The impact of macroeconomic variables on IPO volume in Europe

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Abstract

An Initial Public Offering, IPO, is when a firm sells its shares on the public stock exchange for the first time. Over the last 15 years, IPO volume has fluctuated in Europe and during 2012 the IPO volume are at one of the lowest levels in modern times. Two major advantages for a firm to go public are to increase its liquidity and raise capital for new investments. These two advantages are for many firms the most significant incentives for making an IPO, although other variables have been shown to matter as well.

Using regression analysis and data collected from Bloomberg, World Bank and the Federal Reserve Bank of St. Louis, this thesis shows that IPO volume is correlated with at least two different macroeconomic variables. Based on 6997 IPOs from 26 European countries during 1998-2012, this thesis concludes that IPO volume (relative to economy size) shares a positive correlation with the growth rate of the economy (measured as growth in GDP per capita) and the size of the overall stock market measured as market capitalization relative to GDP.

Key-words
IPO, IPO volume, Europe
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1. Introduction

1.1 Background
According to the Pecking order theory, there are three different financing methods for a firm to raise capital and was popularized by Mayers and Majluf in 1984. Prioritized in the following order by which one that is most attractive to use, the three methods are: internal funds, issuance of debt and issuance of equity (Mayers and Majluf, 1984). When internal funding is used, the firm uses money from its own balance sheet or a close relative member to one of the founders that does not require any management stake in the firm. However, this financing method is often limited for most firms and to be able to grow, they need to seek capital elsewhere (Berk and DeMarzo, 2013).

The second alternative to raise capital is to contact an institution that lends money and apply for a loan. This institution is often a bank and to borrow money the firm needs collateral to be granted a loan. If the firm fulfills the collateral demand and gets accepted by the bank they can get the loan. In return for lending money to the firm, the bank demands an interest rate payment. The interest on the loan is often reflected in the amount of collateral the firm has and what kind of business they operate in. Banks are often risk averse and therefore many firms cannot meet the high demand banks have, to be granted loans.

However, due to asymmetric information problems, borrowing money from a bank is favorable compared with issuance of equity. This is due to most firms want to have control and manage the firm by themselves without any external influences. When firms are seeking capital in terms of issuance of equity, the potential investors often want to be part of the management team in return, therefore the issue of equity is less attractive than a loan from a bank. Nevertheless, it comes to a certain point where interest rates on debt ratio become too expensive and then the firm moves over to issuances of equity instead (Frank & Goyal, 2007).
Examples of issuance of equity operators can be angel investors and venture capital firms. The main difference between angel investors and venture capital firms is that angel investors are often private individuals who invest money in small firms and venture capitalists are organizations based on two operators that are limited partners and general partners.

As mentioned earlier these external investors sometimes demands influence over how the capital-seeking firm is managed and operated. This influential demand from venture capital firms are often seen as negative in the perspective of the management team in the firm and therefore other alternatives can be considered.

Making an initial public offering (IPO) is one alternative. The definition of an IPO can be described as when a firm for the first time list its shares on a stock exchange and the shares are on sale for the general public (Draho, 2004). An IPO is not excluded from investor influence but investors often lets the firm manage and operate their firm individually due to the high number of new investors arising from the IPO (Mayers and Majluf, 1984).

For young firms an IPO can be an excessive way of getting new financing for expansion and investment for the firm. This thesis will examine of there are any correlation between macroeconomic variables and IPO volume in Europe. Based on data from 26 European countries, over a 15-year period (1998-2012), Figure 1 can show big fluctuations in IPO volume over the years. During 1999 the peak of IPO volume can be seen and since then the trend has been negative. After the bottom during 2008, IPO volume has retrieved a bit but has started to reach the lowest levels again in 2012.
The distribution of IPO volume in different regions in Europe is an interesting aspect to highlight. This thesis has, for a better understating of the data, divided the dataset for the 26 countries in four individual regions based on the European Quality of Government Index (EQI) of 2010. Table 1 shows the four regions and the countries included in each region. The regions are Northern Europe, Central Europe, Eastern Europe and Southern Europe. More detailed information about how the data was divided will be presented under section 2.1.4.

Table 1 All countries divided into four regions; Northern, Central, Eastern and Western.
Figure 3 shows the distribution of IPO volume per region in Europe. The percentages are weighted per number of countries in relation to IPO volume in the region for a better comparison. During the studied years, 1998 – 2012, the major part of IPO volume was in Southern Europe. Figure 3 shows that 38% of the IPO volume can be derived from countries in Southern Europe.

<table>
<thead>
<tr>
<th>Region</th>
<th>Average IPO volume per region (M USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Europe</td>
<td>38%</td>
</tr>
<tr>
<td>Central Europe</td>
<td>13%</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>12%</td>
</tr>
<tr>
<td>Southern Europe</td>
<td>37%</td>
</tr>
</tbody>
</table>

The lowest amount of IPO per country in Europe was made in Eastern Europe during the specific time period. The region consists of post-communist countries and according to Fenger, 2007, there are clear differences in governmental policies between post-communist countries and the rest of Europe. Also, the EQI rank for the countries in Eastern Europe have the highest rank, implying the lowest quality of government and high corruption. Rank of EQI can be found under section 2.1.4. These governmental policies can a part of the explanation to the lower IPO volume.

The decision of making an IPO is often based on many different variables that can differ from increasing capital to seeking a greater reputation. Although, the two main advantages from an IPO are, firstly the firms gain more capital and the liquidity in the firm increases (Berk and DeMarzo, 2013).
With this increasing liquidity, the firm can pay off short-term liabilities and increase its capital reserve for future challenges. The second advantage is an increase in capital for future investments and the firm can grow organically.

1.2 Problem formulation

Many firms going public through an IPO are in an early stage of their business. Making an IPO can be the first and only chance for a firm to grow and become significant larger in the industry the firm operates in. Due to this importance for a firm to go public through an IPO, it is critical for the firm to be aware of the timing and if any specific variables are important to consider. Previous research (Lowry 2003, Bilson, Bailsford, & Hooper, 2001, Choe et al 1993, Korajczyk and Levy 2003, Amer 2012, Loughran et al 1994, Rees 1997, Jensen and Johnson 1993, Brau et al. 2003, Frank and Goyal 2007 and Jovanovic and Rousseau 2004) illustrates different macroeconomic variables such as GDP per capita growth, stock market capitalization and real interest rates impact on IPO volume based on data sets until the early years of 2000.

Over the recent years the rapid change in technology and the global economy may have affected the financial industry and incentives to go public through an IPO. The participation in IPO for the public have become considerable easier and more available during recent years. The most important factor for this change is that the banking sector has become more digital and user-friendly for the clients. Due to this change in technology and the economy, this thesis will study if the impact of macroeconomic variables in Europe have transformed during the period 1998-2012. Extensive and solid data for IPO volume for the period has been collected from Bloomberg Terminal and the macroeconomic variables from World Bank and Federal Reserve Bank of St. Louis (FRED). The major contribution to existing theory through this thesis will be the updated and solid data from recent years for IPO volume. Up to date no studies based on European countries have been conducted based on recent data, such as used in this thesis, hence the thesis will significant contribute to the research within the IPO area.
1.3 Purpose of the paper
The purpose of this thesis is to examine whether IPO volume has a correlation with important macroeconomic variables and if these affect firms that are going public. To extend the robustness of the thesis, it will also examine if there are any differences between different regions within Europe. The thesis will use a quantitative study and test four macroeconomic variables that are, based on previous literature, relevant for explaining IPO volume. These variables are GDP per capita growth, GDP per capita, stock market capitalization to GDP and the real interest rate.
Noteworthy for this thesis is the modern and updated data used for IPO volume and the macroeconomic variables. This data and the analysis of it will provide enlargement for the research area for IPOs.

1.4 Limitations
The thesis will be based on countries in Europe. The study will use full datasets hence no missing data for any year in the study. To maintain full datasets, the number of European countries has been limited to 26. The time period for the study were set to 15 year, 1998-2012, for achieving full datasets. Based on previous studies and research, four independent variables were studied for all countries, GDP per capita growth, GDP per capita, stock market capitalization to GDP and real interest rate.

