPS MARKET

Abstract:

This paper studies the value of ECB's announcement and the impact on Stock and Credit Default Swaps Market during 2008–2018.We examine the relationship between ECB announcements, and systematic risk and unsystematic risk of 29 European countries' financial markets through the CAPM regression. Those 29 countries divided into 3 clusters of liquid markets, accordingly the experienced stress during the sovereign debt crisis and their Liquidity Coverage Ratio (LCR). The results indicate that ECB's announcements tend to show more impact on stock markets than CDS markets especially in 1st cluster of liquid market. Furthermore, these two types of financial markets in 29 European countries exhibit more significant market reaction to Financial Sector news and Money Market news while Financial Stability news and Monetary Policy bring more risk and volatility to 2 and 3 cluster of liquid markets. We found that there is a 3 clusters of liquid markets so that in turn reshapes an unequal distribution of systemic risk and help the spread of a financial crisis. The results also reveal financial markets of Finland, Sweden, Austria, Ireland, Spain and Turkey take on more risk and volatility than other sample countries when ECB announcements published.

Keywords:

European Central Bank, Investment, Monetary Policy, Announcements

JEL Classification: G21, O11, E17

Introduction

Most research on the Stock and Credit Default Swaps regarding the rise in government bond yields in the euro area. The first years of the monetary union were characterized by an upward trend in return, both in terms of levels and in responding to new information (Ehrmann et al., 2011a, 2011b, 2014). Using the data from the global financial crisis, before 2008, government bond markets were deterrent against the pricing of credit default risk and therefore did not meet the country's legislative rules to a large extent (D'Agostino and Ehrmann, 2014). This has changed greatly since the start of the European debt crisis. Countries with poor regulatory standards saw their yields grow dramatically, a model that has been recognized as a "wake-up" infection (Arghyrou and Alexandros, 2012). Central announcements in many cases lead market expectations about the future path. As the vital role of controlling financial stability, central bank communications has developed into a significant instrument. Central bank communication included various types of information, such as announcements relevant to Financial Sector (FSE), Financial Stability (FST), Monetary Policy (MP) and Money Market (MM). In this study, we focus on announcements published by European Central Bank (ECB), and estimating the response of financial markets in 29 European countries. Central banks monitor assets price, and their decision may influence economy through the capital and wealth channels. ECB's monetary policy shocks bring the volatility reactions to major member of European financial markets, and the information may extent the reaction spreading across the international market (Bohl et al. 2008). The stable financial stability framework would protect the country's economy when it met financial crisis. ECB as a supervisory role, it makes decisions to construct the financial stability and avoiding the crisis (Uhde and Heimeshoff, 2009). Financial sector supervises contagion effects on financial health of a great number of financial institutions including commercial and investment bank, and insurance company (Krishnamurthy and Vissing-Jorgensen, 2015). Money Market is providing services for shore-term assets borrowing, lending, selling and buying with maturity of one year or less (ECB, 2014).

The relationship between financial assets and central bank announcements has been under research by several studies within the past two decades. It is very critical for policy makers to understand this relationship together with obtaining any particular estimates of the effect the policy instruments have on financial markets in order to make decisions which are effective. Generally, financial markets changes will have a great impact on a country's economy through it wealth and private borrowing costs. On the other hand, financial market participants' suppose that reliable estimates of the relationship is vital in implementing risk management strategies and carrying out investment decisions. Therefore, this chapter aims at carrying out a review on present literature which are related to the impact of European Central Banks' announcements on financial markets.

1. Literature Review

1.1 Announcements of European Central Bank (ECB)

Demonstrations of empirical evidences show that the impact of ECB Policy mechanisms on these variables is greatly unintended (Bernanke and Kuttner, 2005). The primary aim of ECB announcements is to make sure that economic growth robust in the medium and long term. (ECB, 2013). Furthermore, according to ECB (2013), the goal of ECB is defined as "a year-to-year increase in the Harmonized Index of Consumer Price (HICP) for the euro area of below 2%", it further adds that "ECB aims at maintaining inflation rates below, but close to 2% over the medium term". According to Blinder (2006, p437), the 2% inflation is considerably high to be secured against the rising prejudices of the CPI (guarding against deflation) and considerably low to reduce inflation cost. The author further stated that it is more important for CBs to examine financial asset markets as it is easier to impact and predict. According to Greenspan (2006), price stability occurs "When economic agents no longer take account of the perspective change in the general

price level in their economic decision-making." As previously stated that price stability is the key goal which is adopted by several national CBs due to the fact that it would result in various economic assistances. Furthermore, price stability is most significant on the economy because it generates greater transparency and further lets economic agents realize if the price alterations are comparative or not (Feldestein, 2009). This effect may be particularly of importance to investors so as to apportion improved resources and also lead to a reduction of the general economical price alteration costs. Conferring to the ECB (2013), when making use of announcements and news, the ECB ought to make sure the monetary market functions properly and also enable credit institutions achieve their liquidity necessities by evading needless alterations. According to empirical evidences, within 2003-2011(Trichet's tenure), the financial crisis reaction stable rate reduction with the "Trichet reaction function" remained acceptable (Collingnon et al., 2012). Moreover, various studies proposed to the fact that the inflation rate of the euro area had been usually around 2%, various countries included Greece, Ireland and Spain possessed here rates of inflation from 1991, implying their greater exposure to problems concerning competition (Lopez and Papell, 2012). With previous literature examination, it had been discovered that writers accepted to taking Monetary Policy into consideration as an instrument in inflation stabilization and economic growth promotion (Fisher et al, 2009). On the contrary, few writers said on how Monetary Policy actually applies its impact. Conclusively, a single macro economical view is necessary for an advanced knowledge of the manner in which various Monetary Policy announcements could impact various economical indexes in the short term (Bernanke and Mihov, 2008). It has been the concern of most economists to find out this relationship. According to Adersson (2007), "a good understanding of it is extremely relevant especially to the policymakers." This is definitely of significance due to the fact that crucial information may be provided which could be used to correctly examine conclusions market participants' expectations. Furthermore, it could be of help to agents in order to alter their views concerning Monetary Policy forecast, financial stability, money market to certain conclusions. Investor risk preferences, taxes, future earnings variations and future dividends discount rates could influence asset prices. Based on the Efficient Market Hypothesis (EMH), financial asset prices totally reflect the available information. Therefore, investors trading financial assets in an efficient market ought to anticipate getting a stable return rate. "Thus, the entire EMH theory purports that there is supposed an efficient market where financial asset prices reveal all existing information, and in the absence of price perversion, asset prices ought to economic fundamentals in macroeconomics" (Cochrane and Piazzesi, 2002). In theory, share prices are greatly influenced by forecast earnings expectations, which are associated with future economic activity and policy of ECB anticipations. Furthermore, asset prices are usually flexibly determined in stock markets with foresighted participants (Siegel, 2008). ECB also is a vital market participant for CDS markets especially during the crisis. Moreover, since money value depends on Monetary Policy, future Monetary Policy anticipations are vital to assets pricing (Vickers, 2009). Therefore, financial asset prices response by the optimal policy as published by ECB, which rely on the information available in the prices.

1.2 Empirical studies in the Euro Zone

Various researches have tried to examine the financial markets reaction and announcements as published by central government. The study is related to a stream of literature examining the impact of ECB announcements on financial markets in Eurozone. While carrying out a research on the effect which the ECB policy has on Eurozone sovereign debt markets with the use of descriptive statistics analysis, Saka et al. (2014) found that Eurozone CDS spreads were related to ECB policy and additionally that ECB has helped to restore their economies to their pre-crisis state. Furthermore, with the use of event study analysis with two type's windows and descriptive statistics analysis, Falagiarda and Reitz (2015) carried out a research on sovereign spreads changes to ECB unconventional policies, and found ECB announcements have an impact on the euro area countries sovereign debt markets. Additionally, financial markets exhibited a delayed reaction to

ECB news. Moreover, Adcock et al. (2014) carried out a research with descriptive statistic on abnormal returns on European stock indices, and they suggest that the stock market reacts to the negative news about global economy. A hand full of studies have been carried out on the impact of ECB announcements on European financial markets by event study analysis while just a few according to CAPM to examine the impact of ECB announcements. Nonetheless, Saka et al. (2015) used Spain-specific news to identify the days of events through the CAPM regression, and they investigate news about Spain have contagion significantly in European financial markets after the announcement. Furthermore, a similar approach has been adopted in the study of contagion such as Mink and de Haan (2013), and they fund financial markets in Eurozone are not be seriously affected by contagion from a Greek default.