1.5 Sustainability aspects
Sustainability is a wide concept and incorporates many areas. In general, the complete sustainability can be said to rely on three major pillars; social, environmental and economic (Hansman, 2012). All the three pillars are crucial for the sustainability to hold, if any of the pillars are weak, the concept is unsustainable. Different organizations work to improve the separate pillars and to make the whole concept sustainable. Organization for Economic Cooperation and Development (OECD) works with the social aspect through war reduction and justice. United Nations Environmental Programme (UNEP) focuses on the environmental aspect to protect and enhance the environmental climate of various countries. The United Nation (UN) focus mainly on the economic aspect, this since economic growth is most important for its members, particularly in less developed nations.
Important to acknowledge is that not all projects can contribute to one of the three pillars of sustainability. Reviewing this thesis, the contribution to the sustainability by any of the three pillars is uncertain and not direct.

1.6 Outline of the thesis
The thesis will be divided into four sections where the next section includes all relevant previous research about IPOs and the hypothesis. The section after explains how the data collection was made and a method chapter with relevant information about the variables tested and how the tests were performed. After that the results is presented, explained and analyzed. The last section contains a conclusion of the results and suggestions for future research.
2. Theory

2.1 Theoretical framework
When firms go public through an IPO, the firm gains two main advantages. Firstly the liquidity in the firm increases and the ability to pay off some current liabilities increase. Secondly, the higher liquidity also gives the firm greater potential of new investments and to increase the growth of the firm, (Berk and DeMarzo, 2013). These two advantages are the two main reasons why firms go public, hence there are several other variables that affect the decision too. These other variables influencing the decision of an IPO can be divided in two sub categories; internal and external variables. The following section will describe each sub category more closely and provide previous research within the field. Important to understand is most firms that want to succeed with their IPO must consider both categories when making such a big decision. The firm’s owns internal conditions combined with the external variables can be vital if the firm is going to be successful or not.

2.1.1 Internal variables
Internal variables include variables that are specific for the targeted firm. The main purpose of these variables is for the firm to focus more on its own position on the market and less on general variables when deciding about going public. Each firm has different underlying conditions and circumstances and therefore the decision can vary depending on the specific firm’s situation.

Draho (2004) states that firms go public through IPOs to expand the business, make new investments in future projects and increase the liquidity in the firm. Draho’s conclusion is supported by Kim & Weisbach (2008), who concludes that firms use money from IPOs to finance new investment and internal funds to pay off long-term debts. In contrast to Draho (2004) and Kim & Weisbach (2008), Pagano, Panetta and Zingales (1998) states that the main reason for firms do IPOs is because they want to rebalance the capital structure, exploit mispricing and pay off their long-term debt. Pagano, Panetta and Zingales (1998) also states that firms rather pay off their existing debt before financing new investments and that an IPO could be one way of accomplish it.
Draho (2004), Sevenius & Örtengren (2012) and Espinasse (2011) make another conclusion in their reports regarding reputation of the firm. To make an IPO the firm must meet certain demands regarding accounting standards, financial reporting duties and transparency. Hence, an IPO can be a certificate that the firm meets these demands and may increase the reputation and professionalism of the firm and attract potential investors. By going public through an IPO, the firm will state seriousness, professionalism and solidity. This makes institutions, lenders and other actors more confident with investing in the firm and the possibilities of recruiting highly skilled employees will be considerably better. Another aspect in the scenario of an IPO is that the firm gets a lot of publicity in media and the financial world without the need of expensive advertisement. Even though the cost of an IPO often is relatively high, it is cheaper than a massive advertisement campaign, (Sevenius & Örtengren, 2012; Espinasse, 2011).

2.1.2 External variables
The other sub category, external variables, focuses more on general variables that is not specific for each firm, but general for the whole country or industry the firm operates in. These variables must not always be the crucial reasons why firms do IPOs, however these variables will affects the decision and may give the optimal timing to perform an IPO for the firms.

One phenomenon called IPO clustering has enormous impact on the decision for a firm to go public through an IPO or to find other alternative of financing. IPO clustering is a result of firms benefitting on the information production of earlier IPOs, which creates “clusters” of IPOs during a short time, (Hoffmann-Buchardi, 2001). According to Yung, Colak and Wang (2008) and Lowry and Schwert 2002, this phenomenon can be explained by adverse selection.

When the economic outlook is strong, the number of IPOs increases since investment opportunities are better with more potential investors to invest through an IPO. Since these potential investors do not always conduct comprehensive research of each firm that makes an IPO, they may invest their funds in firms that are taking advantage of the current IPO clustering.
Even if these firms may not have the capacity or management skills to succeed with an IPO unaccompanied, they nevertheless can succeed if the other, more qualitative, firms succeed with their IPO. The information of the qualititative firms spreads and then the investors continues to invest funds because they think that every IPO is a potential capital increaser (Yung, Colak and Wang, 2008).

Amer (2012), Jensen and Johnson (1993) and Tran and Jeon (2011) conclude that a higher interest rate results in a lower value of the discounted future cash flow, hence a lower value of the firm and lower IPO volume. In line with Amer (2012) Jensen and Johnson (1993) and Tran and Jeon (2011), Jovanovic and Rousseau (2004) find that the relation between IPO volume and real interest rate is non-monotonic. High real interest rates will discount the future cash flow more heavily and firms will dispirit the IPO. However, with low real interest rates there are advantages of waiting for the interest rates to increase to more beneficial levels.

Brau et al. (2003) states IPO volume will be reduced at low interest rates with respect to the increased number of acquisitions among firms. Brau et al. (2003) state that the number of acquisitions is higher at a low interest rate, since acquiring firms can use larger amounts of debt to finance the acquisition and the targets of the acquisitions will not perform an IPO. Regarding these arguments, Brau et al (2003) concludes that there is a positive relation between nominal interest rate and IPO volume. However, Frank and Goyal (2005) argues that firms with high debt ratios will tend to make IPOs in high interest environments. The base of their argument is that firms with high debt ratios are unwilling to pay high interest rates to their lenders and then an IPO is a pronounced substitute.

Since the theory about the real interest rates impact on IPO volume is inconsistent, this thesis will state a hypothesis which the majority of the previous studies support. In this case a negative correlation is the most common conclusion among the previous literature and therefore the first hypothesis can be stated as:

\[ H1: \text{There is a negative relationship between real interest rate and the IPO volume to GDP.} \]
A general assumption used within research of IPOs is that the IPO volume has the tendency to fluctuate with the business cycle measured by GDP growth or growth in industrial production (Lowry 2003; Bilson, Bailsford, & Hooper, 2001).

Theory states that economic growth impacts, and increases, the demand of capital and hence causes more firms to go public through an IPO. This can be described by when opportunities of new investments arise, more firms have higher demand of capital, and hence more firms will use those opportunities. Indirectly, the demand of capital will be positively correlated with the potential future growth in investments in the wide economy and simultaneous growth in firms that goes public through an IPO. In other words, IPO volumes are presumed to be determined by variations in the total demand for capital by private firms. As the economy advances, the general firm will demand further capital to finance their future expansion and growth (Lowry, 2003). Also, Korajczyk and Levy (2003) states that for firms that enter the public financial markets, equity issues has a positive relationship to business cycles and debt issues have negative relationship to business cycles.

Accordingly, a well-used proxy for capital demand used in previous research is GDP growth (Lowry 2003). Some argue that firms’ sales growth and the number of new firms on the market are established proxies, this paper uses the GDP per capita growth for its accessibility and comparability over the used time series across the observed countries.

Empirically, the demand of capital does seem to influence the IPO volume positively. Choe et al (1993) argues that firms tend to issue equity more frequently in an expansionary phase of the economy. Lowry, 2003, does not acquire significant results for the GDP growth, but acquire results coherent with the theory presented by Choe et al (1993) with support of supplementary proxies.

Previous research and studies are unanimous in their findings and conclusions and based on this, two hypotheses can be formed:

**H2:** There is a positive relationship between GDP per capita and the IPO volume to GDP.

**H3:** There is a positive relationship between GDP per capita growth and the IPO volume to GDP.
The reason why two hypotheses have been established instead of one is due to that GDP can be measured with different methods Callen (2012). By including all methods, this thesis covers possible variables that include GDP. This increases the validity of the thesis and excludes measurement problems that might occur.