2. Cluster Liquidity map

Recent financial crises required the establishment of liquidity risk management models. Basel Banking Supervision Committee introduced in 2010 a new and more stringent liquidity risk law to promote both short-term bank resilience to liquidity shocks and a long-term equilibrium between asset and liability maturity. This model includes the liquid assets held by each central bank to deal with unexpected liquidity outflows. Starting January 1, 2015, banks have a serious obligation to keep in High Quality Liquid Assets (HQLAs) to cover 30-day cash outflows associated with a financial crisis scenario. Our survey according to D'Amico and King, 2013, we use this model (LCR) to identify 3 cluster-country markets according to the liquidity of their central banks. The definition of the renewed HQLAs model requires compliance with the LCR model and is influenced by announcements by the ECB in several financial sectors as some countries are most affected. For example, an increase in HQLAs may cause a decline in credit in the real economy. Consequently, setting appropriate conditions for liquid under different market conditions is of great importance to the regulator in order to reduce the risk of partiality of bank allocation decisions.

3. Data

3.1 Data selection

The aim of this paper is analyzing how ECB announcements affect stock markets and credit default swaps markets among 29 European countries. As one of the crucial economic area, European economy play a key role around the world. Those 29 countries divided into 3 types of cluster of liquid market, which are countries with 1 cluster of liquid market or 2, or 3 cluster of liquid market economy depending on wage rates among member states

3.2.1 Price Index

Based on above discussion, the process of data selection of this study as follow: The first one is market price index for both stock markets and CDS markets. This study used adjusted daily price index chosen from 29 countries' major stock exchange markets (Table 2), and 5-year credit default swap spreads of each country. The endogeneity matter could be further addressed in various ways with the use of observations of higher frequency including daily data. Bredin et al. (2009) investigated the responses of stock markets to actions of international MP in the UK with the use of daily data of an event study. The second one is the study period of price index. The time period of both stock price index and CDS spreads are from 01/11/2008 to 31/12/2018. The third step is collecting each country's risk-free rate for estimating CAPM regression. Used government 10-year bond yield as the risk-free rate of every country.

3.2.2 European Central Bank Announcement

The ECB announcement are applied in this study cover the period from 06/11/2008 to 31/12/2018. The majority of announcements were published on trading day, but some

announcements were released at weekend. Thus, we take the date of later trading day of the next trading week as the date of the announcement. In the first place, identified the relevant events are published by European Central Bank. In the Second place, we classify various announcements into 4 types, and they are financial sector (D_FSE), financial stability (D_FST), monetary policy (D_MP) and money market (D_MM). In the study, we use these 4 types of announcements as 4 dummy variables. Additionally, we define the fifth dummy variable (D_ALL) which included all types of announcements.

3.3 Data sources

The study uses two categories of data. One is price index of both financial assets, and the other one is ECB announcements. With the daily frequency, all stock price indices and CDS spreads are collected from Datastream. In order to explore more reliable and representative evidence of this study, we consult the code of stock index for each country from Bloomberg website. All economic indicators in Table1 were selected from Trading Economics website, risk-free rates of every country are collected from the same website as well. All of events are collected from European Central Bank website, and the announcements classification also referred to ECB website. Furthermore, Excel and Eviews are used to estimate the results in this study.

4. Methodologies

The purpose of this study is exploring the response of stock markets and CDS markets in Europe and ECB announcements. In this chapter, several analytical techniques consulting from previews studies are applied in the study. The methodologies could be discussed with two sections, and they are preliminary analysis of abnormal returns and capital asset pricing model.

4.1 Preliminary analysis of abnormal returns (AR)

In the first section, depending on the results are gotten from event study methodology, descriptive statistics are applied on several indicators of event study, included ARs, average abnormal returns (AAR), Sharpe ratio and cumulative abnormal returns (CAR).

An abnormal return is used to describe the actual return generated by the given security in the period of time that is different from the expected return (Arnold, 2013). So, abnormal returns were calculated within the event window by using the formula as follow:

$$AR_{it} = R_{it} - E(R_{it}) \quad (1)$$

Where;

Abnormal returns are calculated for each day in the event window. Returns are the daily return in the given period; With the total return within an event window, ARs are gotten by total return divided by the given period. In the study, the event window of 3 days before and 3 days after the event day has been taken i.e 7 days. In Michaelides et al. (2015) research, they find that this event window (-3, +3) is significant for most of stock market return around official announcements published.

In the current study, abnormal return has been used to estimate the positive and negative announcements have an impact on daily share prices (Martin and Moran, 2007).

The average abnormal return is used as the indicator to determine the event is significant or not. The AAR_t are averaged across the event window with the stock daily abnormal return based on the formula as follow:

$$AAR_t = \sum AR_{it} / \text{N} \quad (2)$$

Where,

$\sum AR_{it}$ was the sum of the abnormal returns within the event window.

N was the number of days of each event window.

Share prices are always be volatile, this means there is a lot of information that can influence share price. However, the volatile tends can be cancelled out when averaged across the sample. In Bialkowski's (2008) study, the average abnormal return has applied to test the stock market fluctuations across nation.

In practice, the standard deviation is used to quantify the security risk when making investment decisions. In the study, standard deviation was based abnormal returnsat daily frequency in the estimation periodis measuring the risk of the event. The Std.Dev formula is defined as:

$$\sigma_t = \sqrt{\frac{\sum_{it}^{n}(x_{it} - \bar{x})^2}{N}} (3)$$

Where,

x represents one of seven abnormal returns in the event window;

$\bar{x}$ is the mean value of the event window;

N is total dates of each event window (7 days);

According to the previews study, Bessembinder et al. (2009) have used standard deviation of abnormal return in their research to measuring abnormal bond performance.They used the daily data in their research because monthly data are lack of power to detect abnormal returns.

SharpeRatio as the measure for calculating risk-adjusted returns, it reflects over the risk-free level in the security. Additionally, Sharpe Ratio is commonly used to measure the performance of financial assets. Positive Sharp ratio means that the securities' return over the risk-free rate level (Arnold, 2013). In this study, Sharp Ratio applied to measure abnormal returns for each event window.

$$S_t = \frac{AAR_t}{\sigma_t} (4)$$

In the equation, σ_t presents the standard deviation of each event window. AAR_t is the average abnormal return of the event window. In the prior research, this method is significant to measure the financial assets' performance, such Best et al. (2007) applied Sharp Ratio to measure the long-run investment horizon for stocks. In Zakamouline and Koekebakker (2009) research, they used sharp ratio to evaluate portfolio performance as well, and they also mentioned that this method is valid only for the normal distributed returns.

In the event study, cumulative abnormal return is the last measure, it tests security's total return with the event. According daily abnormal return, the cumulative abnormal returns from day$t_1$through day t_n (n= total dates of one event window) are given by;

$$CAR_t = \sum AR_{it} (5)$$

Cumulative abnormal return can be either positive or negative. If CAR_t move in the positive direction in the estimation period, and it suggests the information is the good news and announcements published by EU central bank bring earnings to the stock and CDS markets. On the other hand, a negative CAR indicates that the information cannot carry wealth to both security markets (Reilly and Brown, 2012). Similar results and method have been reported in Kama (2009) research, and the research suggests that all of news is not properly priced into the shares at the time of information as would be expected under Efficient Market Hypothesis (EMH).