Proxies used to implement investor sentiments are not generally agreed on. In previous studies a wide number of proxies has been used such as, stock market valuation, the discount on closed-end funds and market to book ratio (Baker and Wurgler 2002; Lowry, 2003). Baker and Wurgler, (2002), states through market timing hypothesis that firms generally do not prefer issue of equity or debt, all they focus on is what kind of financing method is most beneficial at that exact moment.

Often the stock market index is used to determine what method is preferable to the other. To issue equity through an IPO is more common when the stock market index is increasing, hence the price of equities rises (Ameer, 2012). Due to these circumstances, most firms find it optimal to use issue of equity during increase in stock market index. In line with this, during periods of decreasing stock market index, firms tend to see themselves as undervalued and the volume of IPOs will decrease (Ameer, 2012).

Loughran et al., (1994) and Rees, (1997), have found a significant positive relationship between stock market index and IPO volume in previous studies. Due to the accessibility and availability of the data for stock market capitalization to GDP, this variable will be used as one proxy for investor sentiments. Based on previous studies and theory a fourth hypothesis can be formed;

\[ H4: \text{There is a positive relationship between Stock market capitalization to GDP and IPO volume.} \]
2.1.3 Internal variables versus external variables
This thesis will not study internal variables relationship to IPO volume. This because measuring these variables with quantitative methods is not possible. Nevertheless, these variables are important to highlight due to that they can affect the decision. Excluding them from the thesis would misguide the reader and make the thesis less trustworthy. Instead, the thesis will study and test hypothesis based on four macroeconomic variables. These variables are included in several previous studies and according to their conclusions; they share a relationship with IPO volume.

2.1.4 European Quality of Government Index
The European Quality of Government Index (EQI) focuses on different governmental, impartiality and corruption components between countries. EQI composes an index of all these components for all countries in the European Union with accession of Turkey. The components for governmental components are: education quality, health quality, law quality, election quality and media quality. The components for impartiality are: impartiality of public education, impartiality of public health and impartiality of law enforcement. The components for corruption are: Corruption of public education, corruption of public healthcare, corruption of law enforcement and perceived bribery. (Charron, Dijkstra and Lapuente, 2014).

Based on the results, each country has been given a score and a rank among all the countries included in the index. Table 2 illustrates the EQI scores and ranks for all countries in this thesis, divided by region. The index is based on datasets from 2010 and therefore relevant for the time frame of this thesis. Noticeable is the similar ranks and scores for all countries in each region. The higher value of EQI indicates a higher quality of government. The rank is based on the EQI value and rank 1 has the highest EQI score in the conducted study by Charron, Dijkstra and Lapuente (2014).

Some countries examine in this thesis are not members of the European Union at the time the EQI was generated and will therefore not be included in the EQI. Countries in the thesis not included in the European Union are Iceland, Norway, Russia and Switzerland, these countries where included in the region based on their geographical location in relation to the rest of the countries. Even though these four countries have been included in a region based on the geographical location, the EQI and rank should have matched the rest of the countries in the separate region.
Iceland and Norway have similar Government structures as the rest of the countries in the region Northern Europe, the same arguments can be used for Russia and Switzerland.

The mentioned governmental components will impact various macroeconomic variables in the different regions and specific countries. Based on the different levels of EQI for the four regions, differences in IPO volume to GDP can be expected in this thesis.

<table>
<thead>
<tr>
<th>Region</th>
<th>EQI</th>
<th>Rank</th>
<th>Region</th>
<th>EQI</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern</td>
<td></td>
<td></td>
<td>Southern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>1,64</td>
<td>3</td>
<td>Spain</td>
<td>0,09</td>
<td>124</td>
</tr>
<tr>
<td>Finland</td>
<td>1,49</td>
<td>10</td>
<td>Greece</td>
<td>-0,63</td>
<td>166</td>
</tr>
<tr>
<td>Iceland</td>
<td>N/A</td>
<td>N/A</td>
<td>Italy</td>
<td>-0,84</td>
<td>186</td>
</tr>
<tr>
<td>Norway</td>
<td>N/A</td>
<td>N/A</td>
<td>Portugal</td>
<td>0,07</td>
<td>126</td>
</tr>
<tr>
<td>Sweden</td>
<td>1,39</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Central   |     |      | Eastern   |     |      |
| Austria   | 1,16| 36   | Bulgaria  | -1,59| 218  |
| Belgium   | 0,51| 99   | Czech Rep.| -0,35| 148  |
| Germany   | 0,89| 68   | Estonia   | 0,09 | 123  |
| France    | 0,66| 88   | Hungary   | -0,44| 156  |
| United Kingdom | 0,88 | 72 | Poland    | -0,72| 175  |
| Luxembourg| 1,14| 37   | Romania   | -1,58| 217  |
| Netherlands| 1,20 | 33 | Russia    | N/A  |      |
| Ireland   | 0,95| 62   | Turkey    | -1,50| 204  |
| Switzerland| N/A | N/A |           |     |      |

2.2 Literature review

In Table 2, all relevant theories used in the thesis are summarized in a literature review. In the review both internal and external variables are included. As Table 2 illustrates, macroeconomic variables are the most frequently used factor among the explanation of IPOs and the real interest rate is the most studied variable.

Campbell et al (2001) states that macroeconomic variables are exceptional variables for examine what factors that influence the IPO volume. Further, they state that the simultaneously changes of macroeconomic variables will affect the cash flow for firms and impact the discount rates used when valuating firms.
In line with these arguments, Flannery and Protopappadakis (2002) states that the growth of industrial production signals firms to go public through an IPO in search of finance. High growth of the industrial production will lead to an increase in the output and a higher demand of capital will be noticed at the financing market.

Ameer (2012), Tran and Jeon (2011) and Jenssen and Johnson (1993) conclude a negative correlation between the real interest rate and IPO volume. Their studies were conducted in Malaysia and USA respectively and are based on datasets from different periods, 1990-2008, 1970-2005 and 1962-1991. Brau et al. (2003) and Frank and Goyal (2007) conclude the opposite of Ameer (2012), Tran and Jeon (2011) and Jenssen and Johnson (1993). Based on datasets over a 25-30-year period, they find a positive correlation between the real interest rate and IPO volume. The study conducted by Brau et al. (2003) was based on datasets from USA and the study by Frank and Goyal (2007) was based on 2691 firms from no specific country.

The most recent study conducted based on the real interest rate concludes that there is an inverse U-shaped correlation between the real interest rate and IPO volume. According to Jovanovic and Rousseau (2004), an extremely low or extremely high interest rate does not encourage firms to go public through an IPO. However, when the real interest rate is at moderate levels firms go public through an IPO at a wider range.

A study from Ameer (2007) examines the impact of macroeconomic factors on bond and stock market activity in South Korea and Malaysia under the year 1995-2004. One macroeconomic factor examined is the interest rate, which they find a two-way relationship to bond issuance in South Korea. The finding shows a significant impact on market prices and hence the issuance of equity and IPO volume.

How macroeconomic factors affects the stock market return o the US market have been examined by Chang (2009). The studied years was 1974-1994 and Chang (2009) argues that interest rate is an excellent instrument to implement thigh or loose monetary policy, which will affect the stock market through various credit channels. Chang (2009) also argues that changes in the interest rate will have an impact on IPO volumes.
Focusing on GDP, previous studies are unanimous in their conclusions. According to Korajczyk and Levy (2003), Choe et al. (1993), Bilson, Brailsford & Hooper (2001) and Lowry (2003) there is a positive correlation between GDP and IPO volume. Korajczyk and Levy (2003) conducted a study in USA during the period 1984-1999 and focused on the capital structure choice of firms based on macroeconomic factor, among GDP per capita and found a positive relationship to between IPO volume and GDP per capita. Choe et al. (1993) studied the impact on IP volume based on business cycles and used GDP per capita Growth as a proxy for demand of capital. Their study was conducted in USA during the period 1971-1991. The study by Bilson, Brailsford & Hooper (2001) consisted of a study on emerging markets during 1985-1997 and found a significant positive relationship between IPO volume and GDP per capita growth.

United conclusions are illustrated in previous research regarding market capitalization. According to Ameer (2012), Loughran et al. (1994) and Rees (1997), market capitalization has a positive correlation to IPO volume. Ameer (2012) studied the IPO volume in Malaysia based on various macroeconomic variables, among stock market index, during the period 1990-2008. Ameer (2012) found a significant positive relationship between stock market index and IPO volume. Loughran et al. (1994) conducted a study of 25 countries around the world during the period 1959-1992. Loughran et al. (1994) examine the relationship between stock market index and IPO volume and found a positive relationship for the studied countries around the world. Rees (2007) studied firms in the United Kingdom and their incentives to go public through an IPO. The time period for this study were 1987-1995 and macroeconomic variables were used in the study. Rees (2007) found a significant positive relationship between the level of the stock market and IPO volume.

Chen (2007) examine if monetary policies has irregular effects on stock returns. The study is based on the Standard and Poor’s 500 stock market index during the years 1965-2004. Chen (2007) concludes that monetary policy has a larger effect on stock returns during bear market conditions and will influence the IPO volume.
Table 2 also includes two studies regarding the welfare and quality of the government in European countries. These studies have not been done within the IPO field but are important since this thesis studies the differences among regions in Europe. The first study, Charron, Dijkstra and Lapuente (2014), conducted a survey for all members of the European Union with accession of Serbia and Turkey regarding the quality of the government. Their study provide a score and a ranking among the studied countries based on governance and corruption in the countries. The survey was conducted 2010 and 2014 in the same countries to try to study any changes from the years. Their survey from 2010 showed significant differences among the countries in the survey. In the top of the ranking there are the Scandinavian countries and at the lowest rank they found countries in the eastern of Europe.

The second study, Fenger (2007), studies the effects of communism on the government and welfare in post-communist countries. The study concludes huge differences among countries in Eastern Europe and Western Europe regarding the government programs and welfare. Countries located closer to central Europe such as Poland and Czech Republic tend to have better welfare and government programs than countries located in the east as for example Russia and Belarus.

Table 2 can also show a large time span in the conducted previous studies, from eight to 40 years. As stated previously, most of the used data in previous studies, especially for Europe, are based on data from the 90’s, hence the more recent data in this thesis is unique.
Table 3 Literature review of 27 studies that are relevant for determination of IPO volume. Authors, country, coverage, time period, explanation of IPO volume and summary of findings are included in the table.

<table>
<thead>
<tr>
<th>Author</th>
<th>Country and coverage</th>
<th>Time period</th>
<th>Explanation of IPO volume</th>
<th>Summary of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korajczyk and Levy 2003</td>
<td>USA</td>
<td>1984-1999</td>
<td>Business cycles</td>
<td>Positive correlation between equity issues and business cycles</td>
</tr>
<tr>
<td>Baker and Wurgler 2002</td>
<td>No specific country</td>
<td>1968-1999</td>
<td>Capital structure/market timing</td>
<td>When going public, the most beneficial method is preferable</td>
</tr>
<tr>
<td>Choe et al. 1993</td>
<td>USA</td>
<td>1971-1991</td>
<td>Demand of capital</td>
<td>Positive correlation between the demand of capital and equity issues</td>
</tr>
<tr>
<td>Yung, Colak and Wang 2008</td>
<td>USA</td>
<td>1973-2004</td>
<td>Economic outlook</td>
<td>Positive correlation between economic outlook and IPO volume</td>
</tr>
<tr>
<td>Lowry 2003</td>
<td>USA</td>
<td>1960-1996</td>
<td>GDP growth</td>
<td>Positive correlation between GDP growth and IPO volume</td>
</tr>
<tr>
<td>Lowery and Schwert 2002</td>
<td>USA</td>
<td>1985-1997</td>
<td>Initial returns</td>
<td>More companies tend to go public following periods of high initial returns.</td>
</tr>
<tr>
<td>Ameer 2012</td>
<td>Malaysia</td>
<td>1990-2008</td>
<td>Interest rate</td>
<td>Negative correlation between interest rates and IPO volume</td>
</tr>
<tr>
<td>Ameer 2007</td>
<td>Malaysia and South Korea</td>
<td>1995-2004</td>
<td>Interest rate</td>
<td>Two way relationship between interest rate and bond issuance</td>
</tr>
<tr>
<td>Brau et al. 2003</td>
<td>2691 firms</td>
<td>1984-1998</td>
<td>Interest rate</td>
<td>Positive correlation between interest rate and IPO volume</td>
</tr>
<tr>
<td>Tran and Jeon 2011</td>
<td>USA</td>
<td>1970-2005</td>
<td>Interest rate</td>
<td>Negative correlation between interest rate and IPO volume</td>
</tr>
<tr>
<td>Jensen and Johnson 1993</td>
<td>78 discount rate changes in USA</td>
<td>1962-1991</td>
<td>Interest rate</td>
<td>Negative correlation between interest rates and IPO volume</td>
</tr>
<tr>
<td>Jovanovic and Roussau 2004</td>
<td>No specific country</td>
<td>1987-2002</td>
<td>Interest rate</td>
<td>Inverse U-shaped correlation with interest rates and IPO volume</td>
</tr>
<tr>
<td>Frank and Goyal 2005</td>
<td>USA</td>
<td>1973-2002</td>
<td>Interest rate</td>
<td>Positive correlation between interest rate and IPO volume</td>
</tr>
<tr>
<td>Chang 2009</td>
<td>USA</td>
<td>1974-1994</td>
<td>Interest rate</td>
<td>The interest rate affects monetary policy which in turn affects the financial markets.</td>
</tr>
<tr>
<td>Campbell et al. 2001</td>
<td>USA</td>
<td>1962-1997</td>
<td>Macroeconomic variables</td>
<td>Have significant impact on cash flows for firms and return on the IPO volume.</td>
</tr>
<tr>
<td>Flannery and Protopapasakis 2002</td>
<td>USA</td>
<td>1980-1996</td>
<td>Macroeconomic variables</td>
<td>Macroeconomic variables affects the stock market return</td>
</tr>
<tr>
<td>Draho 2004</td>
<td>38 countries</td>
<td>1959-2000</td>
<td>New investments</td>
<td>Firms make IPOs to expand their business and make new investments.</td>
</tr>
<tr>
<td>Kim &amp; Weidbach 2008</td>
<td>38 countries</td>
<td>1990-2003</td>
<td>New investments</td>
<td>Firms make IPOs to make new investments so that the firm can grow</td>
</tr>
<tr>
<td>Pagano, Panetta and Zingales 1998</td>
<td>Italy</td>
<td>1982-1992</td>
<td>Rebalance capital structure</td>
<td>Rebalance the firms capital structure, exploit mispricing and pay off long-term debts</td>
</tr>
<tr>
<td>Hoffman-Buchardi 2001</td>
<td>7 firms from Kenya</td>
<td>1998-2008</td>
<td>IPO clustering</td>
<td>Positive correlation between clustering and IPO volume</td>
</tr>
<tr>
<td>Chen 2007</td>
<td>USA</td>
<td>1965-2004</td>
<td>Monetary policy</td>
<td>Monetary policy affects stock return in a greater extent in bear markets.</td>
</tr>
<tr>
<td>Amer 2012</td>
<td>Malaysia</td>
<td>1990-2008</td>
<td>Stock market index</td>
<td>Positive correlation between stock market index and IPO volume</td>
</tr>
<tr>
<td>Loughran et al. 1994</td>
<td>25 countries</td>
<td>1975-1989</td>
<td>Stock market index</td>
<td>Positive correlation between stock market index and IPO volume</td>
</tr>
<tr>
<td>Rees 1997</td>
<td>United Kingdom</td>
<td>1987-1995</td>
<td>Stock market index</td>
<td>Positive correlation between stock market index and IPO volume</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Author</th>
<th>Country and coverage</th>
<th>Time period</th>
<th>Explanation of different countries market climate</th>
<th>Summary of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charron, Dijkstra and Lapuente, (2014)</td>
<td>European Union</td>
<td>2010</td>
<td>Governmental, impartiality and corruption</td>
<td>There are big differencies between countries regarding governmental, impartiality and corruption which reflects the geographical location of the countries</td>
</tr>
<tr>
<td>Fenger 2007</td>
<td>Post communist countries</td>
<td>Around 2000</td>
<td>Post communist effects on the government</td>
<td>There are clear differences in the governmental programmes and the social situation between traditional Western welfare states and post-communist welfare states.</td>
</tr>
</tbody>
</table>
3. Methodology

3.1 Data collection
The datasets used in this report have been collected from three different sources; Bloomberg, World Bank Data and Federal Reserve Bank of St. Louis (FRED). After collecting data some adjustments from the original dataset was implemented because of missing data. This restricted the time period and numbers of countries used. The period was settled from 20 years to 15 years, 1998 to 2012 and the number of countries was established from 44 to 26. The following countries were included after the restrictions were made: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey and United Kingdom. All these countries are European countries except from Turkey and Russia that also belongs to Asia and the Middle East. This makes the dataset more homogenous in a location perspective than if they should have been scattered all over the world.