In the descriptive statistics methodology, several statistic indicators are used for analysing ARs, such as average, range, Std.Dev, Skewness, Kurtosis, Jarque-Bera statistic, Jarque- Bera p-value. The study focuses on stock index prices and CDS spreads. Thus, for both financial assets, we calculate the descriptive statistics on ARs of D_ALL, AARs, Sharpe ratio, and CARs in following ways:

we estimate the average value across all events with one type of dummies in the study, and the formula is defined as:

$$\bar{x_t} = \frac{\sum_i^T AR}{T} \quad \textbf{(6)}$$

Where,

$\sum_i^T AR$ represents the sum of one specific date's abnormal returns across all event windows per dummy. However, for AARs, Sharpe ratio and CARs, we summarise all event windows per dummy;

T was the number of events per dummy;

Average number in descriptive statistics is the quantitative way to measure the spread or dispersion of a set of numerical data (Swift and Piff, 2014). According Cheng et al. (2014), they used mean value in their research to calculate the descriptive statistic.

The range indicator demonstrates the difference between the maximum value and the minimum value of the sample (Swift and Piff, 2014). The formula given below:

$$RA_t = MAX_{i,t} - MIN_{i,t} \quad \textbf{(7)}$$

Where,

$MAX_{i,t}$ was the highest value in the sample;

$MIN_{i,t}$ was the lowest value in the sample;

In the prior studies, Amani and Fadlalla (2014) applied range evaluation as one of descriptive statistics method to predict company' financial sustainability. An et al. (2014) also agreed to apply this method in descriptive statistic.

In the descriptive statistics, the standard deviation formula (3) which has introduced above are also applied for statistic calculation. However, the difference is that the sample are crossing all event windows per dummy. Narayan et al. (2014) used standard deviation to measure the risk in the descriptive statistics on stock return sector.

One of the purposes of this research is determining the character of financial markets volatility brought by ECB announcements. Skewness and kurtosis would apply to determine the volatility.

In the probability statistics, skewness as a method of the asymmetry is measuring the probability distribution of the real-valued random variable about its average value. The skewness value can be either positive or negative (Oakshott, 2012). The interpretation of the skewness formula as following:

$$S_t = \frac{1}{n}\frac{\sum_{i=1}^{n}(x_i - \bar{x}_t)^3)}{\sigma^3} \quad (8)$$

Where,

x_i was the specific date's AR in the event window in the descriptive statistic calculation on AR. For AARs, Sharpe ratio and CARs, used the value of per event window to calculate;

$\bar{x}_t$ represents the average value of the sample;

σ was the standard deviation within the event window.

As one of the essential methods for descriptive statistics, skewness has frequently applied in the prior researches, such as Lingaraja et al. (2015), Shaw et al. (2015), and Engle and Mistry (2014).

According to Ivanovski et al. (2015), Kurtosis characterized the relative peakedness or flatness of the distribution compared with the normal distribution, which is calculated as:

$$k_t = \frac{\sum_{i=1}^{n}(x_i - \bar{x}_t)^4}{\sigma^4} (9)$$

Where,

$\sum_{i=1}^{n}(x_i - \bar{x}_t)^4$ was the forth moment around the average value of the sample;

σ was the standard deviation value of x.

The distributions of kurtosis can be classified into three different types, and they are distribution with zero kurtosis, with high kurtosis distribution and with negative kurtosis distribution. Ivanovski et al. (2015) carried this method on their empirical study of measure volatility of European stock market. Furthermore, in Auer (2015) research, Kurtosis also applied to predict the performance of equities.

In statistics, Jarque-Bera test is the method to test whether the sample has the skewness and kurtosis matching a normal distribution. The test was based on the fact that skewness and kutosis of normal distribution equal to zero. In this study, JB-statistic is defined as;

$$JB_t = \frac{n}{6}((S_t)^2 + \frac{(K_t)^2}{4}) \textbf{(10)}$$

Where,

n was the number of observations;

S_t was the skewness value of the sample;

K_t was the kurtosis value of the sample.

In previews studies, JB-test has widely used for statistic calculation. For instance, Kenourgios and Dimitriou' (2015) research has used this method to calculate statistic on stock index, as well as Kuncoro (2015) applied JB-test to statistical analyse exchange rate in his research.

In this section, descriptive statistics based on event study methodology is applied for preliminary analysing of ARs. The next section of the methodologies chapter, capital asset pricing model will use for estimating the systematic risk and unsystematic risk by different ways.

4.2 Capital Asset Pricing Model

The second section of methodologies chapter will describe how to utilize capital asset pricing model (CAPM). CAPM is based on ARs gotten from event study. CAPM predicts a relation between risk premium and excess return of an individual asset. One factor of proportionality is known as systematic risk or beta of the asset. Based on the assumption of CAPM, investors are compensated only for bearing the systematic risk of the asset, because the specific risk of the asset can be diversified away. Knowing the market premium and the β of an asset, the expected rate of return for any asset can be calculated as (Elton, 2006):

$$E_i = \alpha + \beta\ (R_m - R_f)$$

Based on the capital asset pricing model discussed above. For this study, the regression ismodified as;

$$(R_{t,i} - R_{f,i}) = \alpha + \beta\ (R_m - R_{f,m}) \quad (11)$$

Where,

$R_{t,i}$was the daily return of an individual security;

$R_{f,i}$ was individual risk-free rates in daily frequency (Table3);

$R_m$was the daily market return based on the sample countries' daily return;

$R_{f,m}$ was the daily market risk-free return;

βrepresents the systematic riskof the market;

α was the out of system return of the market, which cannot be predicted.

Many previous studies have used capital asset pricing model to examine financial markets among European countries. In Dajcman et al. (2013) research, they applied CAPM to test the systematic risk and validity in three European stock markets included Hungary, Slovenia and Czech Republic. CAPM was also used in Manasse and Zavalloni (2013) research, with CDS spreads changes at country level, to investigate different risk factors, such as global risk factor, European risk factor, financial intermediaries risk factor as well. Furthermore, Abad et al. (2010) also adopted CAPM model to compare differences with systematic risk on government bond return in these two important markets (World and Eurozone).

In the study, we applied an international market model to calculate risk-free rate and market return as follows.

We use the annual absolute risk-free rate (Table3) of each country, and daily (over the 252 trading day) calculated for both assets markets (Bali et al., 2015). We define;

$$R_{f,m} = \frac{1}{252} \sum_{i=29}^{29} |R_{f,i}| * W_i \quad (12)$$

and

$$W_i = \frac{|R_{f,i}|}{\sum_{i=1}^{29} |R_{f,i}|} \quad (13)$$

Where,

$R_{f,i}$ was the annual risk-free rate of the country;

W_i was the weight of an asset market based on 29 European countries' markets.

Market return, which is calculated by the overall market portfolio including all financial assets and having the portfolio weighted for value (Reilly and Brown, 2012). In the study, market return will be calculated in a daily frequency by year for stock markets and CDS markets, and the weight of an individual asset is applied annually (once per year). Since the study period of the data is from 06/11/2008 to 31/12/2018, we take 8 observations for market return calculation. The market return can be expressed as;

$R_m = \sum_{i=1}^{29} W_i \, R_{t,i}$ (14)

Where,

R_m was the market return of each financial market;

m presents stock markets or CDS market;

W_i was the weight value for each country's financial market;

$R_{t,i}$ was the daily return of each asset at time t;

i presents every sample country;

For specifically, every variable in market return calculation are defined as follow;

The daily return of an individual security is calculated continuously by year, and the formula is defined as (Francis and Kim, 2013);

$$R_t = log_e \left(\frac{P_t}{P_{t-1}}\right) \textbf{(15)}$$

Where,

R_t was the return at time t;

P_t was the adjusted price index of an asset market at time t;

P_{t-1} was the adjusted price index one day before P_t.

As the weight value of an individual asset, we estimate the value by 2 steps. In the first step, the regression is estimated using absolute daily return by year:

$$R_{y.i} = \sum_{t=1}^{n} |R_t| \textbf{(16)}$$

Where,

i presents the asset market of each sample countries;

y presents the specific year;

R_t was the absolute daily return at time t.

In the second step, the weight of an individual asset is calculated by using annual cumulative returns per year gotten from the first step.

$$W_i = \frac{|R_{y,i}|}{\sum_{I=29}^{29} |R_{y,i}|} \textbf{(17)}$$

We apply different windows to estimate the systematic risk (β) and unsystematic risk (α). In CAPM, with crossing the event window [-3, +3], we estimate CAPM for each dummy (included D_ALL). Furthermore, these tests are based on ARs, but the way to calculate AR is different. A similar approach has been used in recent studies, such as Mink and de Haan (2013) and Saka et al. (2015).