The datasets have been divided into four regions based on the EQI index. Based on the index, each country has been given a score and a rank among all the countries included in the index. These scores and ranks vary among regions. Based on the scores and ranks the four regions in this thesis were created.

As stated in the background section, the four regions are Northern Europe, Central Europe, Eastern Europe and Southern Europe. The aim for this sectioning is to provide a better understanding of the collected data and show variations in the dataset. The sectioning of the data will help the study to show the robustness of the data and to show any differences between the regions regarding the studied variables. More detailed information about how the data was collected can be found in the Appendix.
3.2 Method and data description
This section contains a description of each variable that has been used in the regressions and the empirical tests that have been implemented in the thesis. The section also includes some of the econometric issues regarding the tests and the models.

All regressions in this thesis have been made in STATA where panel data has been used which refers to multi-dimensional data frequently involving measurements over time. The advantage with panel data is that when using it, it is possible to control for variables not measurable or observable as for example policies, laws and cultural variables. The data contained one dependent variable and was tested against four independent variables. The dependent variable used was IPO volume to GDP and the independent variables were GDP per capita, GDP per capita growth, real interest rate and stock market capitalization to GDP.

3.2.1 IPO volume to GDP
Measuring IPO data, it is possible to use two different methods. The first method is to measure the number of IPOs in a country for a specific year. The second is to measure the actual amount of funds the firm raised through the IPO, (Berk and DeMarzo, 2013). In this thesis the collected data is measured in IPO volume in USD. Compared to the number of IPOs, the IPO volume gives a better interpretation about how large amounts firm raises by performing an IPO. Previous studies tend to prefer IPO volume to the number of IPOs; hence IPO volume will be used in this thesis.

The total IPO volume per year will be divided by that country’s GDP for each year. This makes the IPO volume more comparable between countries than if the total amount of IPO volume would be used as pendent variable. Below, Figure 4 shows how IPO volume to GDP has fluctuated over the studied time 1998-2012. Interesting to notice is that during the financial crisis of 2008 the IPO volume decreased and has not recovered since then.
As shown in Figure 5, all countries in Northern Europe have similar fluctuations in IPO volume to GDP. The IT boom, year 2000 and the financial crisis, year 2008, are periods where the fluctuations are significant. Noticeable is the peak for Finland during 1998 when the rest of the countries had a very low IPO level.
Illustrated in Figure 6 the IPO volume for Luxembourg has three major peaks, 2000, 2006 and 2010. The GDP for Luxembourg is significantly smaller in relation to the other countries in this region, hence small changes in IPO volume will impact the IPO volume to GDP remarkably. Also, noticeable is the high peak for Ireland during 1999. In general, fluctuations in IPO volume to GDP can be noticed around year 2000 and 2008 when the IT boom and financial crisis impacted the financial markets.

In Figure 7 Estonia, Russia, Turkey and Poland have several high peaks during the studied period. Especially during the years 1999, 2005, 2007 and 2010 the IPO volume tended to be abnormal in comparison to the other countries. Noticeable is the low maximum value for the region in comparison to the other regions, Eastern Europe have a maximum value of approximately 1.8% while Northern and Central Europe have 10%.
As illustrated in Figure 8 Greece has the highest peak in 1999. Overall the countries in the region seem to fluctuate similar over the years, with a peak around 1999 and 2007. These peaks can be explained by the IT boom 2000 and financial crisis 2008.
3.2.2 GDP per capita and GDP per capita growth

Gross Domestic Product, GDP, measures all services and goods that are brought to the final user or produced in a country for a given period, Callen (2012). Within the borders of a country every output generated under this definition will contribute to that specific country’s GDP. This also includes certain government services such as education and defense, Callen (2012).

Another variable that easily can be mistaken for, or confused, with GDP is Gross National Product, GNP. GNP is value of all goods and services produced during a year by the labor and property provided by the citizens of the specific country. To simplify; if a Swedish-owned firm has a factory in Denmark, this factory will contribute to Denmark's GDP and Sweden’s GNP, Callen (2012). Voluntary workers, unpaid work and the black-market are some variables of work that does not contribute to GDP. These variables do not contribute to the GDP since it is difficult to measure and even more difficult to estimate the value of them. In countries where the black-market constitutes a wide part of the performed services, measuring GDP is more difficult and gives a less precise indicator on how the country economy is evolving, Callen (2012).

GDP is a good variable for measuring how a country’s economy is performing but also how large its economy is. However, when comparing GDP over time it is important to adjust for the inflation to be able to compare the cost of certain goods from different years, Callen (2012). If GDP has risen over a five-year period, this can have two alternative explanations. Either, the country has increased its production and services or prices on goods and services have risen. If the latter is the scenario and no adjustment for inflation has been made, it will appear that the country’s GDP has risen even if it has not. Initially this indicates a higher level of production in the country. But if the inflation composes a large part of this increase, the fact is that the level of production may not have increased as much as implied, and in the worst case it may have decreased. If there is no adjustment for inflation it is not appropriate to compare GDP from year to year Callen (2012). Adjustments for inflation have been made on all GDP data collected and used in this thesis. GDP per capita growth are used in its original form. The logarithm of GDP per capita will be used due to a better fit of the data to the model.
The illustrated graphs represented by Figure 9-10 shows that fluctuation of GDP per capita and GDP per capita growth over the studied period have increased since 1998. During the financial crisis in 2008 both graphs show a declining curve followed by an increase to 2012. Since the datasets have been adjusted for inflation, this indicates that the GDP has increased. This is supported by GDP growth per capita illustrated in Figure 10. This graph shows a constant growth between 2% and 5% to 2006-2007. After this period it drops to a negative level during 2008 and 2009 and then partly recovers to the 2006-2007 levels.

**Figure 8** GDP per capita in USD over the studied period 1998-2012.

**Figure 9** Average GDP per capita growth in % over the studied period 1998-2012.
3.2.3 Real interest rate

The most common interest rate when loans are taken or present values are calculated for an investment is the nominal interest rate (Berk and DeMarzo, 2013). According to Fisher (1930), one can approximately state that the nominal interest rate is consistent of the real interest and the inflation, also called the Fisher equation. If the prices in an economy are growing with the inflation, the nominal interest rate will not represent the surge in purchasing power from an investment. The growth of the purchasing power, after it has been adjusted for inflation, arises by the real interest rate (Berk and DeMarzo, 2013).

The real interest rate is used to reflect the real cost of funding for the borrower, or the real yield for a lender, since it is adjusted to remove the effects of inflation (Berk and DeMarzo, 2013). According to Fisher (1930), the real interest rate can be calculated as follows:

\[ r_r = \frac{r_n - i}{1 + i} \approx r_n - i \]

Where:
- \( r_r \) = Real interest rate
- \( r_n \) = Nominal interest rate
- \( i \) = Inflation

The real interest rate used in the paper is fabricated by subtracting the annual GDP deflator from the 3-month interbank rate for all countries included in the study. The 3-month interbank rate is defined as the interest rate which banks use for deposits and loans between them with a maturity of three months.

The 3-month interbank rates are usually considered to be the benchmark rate for different type of bonds and other commercial papers. The interbank rate has been collected from the Federal Reserve Bank of St. Louis.
The GDP deflator is defined as the ratio of GDP in the constant local currency to the current local currency and this ratio demonstrates the price change in the economy. In the sense of a measure of inflation, the GDP deflator is a superior alternative to consumer price index (CPI) since it is not based on a basket of services and goods, thus the change in consumption patterns of services and goods are inevitably accounted for. The GDP deflator data has been collected from the World Bank Data.

Figure 11 illustrates the Real interest rate’s fluctuations over the studied period. The interest rate has been divided by the number of countries in the study in the illustration. Two major drops can be observed. The first occurred during the period 2001-2005 and the second, more recently, between 2009 and 2011. Since 2011 it has increased marginally but is still at a negative level during 2012.

![Real Interest rate (Average)](image)

Figure 10 Real interest in % as an average of the studied 26 countries over the studied period 1998-2012.

3.2.4 Market capitalization to GDP
The market capitalization is the compounded market value of all public firms in a specific country. The stock market value of a specific firm is calculated through the stock price on the market multiplied with the number of outstanding shares of the firm. The data for stock market capitalization has been collected from the World Bank.
Figure 12 illustrates the fluctuations of market capitalization to GDP over the studied period. One period of increasing Stock market capitalization can be observed during the period of 2003-2007 and two drops at 2000-2002 and 2007-2009. Since 2009 it has remained relatively constant and is at its lowest level 2012.

![Average Market Capitalization to GDP](image)

**Figure 11** Average Stock market capitalization to GDP in % over the studied period 1998-2012.

3.2.5 Skewness and kurtosis

Two measures often used to examine and understand the symmetry of the data is skewness and kurtosis. Skewness is a measure of how close the data is related to a normal distribution. The skewness for a normal distribution is zero, implying any symmetric data should have skewness close to zero. A negative skewness value for a dataset implies that the dataset is left skewed; hence the left tail is longer relative to the right tail of the distribution. If the skewness value is positive, the dataset is right skewed, hence the right tail is longer relative to the left tail of the distribution.

Kurtosis is a measure of how heavy-tailed or light-tailed the dataset is relative to a normal distribution. Datasets with high kurtosis often have heavy tails, implying outliers in the dataset. Datasets with low kurtosis values tend to have light tails, implying few, or no, outliers. Kurtosis is measured from 0 to positive values, where the kurtosis value of a normal distribution is three (3). The larger positive value of kurtosis indicates a more heavy-tailed distribution, hence outliers are present in the dataset.
Table 4 illustrates some fluctuations in skewness and kurtosis. The skewness of all countries fluctuates from -0.73 for Real interest rate to 6.29 for IPO volume to GDP. Noteworthy is the high skewness for IPO volume to GDP. The kurtosis values are in a disproportionate span from 2.36 to 50.98. IPO volume and real interest rate have high kurtosis values, implying several outliers in the respective datasets.

Table 4 Statistical summary for all countries in the study, including number of observations, mean, standard deviation, minimum, maximum, skewness and kurtosis.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Min</th>
<th>Max</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO volume to GDP</td>
<td>0.38</td>
<td>1.01</td>
<td>0.00</td>
<td>10.68</td>
<td>6.29</td>
<td>50.98</td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>1.86</td>
<td>3.54</td>
<td>-14.55</td>
<td>10.92</td>
<td>-0.50</td>
<td>4.49</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>63.96</td>
<td>63.96</td>
<td>0.73</td>
<td>265.12</td>
<td>1.50</td>
<td>5.02</td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>10.23</td>
<td>0.79</td>
<td>8.24</td>
<td>11.61</td>
<td>-0.59</td>
<td>2.36</td>
</tr>
<tr>
<td>Real interest rate</td>
<td>1.07</td>
<td>6.10</td>
<td>-49.42</td>
<td>42.81</td>
<td>-0.73</td>
<td>26.00</td>
</tr>
<tr>
<td>N</td>
<td>390</td>
<td>390</td>
<td>390</td>
<td>390</td>
<td>390</td>
<td>390</td>
</tr>
</tbody>
</table>

The statistical summary for Northern Europe is presented in Table 5. For the five countries included in the region, the kurtosis for IPO volume to GDP is high, 5.79. This indicates outliers for the countries.

Table 5 Statistical summary Northern Europe. Countries included: Denmark, Finland, Iceland, Norway and Sweden

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Min</th>
<th>Max</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO volume to GDP</td>
<td>0.35</td>
<td>0.96</td>
<td>0.00</td>
<td>7.41</td>
<td>5.79</td>
<td>41.12</td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>1.30</td>
<td>2.82</td>
<td>-8.70</td>
<td>7.15</td>
<td>-1.11</td>
<td>5.30</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>78.03</td>
<td>43.66</td>
<td>11.82</td>
<td>238.84</td>
<td>1.28</td>
<td>4.94</td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>10.88</td>
<td>0.27</td>
<td>10.44</td>
<td>11.42</td>
<td>0.68</td>
<td>2.37</td>
</tr>
<tr>
<td>Real interest rate</td>
<td>1.13</td>
<td>3.21</td>
<td>-8.68</td>
<td>10.12</td>
<td>-0.22</td>
<td>4.41</td>
</tr>
<tr>
<td>N</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
</tbody>
</table>

Table 6 illustrates the statistical summary for Central Europe. Nine countries are included in the region and the skewness and kurtosis for IPO volume to GDP is high, indicating longer right tail of the distribution and outliers in the dataset. Overall, the skewness and kurtosis values are normal and this indicates a fairly normal distributed dataset.
Table 6 Statistical summary Central Europe. Countries included: Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, Switzerland and United Kingdom.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Min</th>
<th>Max</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO volume to GDP</td>
<td>0.55</td>
<td>1.09</td>
<td>0.00</td>
<td>8.60</td>
<td>4.65</td>
<td>29.54</td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>1.32</td>
<td>2.60</td>
<td>-7.11</td>
<td>9.62</td>
<td>-0.33</td>
<td>5.02</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>95.29</td>
<td>62.14</td>
<td>8.11</td>
<td>265.12</td>
<td>0.91</td>
<td>3.0</td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>10.80</td>
<td>0.30</td>
<td>10.40</td>
<td>11.61</td>
<td>1.27</td>
<td>3.50</td>
</tr>
<tr>
<td>Real interest rate</td>
<td>0.99</td>
<td>1.94</td>
<td>-3.82</td>
<td>6.48</td>
<td>0.24</td>
<td>3.13</td>
</tr>
<tr>
<td>N</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
</tr>
</tbody>
</table>

The statistical summary for Eastern Europe is illustrated in Table 7. Eight countries are included in the region and the kurtosis for real interest rate is significantly high. This might be explained by the enormous difference between min and max value of the real interest rate. The mean for Market capitalization to GDP is low in this group in comparison to the mean for all countries in the study.

Table 7 Statistical summary Eastern Europe. Countries included: Bulgaria, Czech Republic, Estonia, Hungary, Poland, Romania, Russia and Turkey

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Min</th>
<th>Max</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO volume to GDP</td>
<td>0.20</td>
<td>0.41</td>
<td>0.00</td>
<td>2.89</td>
<td>3.47</td>
<td>3.47</td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>3.22</td>
<td>4.19</td>
<td>-14.55</td>
<td>10.92</td>
<td>-1.07</td>
<td>5.24</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>29.49</td>
<td>20.27</td>
<td>0.73</td>
<td>100.83</td>
<td>1.28</td>
<td>4.37</td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>9.43</td>
<td>0.56</td>
<td>8.47</td>
<td>10.71</td>
<td>0.90</td>
<td>3.30</td>
</tr>
<tr>
<td>Real interest rate</td>
<td>1.57</td>
<td>10.06</td>
<td>-49.42</td>
<td>42.81</td>
<td>-0.52</td>
<td>11.15</td>
</tr>
<tr>
<td>N</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

Table 8 illustrates the statistical summary for Southern Europe. For the four countries included in the group, the kurtosis for IPO volume to GDP and real interest rate is high, 30.85 and 10.60 separately, implying outliers in the dataset.