4.2.1 CAPM

We define CAPM based on abnormal returns and abnormal market returns (AMRs) within event windows [-3, +3] per dummy. In another words, we take ARs and AMRs from all event windows per dummy and reorganized a new series for CAPM. In CAPM, we use daily ARs of an individual asset as $R_{t,i}$ and AMRs in daily frequency asR_m. Using individual risk-free rates in daily frequency as $R_{f,i}$ and using market risk-free rates in daily frequency as $R_{f,m}$. Overall, according to several methods above, this study used descriptive statistics on D_ALL ARs, AARs, Sharpe ratio and CARs to examine whether ECB announcements have an impact on 29 European countries' financial markets or not. We then apply various windows in CAPM regression to estimate β andα of each financial market by using an international model.

Empirical Findings

In this study we employ several empirical strategies to analyse the impact of ECB announcements on 29 European countries' stock and CDS markets. Firstly, in the section 5.1, we state the results provided by descriptive statistics analysis on D_ALL ARs with figures, and AARs, Sharpe ratio, CARs with tables; Secondly, in the section 5.2, we analyse results are shown in various tables for CAPM.

5.1 Descriptive Statistic

In the section 5.1, four categories of descriptive statistic findings will be detail analysed as follow;

5.1.1 D_ALL Abnormal Returns

5.1.1.1 Average

Average indicator of D_ALL ARs measures that ECB announcements are significant to each country's market or not. In many event studies, AAR is used to measure the significance of the event, such as Aizenman et al. (2015) research. In this study, Average are equal to 0, which means ECB announcements are insignificant to stock markets and CDS markets. Firstly, we find that 4 countries in 1st cluster of liquid market (Sweden, UK, Netherlands and Denmark) follow the same patterns, they all have a slightly fluctuation around the event day and sharply reduced after +1day. In 2 cluster of liquid market, Slovenia and Latvia stock markets are reaching to the peak on the event day, after that decreasing sharply until the increasing tendency appeared on +2day. Additionally, Greece and Italy these 2 cluster of liquid market countries are also following the same patterns. The increasing trend was showed within [-1, +1] days, and then downward trend was showed after the event day. In CDS markets, Finland and Denmark have the similar movements in CDS_ 1st cluster of liquid market and they all present the rapidly decreasing tendency when announcements released. Furthermore, in CDS_ 3 cluster of liquid market there are three countries (Bulgaria, Romania, and Czech Republic) have the same patterns with a continued declining trend until +1day. Different national financial markets follow the same patterns within market implies that ECB announcements have a statistic significant effect on

various national stock or CDS markets which is leading them move into the same direction at the same specific date of the event window. Secondly, both financial assets markets of all sample countries follow the normal distribution, provide the evidence that news published by ECB are significant to stock markets and CDS markets. Thirdly, we investigate the highest average based on the absolute value. 4 countries in stock markets (i.e.: France, Ireland, Luxembourg, and Belgium) show the most negative average indicators on -3day time frame, while 3 countries have the highest positive average on +2day. In the CDS markets, we find that the event day is the highest date of 4 countries, but 3 countries show the most negative average on this day. Only Estonia presents the highest positive range on the event day. In addition, 4 countries have the most negative range indicator on +1day (France, Ireland, Luxembourg, and Belgium). According the above discussion, we find that ECB announcements bring the most significant market reactions to some countries at the same within markets in the event window. Lastly, none of countries have the same patterns and the same highest date in their stock and CDS markets within country. The evidence shows that ECB announcements cannot affect both markets moving into the same direction within country.

5.1.1.2 Standard Deviation

Std.Dev indicator examines the variability of D_ALL ARs, and the high standard deviation implies the data is more spread out (Swift and Piff, 2014). In this research, we use Std.Dev to examine the risk effect of ECB announcements on 29 European countries' stock markets and CDS markets. Firstly, every movements show that 4 countries in Stock_1st cluster of liquid market (Finland, Sweden, Denmark and UK) follow the same patterns. They are declining at -3day and then a fluctuation is remaining within [-2, 0] days. Portugal and Malta are following the same patterns in Stock_2 cluster of liquid market, and they have an increasing tendency after the news disclosed. Additionally, no evidence shows that the same patterns existed within Stock_1st cluster of liquid market. In the CDS markets, few countries have the same patterns. In CDS_1st cluster of liquid market, Sweden and Germany changed in the same direction, and the fluctuation existed from +1day to +3day. In CDS_2 cluster of liquid market, only Spain and Portugal are following the same patterns, and the volatility appeared in [+1, +3] of event window. The same movements in Std.Dev indicator demonstrate that market risk brought by announcements, which appeared at the same time in different nations within the event window. Secondly, in stock markets, Spain shows the highest movement above other countries while Bulgaria is the lowest. In CDS markets, Sweden presents the highest above others while UK is the lowest with the stable tendency. Thirdly, in stock markets, 4 countries (Finland, Sweden, Denmark and UK) have the highest standard deviation indicator on -3day. In CDS markets in cluster of liquid market 2, 3 countries (Greece, Italy, Spain) show the highest std.dev at event day, and the other 3 countries (Bulgaria, Romania, Hungary) in 3 cluster of liquid market have the same highest statistic indicator on +2day. According to find out the same highest date within asset markets, the evidence states that ECB announcements brought the highest risk to different countries' asset markets at the same time within the event window [-3, +3]. Finally, Denmark, Ireland, France and United Kingdom show the same patterns cross stock and CDS markets within country. There are 3 countries have the same highest date, Denmark (-1day), UK (-3day) and France (event day). It means that ECB announcements also bring the risk effect crossing markets within country.

5.1.1.3 Range

As one of statistic indicators, range measures the stability of the both financial assets markets based on D_ALL ARs (An et al., 2014).

Firstly, we find out two countries in Stock_1st cluster of liquid market (Finland and Austria) have the same patterns while the other 3 countries in Stock_2 cluster of liquid market (Malta, Cyprus and Latvia) are following the same patterns. For these two countries in stock markets, they are

decreasing after -2day, and then growing tendency lasted until the event day. After ECB announcements released, the downward trend appeared again. For these three countries, they have an obviously volatility within [0, +2]. In Stock_2 cluster of liquid market, Spain and Portugal show an increasing tendency after the event day within [0, +2], while Greece and Italy present the largest fluctuation when announcements published. For CDS markets, Sweden and Denmark these countries in CDS_1st cluster of liquid market have the same patterns, and they show the steady market trend. However, in CDS_3 cluster of liquid market, 4 countries (Hungary, Croatia, Czech Republic and Slovakia) present the large volatility after the event day. According above observation, the evidence indicates that the volatility existed in both markets and some countries' markets fluctuate in the same direction. Secondly, Spain shows the highest range indicator in stock markets, and in CDS markets, Sweden shows the highest range. France and UK have stable range indicators over the event window in their CDS markets. This situation is same with the standard deviation statistic indicator, except Estonia. Thirdly, 4 countries (Hungary, Croatia, Czech Republic and Slovakia) in 3 cluster of liquid market have the same highest date on the event day in stock markets. In addition, two countries (Czech Republic and Slovakia) show the highest range indicator on +2day. In CDS markets, nearly half of sample countries present the highest range at the same date (+2day). The same highest date indicates that ECB announcements carry out the largest volatility at the same time crossing different countries' stock or CDS markets. In the end in 1st cluster of liquid market, Austria, Ireland and Luxembourg present the same patterns crossing these two assets markets within country. There are 2 countries have the same highest date, Denmark (+2day) and Luxembourg (event day). It implies that announcements bring the volatility crossing markets as well.

5.1.1.4 Conclusion

Several previous studies report evidence that unexpected ECB's announcements increase (decrease) stock prices (Angeloni and Ehrmann,2003) .However, not all studies find a negative relationship between ECB's announcements easing and stock prices In many previews studies, different European countries' financial markets are used to investigate the impact of ECB announcements. Rühl and Stein (2015) point that ECB announcements have higher impact on FTSE100 index of UK stock markets than the DAX stocks and additionally ECB announcements have indirect impacts around the world, especially within Europe. However, Brzeszczynski et al. (2014) has different finding with this study that he argued National Bank of Poland (NBP) announcements had stabilizing effects on stock and foreign exchange markets within country. According to Papadamou et al. (2014), they find that Central Bank transparency should be considered as one of the factors which affects stock market volatility and financial stability. Saka et al. (2015) point that significant contagion was identified in Eurozone and contagion became far less frequent after ECB announced to keep the Euro together. Saka et al.'s finding can be consistent with the empirical findings of study that different countries' financial markets follow the same patterns and have the same highest date. In this study, summing up, most of Stock_1st cluster of liquid market and Stock_2st cluster of liquid market countries have the same patterns with standard deviation, skewness and kurtosis. In addition, 4 indicators crossing different rating within market have the same highest date, and they are Std.Dev (-3day), range (the event day), skewness (+2day) and kurtosis (+2day). In CDS markets, most of CDS_1st cluster of liquid market countries have the same patterns with most of CDS_2 cluster of liquid market countries with average and range statistic indicators. For average indicator, CDS_2 cluster of liquid market and CDS_ 3 cluster of liquid market show the highest value at -3day. For range, CDS_ 2 cluster of liquid market and CDS_ 3 cluster of liquid market present the highest range on +2day. We observe different markets within same rating criteria, and few evidences are provided to prove that different financial markets have the same patterns.

5.2 Capital Asset Pricing Model

In the section5.2, analysing the results of CAPM. Based on country credit rating (Table4), we classified these 29 European countries' financial markets into groups, which are Stock_ cluster of liquid market country and CDS_ cluster of liquid market country. First, we investigate the results of CAPM on different dummy variables across all event windows. According several comparisons, the discussions on empirical findings are developed as follows;

5.2.1.1 Stock Markets

We investigate that all α are insignificant and all countries' β show significant (except Estonia in Stock_ cluster of liquid market 3 on D_MM and) in Stock_ cluster of liquid market countries from D_FSE to D_MM. Insignificant in cluster of liquid market 1 are the countries Belgium, Switzerland, Germany, France, Luxembourg, and Netherlands. Insignificant in cluster of liquid market 2 are the countries Greece, Portugal, Malta, Slovenia, Cyprus, Italy and Latvia. Insignificant in cluster of liquid market 3 are the countries Bulgaria, Lithuania, Romania, Hungary, Czech Republic and Slovakia. Then, in Stock_ cluster of liquid market 1, we find Austria has the highest α and β on D_FSE, D_FST and D_MP. Sweden presents the highest un-system risk factor and system risk factor on D_MM. In Stock_ cluster of liquid market 2, we find Spain has the highest α and β on D_FSE and D_FST. In addition, Spain shows the highest β on D_MP and D_MM. Next, as results are shown in Stock_ cluster of liquid market 2, Finland, Sweden and Austria stock markets' risk are over 1 on D_FSE, D_FST and D_MP. On D_MM, all countries' market risk are over 1, excluded Estonia. In Stock_ cluster of liquid market 2, the evidence shows that Spain have the β over 1 from D_FSE to D_MM. In the end, the results of D_ALL are included all types of news. We find that some countries' α (Finland, Sweden and Austria) show significant in Stock_ cluster of liquid market 1, and none of country presents significant α in Stock_ cluster of liquid market 2. However, all countries' market risk factors show significant. Comparing the above investigation with D_ALL. Finland, Sweden and Austria also have the systematic risk over 1 and their α present significant in Stock_ cluster of liquid market 1. Furthermore, the similar results are also shown in Stock_ cluster of liquid market 2 that systematic risk of Spain are over 1.

5.2.1.2 CDS markets

We find that all countries in CDS_ cluster of liquid market 1 present insignificant unsystematic risk and significant systematic risk on D_FSE, D_FST, D_MP and D_MM, excluded Estonia on D_MM in CDS_ cluster of liquid market 1.Only Sweden shows β over 1 on D_FST, D_MP and D_MM in CDS_ cluster of liquid market 1.This situation is same with stock markets. In CDS_ cluster of liquid market 1, Sweden has the highest α and β from D_FSE to D_MM. In CDS_ cluster of liquid market 2, we find all the highest β are distributed on Spain from D_FSE to D_MM. On D_FSE and D_FST, IN 2 &3 cluster of liquid market countries only Spain and Poland show their systematic risk over 1. On D_MP, only Spain has the β over 1. On D_MM, Spain present the β over 1. Finally, we find that the results in D_ALL which are similar with the above investigation of these 4 types of dummy. In CDS_ cluster of liquid market 1, Sweden has the highest α and β. In CDS_ cluster of liquid market 2, Spain shows the highest β.

5.2.1.3 Conclusion

Overall, according to evidences are gotten from various financial markets on different types of dummy variables. We find that Spain stock market is the most risk over other countries' stock markets, and Spain CDS market also shows the most risk factor than other CDS markets. In Caporale et al. (2015) research, they agree macro news have significant effects on stock returns and volatility was existed in Spain stock markets. Additionally, Afonso et al.'s (2014) results imply that Spain has the high systematic risk than other European countries. Observing these two

financial markets, we find that stock markets are more volatile than CDS markets. The results follow the prior research (Forte and Lovreta, 2009), and they indicate that risk appeared in stock markets more frequently than CDS markets. Stock_ cluster of liquid market 1 is more risk than Stock_ cluster of liquid market 2.

6. Conclusions

According above investigation, we find evidence consistent with various types of effects of ECB announcements on 29 European countries' stock and CDS markets from 06/11/2008 to 31/12/2018. In order to identify the impact of ECB announcements which are more convincingly, and we use methods to measure various effects brought by ECB announcements on these two financial markets. After above discussion on descriptive statistic analysing and CAPM, the conclusion made as follows: First of all, we find aggregative effect (D_ALL) from ECB announcements lead to most countries' stock and CDS markets with the most significant market reaction, risk and volatility on +2day over other dates of the event window. In Eng et al. (2015) research, AAR on +2 day shows the most significant market reaction to information concerning acquisitions in the event window. Spain (Stock_ cluster of liquid market 2/CDS_ cluster of liquid market 2), Sweden (CDS_ cluster of liquid market 1) and Finland (CDS_ cluster of liquid market 1) exhibit the most volatile and risk financial markets over other sample countries. Doshi et al. (2014) concluded that risk premiums are still high after financial crisis in European CDS markets which included Spain, Sweden and Finland. Furthermore, UK, and Sweden stock markets are always following the same patterns within the event window when ECB announcements released. Iglesias (2012) also agreed this finding. Secondly, we investigate difference influences of 4 types ECB announcements on 29 countries' both financial markets by using statistic analysing on AARs, Sharpe ratio and CARs. The results indicate that D_FSE and D_MM are most significant to stock markets and CDS markets, but most of market reaction present of third cluster of liquid market countries which is negative. The results are proved by prior literature (Papadamou et al, 2014; Eller and Steiner, 2006) In addition, the results indicate that D_FST results in the highest risk and volatility in both financial markets (Born et al., 2014). Behind D_FST, results indicate D_MP also brings the highest risk and fluctuation to these two financial markets (Rogers et al., 2014). Furthermore, depending on AAR indicator that we find stock markets are more volatile on significant level and CDS markets show more risk on significant level to ECB announcements. According Sharpe ratio, we investigate that CDS markets are better performed and volatile than stock markets (Kiesel et al., 2015). The results are shown in CARs, which indicate that ECB announcements bring more risk to CDS markets' wealth while bring more fluctuation to stock markets' wealth. Besides, we find that the highest reactions are always shown in markets in C_ cluster of liquid market 1, which implies that ECB announcements are more efficient to countries with high credit rating (Afonso et al., 2014). We conclude that D_FSE and D_MM have less news than other two dummies, but they are significant to 29 countries' financial markets. On the side, most of ECB news are relative with D_FST and D_MP and these two types news published very frequently. As results are presented, D_FST and D_MP lead to most of risk and fluctuation on 29 European countries' financial markets. Finally, our investigation is concerned on CAPM. We used different event windows to examine CAPM among the sample countries' financial markets. All results of CAPM indicate that all of α are insignificant in different CAPM, which under the assumption of CAPM (Reilly and Brown, 2012). In CAPM, we find that; Firstly, most of countries' markets have highest systematic risk, and they also have the highest unsystematic risk. Second, the results indicate that Austria stock market and Sweden CDS market are the most risk financial markets in C_ cluster of liquid market 1 when ECB published relevant announcements. In C_ cluster of liquid market 2, both financial markets in Spain take on the most risk when ECB announcements published. In Falagiarda and Reitz (2014) empirical findings, the results indicate that ECB announcements have significant impact on Spain which to be consistent with the study results. Third, stock markets are more risk than CDS markets across the event window [-3, +3]