Table 8 Statistical summary Southern Europe. Countries included: Greece, Italy, Portugal and Spain.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Min</th>
<th>Max</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO volume to GDP</td>
<td>0.52</td>
<td>1.60</td>
<td>0.00</td>
<td>10.68</td>
<td>5.18</td>
<td>30.85</td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>0.32</td>
<td>3.09</td>
<td>-8.99</td>
<td>5.54</td>
<td>-0.76</td>
<td>3.40</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>57.90</td>
<td>35.20</td>
<td>15.44</td>
<td>198.69</td>
<td>2.06</td>
<td>8.28</td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>10.24</td>
<td>0.20</td>
<td>9.91</td>
<td>10.89</td>
<td>0.02</td>
<td>1.62</td>
</tr>
<tr>
<td>Real interest rate</td>
<td>0.75</td>
<td>3.08</td>
<td>-2.17</td>
<td>5.54</td>
<td>2.53</td>
<td>10.60</td>
</tr>
<tr>
<td>N</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>
3.2.6 Summary of data
Reviewing the presented data in the method and data collection, there can be established certain variations in the data over the four geographical areas. The real interest rate in Eastern Europe can be seen to have the largest variation of all regions, varying from -49.42 % to 42.81 %. However, the mean of the interest in Eastern Europe is not considerably higher compared to all other regions, showing a few extreme values of the real interest rate in Eastern Europe. Supported by the EQI score, the immense variation in the real interest rate for Eastern Europe can be derived from unstable financial markets and unstable political climate.

The mean of market capitalization to GDP in Eastern Europe is noticeable small in comparison to the three other regions. The mean in Eastern Europe is 29.49 % and for all regions the mean is 63.96 %, meaning the market capitalization to GDP is considerably inferior. Most of the countries included in Eastern Europe are post-communist countries and this could be a factor influencing the less developed stock market according to Fenger (2007), also the EQI rank for the countries are noticeable higher than the other regions, as seen in Table 2. In this dataset Central Europe has the highest average market capitalization to GDP, a mean of 95.29 %, signifying well developed financial markets and a stable political climate.

The IPO volume to GDP varies among the four areas, lowest mean is in Eastern Europe, 0.20 % and the highest mean is in Central Europe, 0.55 %. The mean for all countries are 0.38 %, hence Central Europe have substantially higher IPO volume to GDP in relation to the total regions.

GDP per capita growth for Eastern Europe is noticeable high in relation to all regions. According to Table 7 and Table 4, the mean of GDP per capita growth in Eastern Europe is 3.22 %, meanwhile the mean for all regions is 1.86 %. The higher GDP per capita growth in Eastern Europe can be derived from the rapid growth in technology and a more stable political climate after the eruption from communism. Countries often experience a rapid growth in GDP recent years after an eruption from a dictator or communism since a free market regularly is implemented.
3.2.7 Multicollinearity and correlation

Brooks (2008), states that multicollinearity in a model can impact the results negatively, implying it should be tested. To test this, a correlation matrix and a VIF table for all variables in the model has been established. A correlation less than 0.8 or -0.8 indicates low correlation between the variables, hence there is no indication of multicollinearity being present, (Brooks, 2008). A VIF value of less than 10 indicates no multicollinearity, (Brooks, 2008). As Table 9 illustrates, no variables used in the model have a correlation of 0.8 or -0.8 or more and as Table 10 shows, no variable has a VIF value higher than 10, therefore there is no indication of multicollinearity.

Table 9 Correlation matrix.

<table>
<thead>
<tr>
<th></th>
<th>IPO volume</th>
<th>GDP per capita growth</th>
<th>Market cap to GDP</th>
<th>Log GDP per capita</th>
<th>Real interest rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPO volume to GDP</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>0.1027</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>0.2557</td>
<td>-0.0909</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>0.1636</td>
<td>-0.3343</td>
<td>0.5906</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Real interest rate</td>
<td>0.0411</td>
<td>-0.0039</td>
<td>-0.0128</td>
<td>-0.0285</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 10 VIF test.

<table>
<thead>
<tr>
<th></th>
<th>VIF value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita growth</td>
<td>1.86</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>1.69</td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>1.07</td>
</tr>
<tr>
<td>Real interest rate</td>
<td>1.19</td>
</tr>
</tbody>
</table>

3.3 Method

Due to the inconsistent results from previous papers and studies described under the theory section, the econometric model and method becomes a high priority. The following section consists of empirical tests and describes the econometric issues of the model. An analysis of the panel data used in the study is presented in Table 11.
3.3.1 Fixed effects and random effects
The initial step of the study was to determine if fixed effects (FE) or random effects (RE) should be used. Commonly the FE model is applicable when the aim of the study is to analyze and compare effects of variables that differ between countries. According to Draho, 2004, there can be found differences in political and some legal environments can form differences in the safety for minority shareholders.

Furthermore, the determination of other cultural cross-country disparities cannot be ruled out to either encourage or discourage firms to go public through an IPO. An adequate assumption of a FE model is that the error term of two, or more, countries do not correlate at all, hence the appearances of the fixed effects must be unique for the all the specific countries. If there are correlated error terms among the countries in the study, the FE model should be left out in preference for a RE model that permits correlation in error terms among countries (Baltagi, 2008).

3.3.2 Hausman test
A Hausman test was performed to decide if a RE or FE test was most suitable for the tests. The null hypothesis in a Hausman test is that RE model should be used. The performed test obtained a p-value of 0.00 as is illustrated in Table 11. Hence the conclusion of the test is that FE model is preferred and should be used (Brooks, 2008).

3.3.3 F-test
A F-test was implemented to decide if fixed effects or pooled OLS model should be used. The null hypothesis of the F-test is that the observed and unobserved fixed effects are equal to zero, hence they are equal among all countries. The observed P-value of the test was 0.000 as is illustrated in Table 11, thus the null hypothesis was rejected and fixed effects should be used (Greene, 1990).
3.3.4 Heteroscedasticity

A Modified Wald test was performed to control for heteroscedasticity. The null hypothesis of a Modified Wald test is homoscedasticity. The obtained p-value of the test was 0.000 as is illustrated in Table 11. Hence the null hypothesis that there is constant variance can be rejected and heteroscedasticity can be derived. The control for heteroscedasticity in the model was performed to obtain robust standard errors (Baum, 2001).

3.3.5 Wooldridge test of autocorrelation

Standard errors can be biased by serial correlation, hence the estimates will be less efficient. A suggested model, according to Drukker (2003), for testing autocorrelation is a Wooldridge test for autocorrelation. The hypothesis in the test is that autocorrelation is present, with a critical P-value of 0.05. The obtained P-value in the performed test was 0.638, as can be illustrated in Table 11, hence the null hypothesis will not be rejected and the conclusion is that the data do not experience serial correlation.

Table 11 Econometric tests including Hausman test, F-test, Modified Wald test and Wooldridge test.

<table>
<thead>
<tr>
<th>Tests</th>
<th>Null hypothesis</th>
<th>Critical P-value</th>
<th>Observed P-value</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hausman test</td>
<td>Random effects</td>
<td>0.05</td>
<td>0.000</td>
<td>Fixed effects model is preferred to random effects model</td>
</tr>
<tr>
<td>F-test</td>
<td>Pooled OLS regressions</td>
<td>0.05</td>
<td>0.000</td>
<td>Fixed effects needed</td>
</tr>
<tr>
<td>Modified Wald test for heteroskedasticity</td>
<td>Homoskedasticity</td>
<td>0.05</td>
<td>0.000</td>
<td>Heteroskedasticity</td>
</tr>
<tr>
<td>Wooldridge test of autocorrelation</td>
<td>No serial correlation</td>
<td>0.05</td>
<td>0.638</td>
<td>No serial correlation</td>
</tr>
</tbody>
</table>

Given all the test results a core model was created to use for all the regressions, below the core model is illustrated:

\[
IPO\_volume\_to\_GDP_{it} = \beta_1 GDP\_per\_capita\_growth_{it} + \beta_2 Stock\_market\_cap_{it} + \\
\beta_3 LN\_GDP\_per\_capita_{it} + \beta_4 Real\_interest\_rate_{it} + u_{it}
\]
The core model is based on panel data and in all the regressions robust standard errors has been used to handle the outliers in the datasets. As seen in Table 4, 5, 6, 7 and 8, the kurtosis value is relatively high for IPO volume to GDP and real interest rate, implying outliers in the datasets.
4. Empirical analysis

4.1 Results
This section will illustrate all results the regressions generated. First the core results for all countries will be presented and explained. The sections after will divide the results by the four different regions. This is to see if there are specific areas in Europe that shares or contradicts the core result for all countries. The segmenting is made to examine significant differences between the four regions and reflect if some variables have a greater influence than others.