(Forte and Lovreta, 2009). We summarize that; for these two asset markets, we find ECB announcements have more impact on stock markets of 1 and 2 cluster of liquid market countries than CDS markets in 3 cluster of liquid market countries. With different types of news, we find Financial Sector news and Money Market news are more significant while Financial Stability news and Monetary Policy lead to more risk and fluctuation in the sample countries' financial markets. For these 29 European countries, we find that financial markets of Finland, Sweden, Austria, Ireland, Spain and Turkey take on more risk and volatility than other countries when ECB announcements published.

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8. Appendix

Table1: Liquidity Coverage Ratio (LCR)

Index / Countries	Markets	GDP	Labour	Prices	Money	Trade	Government	Business	Consumer	Housing	Taxes
	Government Bond 10Y	GDP	Unemployment Rate	Inflation rate	Interest rate	Current Account to GDP	Government Debt to GDP	Capacity Utilization	Retail Sales YoY	Construction Output	Corporate Tax Rate
1 cluster of liquid market Countries											
Austria	0,79	271	8,4	-0,6	0,05	-1,8	59,3	80,1	-2,4	7,6	20
Belgium	1,19	246	9,3	-0,3	0,05	6,2	110		8,6		12,5
Denmark	1,92	1404	21,18	-0,7	0,05	0,8	97,7	77,82	4,3	-2,8	28
Finland	0,92	342	4,6	0,5	-0,75	6,2	45,2	80,6	2	4,1	23,5
France	2,81	548	9,6	-0,8	1,5	-1,4	50,1	79,1	0,1	-1,6	19
Germany	0,75	571	6,7	0,1	-0,35	6,3	43,9	89,7	3,7	13	22
Ireland	2,04	2942	5,4	-0,1	0,5	-5,5	89,4	80	6,5	-1,3	20
Luxembourg	0,88	436	8,7	0,7	0,05	0,8	84,5	83,4	1,6	-2,1	25
Netherlands	1,3533	1181,3	3,2	0,8	0,4	-4,96	113,2	78	1,8	-11,9	20
Sweden	1,4183	1113,8	4,3	1,1	0,6	-7,7	133,5	74,9	3,2	-19,45	21
Switzerland	1,4833	1046,3	10,2	0,5	0,81	-10,4	153,8	71,7	6,2	-27	19
United Kingdom	1,5483	978,83	19,2	1,7	1,07	-13,2	174,1	68,6	5,3	-34,55	23
2 cluster of liquid market Countries											
Cyprus	9,45	800	9,8	7,58	7,5	-5,7	33	75,5	-0,2	1,8	10
Greece	6,56	25,9	5,2	-0,6	0,05	-0,1	10,6	71	9	-7,3	12
Italy	4,18	57,22	16,2	-0,9	5	0,7	80,6	67	1,3	-11,9	11
Latvia	1,46	-448,4	16,8	-6,4533	1,6833	4,7	89	62,667	4,86667	-19,5	9
Malta	-1,175	-819,8	20	-10,693	0,4333	7,9	112,8	58,417	5,61667	-26,35	4
Portugal	-3,81	-1191	23,2	-14,933	-0,817	11,1	136,6	54,167	6,36667	-33,2	7
Slovenia	-6,445	-1563	26,4	-19,173	-2,067	14,3	160,4	49,917	7,11667	-40,05	13
Spain	-9,08	-1934	29,6	-23,413	-3,317	17,5	184,2	45,667	7,86667	-46,9	12
3 cluster of liquid market countries Countries											
Bulgaria	9,45	800	9,8	7,58	7,5	-5,7	33	75,5	-0,2	1,8	20
Croatia	4,18	57,22	16,2	-0,9	5	0,7	80,6	67	1,3	-11,9	11
Czech Republic	1,46	-448,4	16,8	-6,4533	1,6833	4,7	89	62,667	4,86667	-19,5	9
Estonia	-1,175	-819,8	20	-10,693	0,4333	7,9	112,8	58,417	5,61667	-26,35	4
Hungary	-5,17	-1444	23,5	-17,71	-2,475	13,1	140,8	52	8,15	-37	-1,5
Lithuania	-8,6295	-1981	26,62	-23,747	-4,927	17,58	165,58	46,442	10,2517	-46,205	-6,5
Poland	-12,089	-2517	29,74	-29,785	-7,378	22,06	190,36	40,883	12,3533	-55,41	-11,5
Romania	-15,549	-3054	32,86	-35,822	-9,83	26,54	215,14	35,325	14,455	-64,615	-16,5
Slovakia	-19,008	-3590	35,98	-41,859	-12,28	31,02	239,92	29,767	16,5567	-73,82	-21,5

(Trading Economics, 2018)

Table 2: Risk-free rate (Government 10-year bond yield)

(Unit:%)

Country	Yield	daily_indivisual_fr
Austria	0,88	0,003492063
Belgium	0,79	0,003452063
Bulgaria	0,6283	0,002493387
Croatia	4,18	0,016587302
Cyprus	0,5633	0,00223545
Czech Republic	0,4983	0,001977514
Denmark	0,92	0,003650794
Estonia	1,54	0,006111111
Finland	0,79	0,003134921
France	0,9533	0,003783069
Germany	0,8883	0,003525133
Greece	0,8233	0,003267196
Hungary	0,7583	0,00300926
Ireland	1,19	0,004722222
Italy	0,4983	0,001977514
Latvia	0,4333	0,001719577
Lithuania	0,4983	0,001977514
Luxembourg	0,4333	0,001719577
Malta	0,4983	0,001977514
Netherlands	0,88	0,004836
Poland	2,81	0,011150794
Portugal	4,9167	0,019510583
Romania	3,8867	0,015423281
Slovakia	1,03	0,004087302
Slovenia	0,14	0,000555556
Spain	1,92	0,007619048
Sweden	0,75	0,00297619
Switzerland	0,91	0,004725
Turkey	9,45	0,0375

(Trading Economics, 2018)

Where, we cannot find the 10-year government bond yield of Estonia. So, assumed Estonia risk-free rate using a similar European Country's (Lithuania) risk-free rate. The daily individual risk-free rates are divided by 252, which calculated basing on government 10-year bond yield.

Table 3: Rating (S&P)

Country	Rating
Austria	AA+
Belgium	AA
Bulgaria	BBB-
Croatia	BB
Cyprus	BBB-
Czech Republic	AA-
Denmark	AAA
Estonia	AA-
Finland	AA+
France	AA+
Germany	AAA
Greece	B+
Hungary	BBB-
Ireland	A+
Italy	B-
Latvia	A
Lithuania	A
Luxembourg	AAA
Malta	A+
Netherlands	AAA
Poland	A-
Portugal	B-
Romania	BBB-
Slovakia	A-
Slovenia	A+
Spain	BBB+
Sweden	AAA
Switzerland	AAA
Turkey	BB+
UK	AAA

This table presents credit rating on sample countries. We consult the letter grades of S&P credit agency (Trading Economics, 2018).

Table 5: CAPM

Table 5.1: D_FSE

Countries	**Stock_1 cluster of liquid market**				**CDS_1 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Austria	**0,0002437**	**0**	**1,3935637**	**1**	**0,0000493**	**0**	**0,4215196**	**1**
Belgium	-1,04E-05	0	0,4571333	0	0,0001131	0	0,7910333	0
Switzerland	-6,32E-06	0	0,4361833	0	9,141E-05	0	0,6986833	0
Germany	-2,241E-06	0	0,4152333	0	6,969E-05	0	0,6063333	0
Denmark	**0,0001579**	**0**	**0,96969**	**1**	**0,0001134**	**0**	**0,7469688**	**1**
Finland	**0,0001872**	**0**	**1,0912178**	**1**	**0,00002**	**0**	**0,25501**	**1**
France	-1,856E-05	0	0,4990333	0	0,0001565	0	0,9757333	0
Ireland	**0,0001673**	**0**	**1,0714177**	**1**	**0,0001414**	**0**	**0,9419481**	**1**
Luxembourg	-3,08E-05	0	0,5618833	0	0,0002217	0	1,2527833	0
Netherlands	-2,264E-05	0	0,5199833	0	0,0001783	0	1,0680833	0
Sweden	**0,000175**	**0**	**1,0248657**	**1**	**0,0001637**	**0**	**0,9685064**	**1**
United Kingdom	**6,822E-05**	**0**	**0,7461**	**1**	**8,573E-05**	**0**	**0,8336**	**1**
Countries	**Stock_2 cluster of liquid market**				**CDS_2 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Greece	-7,159E-05	0	0,7713833	0	0,0004388	0	2,1762833	0
Portugal	-2,672E-05	0	0,5409333	0	0,0002	0	1,1604333	0
Malta	-7,567E-05	0	0,7923333	0	0,0004605	0	2,2686333	0
Slovenia	-4,712E-05	0	0,6456833	0	0,0003085	0	1,6221833	0
Spain	**0,000244**	**0**	**1,5999971**	**1**	**0,0002018**	**0**	**1,388898**	**1**
Cyprus	-4,304E-05	0	0,6247333	0	0,0002868	0	1,5298333	0
Italy	-5,935E-05	0	0,7085333	0	0,0003737	0	1,8992333	0
Latvia	-5,119E-05	0	0,6666333	0	0,0003303	0	1,7145333	0
Countries	**Stock_3 cluster of liquid market**				**CDS_3 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Bulgaria	-3,488E-05	0	0,5828333	0	0,0002434	0	1,3451333	0
Lithuania	-6,343E-05	0	0,7294833	0	0,0003954	0	1,9915833	0
Romania	-3,896E-05	0	0,6037833	0	0,0002651	0	1,4374833	0
Hungary	-3,08E-05	0	0,5618833	0	0,0002217	0	1,2527833	0
Croatia	**-0,0001014**	**0**	**0,3228564**	**1**	**-4,038E-06**	**0**	**0,8098**	**1**
Czech Republic	-6,751E-05	0	0,7504333	0	0,0004171	0	2,0839333	0
Slovakia	-5,527E-05	0	0,6875833	0	0,000352	0	1,8068833	0
Estonia	**9,282E-06**	**0**	**0,3514**	**1**	**6,892E-05**	**0**	**0,6496**	**1**
Poland	**6,558E-05**	**0**	**0,8879**	**1**	**0,0001148**	**0**	**1,1337792**	**1**

Table 5.2: D_FST

Countries	**Stock_1 cluster of liquid market**				**CDS_1 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Austria	**0,0001883**	**0**	**1,2599634**	**1**	**9,999E-05**	**0**	**0,6531**	**1**
Belgium	1,722E-05	0	0,67575	0	0,0002247	0	1,32217	0
Switzerland	1,493E-05	0	0,60435	0	0,0001772	0	1,10725	0
Germany	1,327E-05	0	0,4049	0	3,686E-05	0	0,4776	0
Denmark	**0,0001187**	**0**	**0,8724986**	**1**	**0,0001394**	**0**	**0,8483839**	**1**
Finland	**0,0001669**	**0**	**1,117**	**1**	**6,265E-05**	**0**	**0,4531**	**1**
France	1,837E-05	0	0,71145	0	0,0002484	0	1,42963	0
Ireland	**0,0001373**	**0**	**1,0399395**	**1**	**0,0001582**	**0**	**0,9927996**	**1**
Luxembourg	1,034E-05	0	0,46155	0	8,23E-05	0	0,67741	0
Netherlands	1,435E-05	0	0,5865	0	0,0001654	0	1,05352	0
Sweden	**0,0001591**	**0**	**1,067**	**1**	**0,0001946**	**0**	**1,0865589**	**1**
United Kingdom	**7,042E-05**	**0**	**0,8543**	**1**	**8,004E-05**	**0**	**0,7791**	**1**
Countries	**Stock_2 cluster of liquid market**				**CDS_2 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Greece	9,191E-06	0	0,42585	0	5,857E-05	0	0,56995	0
Portugal	9,764E-06	0	0,4437	0	7,044E-05	0	0,62368	0
Malta	1,149E-05	0	0,49725	0	0,000106	0	0,78487	0
Slovenia	1,321E-05	0	0,5508	0	0,0001416	0	0,94606	0
Spain	**0,000157**	**0**	**1,3146465**	**1**	**0,000209**	**0**	**1,3789918**	**1**
Cyprus	1,607E-05	0	0,64005	0	0,0002009	0	1,21471	0
Italy	1,263E-05	0	0,53295	0	0,0001298	0	0,89233	0
Latvia	1,78E-05	0	0,6936	0	0,0002365	0	1,3759	0
Countries	**Stock_3 cluster of liquid market**				**CDS_3 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Bulgaria	1,665E-05	0	0,6579	0	0,0002128	0	1,26844	0
Lithuania	1,55E-05	0	0,6222	0	0,0001891	0	1,16098	0
Romania	1,378E-05	0	0,56865	0	0,0001535	0	0,99979	0
Hungary	1,091E-05	0	0,4794	0	9,417E-05	0	0,73114	0
Croatia	**-8,728E-05**	**0**	**0,4441**	**1**	**-2,273E-05**	**0**	**0,6931**	**1**
Czech Republic	1,894E-05	0	0,7293	0	0,0002603	0	1,48336	0
Slovakia	1,206E-05	0	0,5151	0	0,0001179	0	0,8386	0
Estonia	**1,017E-05**	**0**	**0,4015**	**1**	**0,0000405**	**0**	**0,4910697**	**1**
Poland	**4,247E-05**	**0**	**0,8714**	**1**	**9,708E-05**	**0**	**1,012**	**1**

Table 5.3: D_MP

Countries	**Stock_1 cluster of liquid market**				**CDS_1 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Austria	**0,0001502**	**0**	**1,1849599**	**1**	**0,0001211**	**0**	**0,7318467**	**1**
Belgium	1,638E-05	0	0,47211	0	7,998E-05	0	0,67405	0
Switzerland	9,764E-06	0	0,4437	0	7,044E-05	0	0,62368	0
Germany	2,52E-05	0	0,50999	0	9,269E-05	0	0,74121	0
Denmark	**9,977E-05**	**0**	**0,8687**	**1**	**0,0001609**	**0**	**0,9228157**	**1**
Finland	**0,0001442**	**0**	**1,1211403**	**1**	**7,534E-05**	**0**	**0,4985**	**1**
France	4,505E-05	0	0,59522	0	0,0001213	0	0,89232	0
Ireland	**0,0001049**	**0**	**0,971859**	**1**	**0,0001484**	**0**	**0,9156974**	**1**
Luxembourg	4,064E-05	0	0,57628	0	0,0001149	0	0,85874	0
Netherlands	2,079E-05	0	0,49105	0	8,633E-05	0	0,70763	0
Sweden	**0,0001411**	**0**	**1,0947232**	**1**	**0,0002175**	**0**	**1,1601028**	**1**
United Kingdom	**5,747E-05**	**0**	**0,886**	**1**	**0,0001097**	**0**	**0,8939791**	**1**
Countries	**Stock_2 cluster of liquid market**				**CDS_2 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Greece	4,726E-05	0	0,60469	0	0,0001245	0	0,90911	0
Portugal	2,3E-05	0	0,50052	0	8,951E-05	0	0,72442	0
Malta	1,859E-05	0	0,48158	0	8,315E-05	0	0,69084	0
Slovenia	2,741E-05	0	0,51946	0	9,587E-05	0	0,758	0
Spain	**0,0001201**	**0**	**1,2548495**	**1**	**0,0002147**	**0**	**1,362457**	**1**
Cyprus	1,197E-05	0	0,45317	0	7,362E-05	0	0,64047	0
Italy	3,402E-05	0	0,54787	0	0,0001054	0	0,80837	0
Latvia	4,285E-05	0	0,58575	0	0,0001181	0	0,87553	0
Countries	**Stock_3 cluster of liquid market**				**CDS_3 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Bulgaria	3,623E-05	0	0,55734	0	0,0001086	0	0,82516	0
Lithuania	9,764E-06	0	0,4437	0	7,044E-05	0	0,62368	0
Romania	2,961E-05	0	0,52893	0	9,905E-05	0	0,77479	0
Hungary	3,844E-05	0	0,56681	0	0,0001118	0	0,84195	0
Croatia	**-8,256E-05**	**0**	**0,5338**	**1**	**-3,666E-05**	**0**	**0,6063**	**1**
Czech Republic	3,182E-05	0	0,5384	0	0,0001022	0	0,79158	0
Slovakia	1,418E-05	0	0,46264	0	7,68E-05	0	0,65726	0
Estonia	**-1,837E-06**	**0**	**0,3785**	**1**	**4,268E-05**	**0**	**0,486**	**1**
Poland	**2,375E-05**	**0**	**0,8685**	**1**	**9,616E-05**	**0**	**0,9757**	**1**

Table 5.4: D_MM

Countries	**Stock_1 cluster of liquid market**				**CDS_1 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Austria	**0,0001683**	**0**	**1,0164649**	**1**	**0,0001347**	**0**	**0,8482884**	**1**
Belgium	-5,34E-05	0	0,7340873	0	0,0003823	0	1,9445397	0
Switzerland	1,327E-05	0	0,4049	0	3,686E-05	0	0,4776	0
Germany	-6,762E-05	0	0,8269063	0	0,0004722	0	2,3299302	0
Denmark	**0,0001912**	**0**	**1,1360674**	**1**	**0,0001443**	**0**	**0,9015539**	**1**
Finland	**0,000175**	**0**	**1,0302387**	**1**	**0,0001552**	**0**	**0,9310953**	**1**
France	-3,918E-05	0	0,6412683	0	0,0002924	0	1,5591492	0
Ireland	**0,0001969**	**0**	**1,2197365**	**1**	**0,0001622**	**0**	**1,0458568**	**1**
Luxembourg	-3,563E-05	0	0,6180635	0	0,0002699	0	1,4628016	0
Netherlands	-6,407E-05	0	0,8037016	0	0,0004497	0	2,2335825	0
Sweden	**0,0001996**	**0**	**1,1481581**	**1**	**0,000217**	**0**	**1,23512**	**1**
United Kingdom	**0,0001209**	**0**	**1,0095173**	**1**	**0,00008**	**0**	**0,80498**	**1**
Countries	**Stock_2 cluster of liquid market**				**CDS_2 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Greece	-3,208E-05	0	0,5948587	0	0,0002474	0	1,366454	0
Portugal	-4,985E-05	0	0,7108825	0	0,0003598	0	1,8481921	0
Malta	-2,497E-05	0	0,5484492	0	0,0002025	0	1,1737587	0
Slovenia	-8,184E-05	0	0,9197254	0	0,000562	0	2,7153206	0
Spain	**0,0002206**	**0**	**1,4832319**	**1**	**0,0002178**	**0**	**1,4691485**	**1**
Cyprus	-4,629E-05	0	0,6876778	0	0,0003373	0	1,7518444	0
Italy	-6,051E-05	0	0,7804968	0	0,0004272	0	2,1372349	0
Latvia	-5,696E-05	0	0,7572921	0	0,0004047	0	2,0408873	0
Countries	**Stock_3 cluster of liquid market**				**CDS_3 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Bulgaria	-7,473E-05	0	0,8733159	0	0,0005171	0	2,5226254	0
Lithuania	6,322E-06	0	0,3366	0	-7,485E-07	0	0,3013	0
Romania	-7,117E-05	0	0,8501111	0	0,0004946	0	2,4262778	0
Hungary	-7,828E-05	0	0,8965206	0	0,0005396	0	2,618973	0
Croatia	**-0,0001034**	**0**	**0,3130819**	**1**	**-1,967E-05**	**0**	**0,7316**	**1**
Czech Republic	-2,852E-05	0	0,571654	0	0,000225	0	1,2701063	0
Slovakia	-4,274E-05	0	0,664473	0	0,0003149	0	1,6554968	0
Estonia	6,322E-06	0	0,3366	0	-7,485E-07	0	0,3013	0
Poland	**6,394E-05**	**0**	**0,8797**	**1**	**7,325E-05**	**0**	**0,9263**	**1**

Table 5.5: D_ALL

Countries	**Stock_1 cluster of liquid market**				**CDS_1 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Austria	**0,0001935**	**1**	**1,246**	**1**	**0,0001033**	**0**	**0,6752462**	**1**
Belgium	1,894E-05	0	0,7293	0	0,0002603	0	1,48336	0
Switzerland	2,009E-05	0	0,765	0	0,000284	0	1,59082	0
Germany	1,55E-05	0	0,6222	0	0,0001891	0	1,16098	0
Denmark	**0,0001257**	**0**	**0,8816**	**1**	**0,0001398**	**0**	**0,8582965**	**1**
Finland	**0,0001747**	**1**	**1,121**	**1**	**5,818E-05**	**0**	**0,4353**	**1**
France	2,411E-05	0	0,88995	0	0,0003671	0	1,96693	0
Ireland	**0,0001407**	**0**	**1,023**	**1**	**0,0001514**	**0**	**0,9684682**	**1**
Luxembourg	2,181E-05	0	0,81855	0	0,0003196	0	1,75201	0
Netherlands	1,493E-05	0	0,60435	0	0,0001772	0	1,10725	0
Sweden	**0,0001678**	**1**	**1,079**	**1**	**0,0002072**	**0**	**1,1577143**	**1**
United Kingdom	**7,668E-05**	**0**	**0,8596**	**1**	**0,0000843**	**0**	**0,806811**	**1**
Countries	**Stock_2 cluster of liquid market**				**CDS_2 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Greece	2,353E-05	0	0,8721	0	0,0003552	0	1,9132	0
Portugal	2,124E-05	0	0,8007	0	0,0003077	0	1,69828	0
Malta	2,468E-05	0	0,9078	0	0,0003789	0	2,02066	0
Slovenia	2,525E-05	0	0,92565	0	0,0003908	0	2,07439	0
Spain	**0,0001629**	**0**	**1,3025893**	**1**	**0,0002021**	**0**	**1,3575708**	**1**
Cyprus	1,837E-05	0	0,71145	0	0,0002484	0	1,42963	0
Italy	1,78E-05	0	0,6936	0	0,0002365	0	1,3759	0
Latvia	2,239E-05	0	0,8364	0	0,0003315	0	1,80574	0
Countries	**Stock_3 cluster of liquid market**				**CDS_3 cluster of liquid market**			
	α	Sign α	**β**	Signβ	**α**	Sign α	**β**	Signβ
Bulgaria	1,607E-05	0	0,64005	0	0,0002009	0	1,21471	0
Lithuania	1,722E-05	0	0,67575	0	0,0002247	0	1,32217	0
Romania	2,066E-05	0	0,78285	0	0,0002959	0	1,64455	0
Hungary	1,665E-05	0	0,6579	0	0,0002128	0	1,26844	0
Croatia	**-7,745E-05**	**0**	**0,4827**	**1**	**-3,299E-05**	**0**	**0,6492**	**1**
Czech Republic	1,952E-05	0	0,74715	0	0,0002721	0	1,53709	0
Slovakia	2,296E-05	0	0,85425	0	0,0003433	0	1,85947	0
Estonia	**1,327E-05**	**0**	**0,4049**	**1**	**3,686E-05**	**0**	**0,4776**	**1**
Poland	**5,308E-05**	**0**	**0,9**	**1**	**9,061E-05**	**0**	**0,9889**	**1**