4.1.1 Core results
For all countries in the study, Table 12 can illustrate the econometric results. The independent variables used in the model are listed in column one in table 12. The results of model 1 show that the GDP per capita growth and the Stock market capitalization to GDP are significant at the 5 % level. Log GDP per capita and the real interest rate have no significance in the model, thus these two variables cannot provide any explanation for the dependent variable IPO volume to GDP.

Table 12 Econometric results. Variables included in this regression: GDP per capita growth, Stock market capitalization to GDP, Log GDP per capita, Real interest rate and GDP.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita growth</td>
<td>0.0315** (0.011)</td>
<td>0.3130*** (0.0112)</td>
<td>0.0419*** (0.0149)</td>
<td>0.0467*** (0.0016)</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>0.0071** (0.0030)</td>
<td>0.0073** (0.0031)</td>
<td>0.0067** (0.0028)</td>
<td></td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>-0.6904 (0.4910)</td>
<td>-0.7347 (0.5504)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real interest rate</td>
<td>0.0057 (0.0113)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>390</td>
<td>390</td>
<td>390</td>
<td>390</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*p < 0.1.* ** < 0.05. *** < 0.01
GDP per capita growth has a positive relationship to IPO volume to GDP, this implies that the higher growth in GDP, the higher is the IPO volume. Market capitalization to GDP has a significant positive relationship to IPO volume to GDP. The positive relationship between the Market capitalization to GDP and IPO volume per capita suggests that the bigger the market capitalization is in ratio to GDP, the larger the IPO volume to GDP is.

Among the non-significant variables, real interest rate has a positive coefficient and the relationship between the variable and IPO volume per capita is due to that, positive. Regarding the relationship between Log GDP per capita and IPO volume to GDP the coefficient is negative. This suggests that the higher the GDP per capita, the lower the IPO volume to GDP. Highly noticeable is that there is no significance in this relationship, therefore IPO volume cannot be explained by these variables.

For all countries in the study some variables have higher peaks than others. The skewness and kurtosis for IPO volume to GDP and the kurtosis for real interest rate are noticeably high, as can be seen in Table 4. The high kurtosis values for the two variables can be explained by the significant fluctuations in the datasets. The maximum value for IPO volume to GDP is 10.68 and the minimum value is 0, for real interest rate the maximum value is 42.81 and the minimum value is -49.42. This will make the dataset heavy-tailed, hence the datasets have outliers.

### 4.1.2 Results per region

It is interesting to interpret the different geographical areas in the thesis. Due to this segmenting the results can be described in a better extent and more robust conclusions can be drawn. In a more general perspective, it can be established differences between the areas. In general, the kurtosis for IPO volume to GDP is high for all areas, indicating outliers in the data. This is expected due to the big fluctuations in IPO volume to GDP over the studied countries and time period. As can be seen in the individual statistical summary for the separate regions in Table 5, Table 6, Table 7 and Table 8, the minimum value for IPO volume to GDP is 0 and the maximum value varies from 2.89 to 10.68. This will naturally affect the kurtosis value to increase.
Also noteworthy is that the skewness for IPO volume to GDP are positive in a range from 3.47 to 5.79 for all regions, implying the data is right skewed, hence the right tail is longer in the distribution. This can be explained by the fact that some years in the dataset IPO volume to GDP is equal to zero, and this will impact the normal distribution to be right skewed in a larger extent.

The regression model was implemented on the different geographical areas to test the robustness of the model. Table 13 can show one significant variable for Northern Europe, the real interest rate, at the 10% level. The real interest rate has a negative coefficient, implying a negative relationship between IPO volume to GDP and real interest rate in the area. Noticeable for the model in Northern Europe is that real interest rate only have a significant impact on IPO volume to GDP when Log GDP per capita, market capitalization to GDP and GDP per capita Growth are included in the model. Real interest rate are the only variable with significance, hence the other variables cannot explain the IPO volume to GDP in this specific geographical area.

Table 13 Econometric results Northern Europe. Countries included: Denmark, Finland, Iceland, Norway and Sweden

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1 IPO volume to GDP</th>
<th>Model 2 IPO volume to GDP</th>
<th>Model 3 IPO volume to GDP</th>
<th>Model 4 IPO volume to GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita growth</td>
<td>-0.0147 (0.0221)</td>
<td>-0.0451 (0.0307)</td>
<td>0.0473 (0.03748)</td>
<td>0.0518 (0.0353)</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>0.0038 (0.0045)</td>
<td>0.0019 (0.0026)</td>
<td>-4.2920 (2.68485)</td>
<td></td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>-4.6045 (2.8167)</td>
<td>-0.1094 (0.5108)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real interest rate</td>
<td>-0.0528* (0.0235)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N: 75

Standard errors in parentheses
*p < 0.1. ** < 0.05. *** < 0.01

Table 14 illustrates the econometric results for Central Europe. It shows that GDP per capita growth, Log GDP per capita and real interest rate have significant impact on IPO volume to GDP on the 1% level. All coefficients are positive, hence indicating a positive relationship between IPO volume to GDP and GDP per capita growth, Log GDP per capita and real interest rate.
All variables have the same level of significance, independent of the number of variables added to the model. Market capitalization to GDP is not significant in model 1 including all variables. However, in Model 3 market capitalization to GDP is significant at the 10 % level.

Table 14 Econometric results Central Europe. Countries included: Austria, Belgium, France, Germany, Ireland, Luxembourg, Netherlands, Switzerland and United Kingdom.

<table>
<thead>
<tr>
<th>Central Europe</th>
<th>Variables</th>
<th>Model 1 IPO volume to GDP</th>
<th>Model 2 IPO volume to GDP</th>
<th>Model 3 IPO volume to GDP</th>
<th>Model 4 IPO volume to GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDP per capita growth</td>
<td>0.1241***</td>
<td>0.1075***</td>
<td>0.0942***</td>
<td>0.0901***</td>
</tr>
<tr>
<td></td>
<td>Market cap to GDP</td>
<td>0.0004</td>
<td>0.0011</td>
<td>0.0047*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Log GDP per capita</td>
<td>1.4066***</td>
<td>1.1235***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Real interest rate</td>
<td>0.1007***</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses
*p < 0.1. ** < 0.05. *** < 0.01

The econometric results for Eastern Europe are presented in Table 15. The table shows market capitalization to GDP is significant on the 1 % level and Real interest rate is significant on the 5 % level. The coefficient for market capitalization to GDP is positive and implies a positive relationship between market capitalizations to GDP and IPO volume to GDP. The coefficient for real interest rate is negative, hence the model implies a negative relationship between real interest rate and IPO volume to GDP. Log GDP per capita shows no significance at all in Eastern Europe.
Table 15  Econometric results Eastern Europe. Countries included: Bulgaria, Czech Republic, Estonia, Hungary, Poland, Romania, Russia and Turkey.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IPO volume to GDP</td>
<td>IPO volume to GDP</td>
<td>IPO volume to GDP</td>
<td>IPO volume to GDP</td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>0.0069 (0.0069)</td>
<td>0.0103 (0.0083)</td>
<td>0.0128 (0.0080)</td>
<td>0.0123 (0.0082)</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>0.0145*** (0.0027)</td>
<td>0.0113*** (0.0022)</td>
<td>0.0098*** (0.0006)</td>
<td></td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>-0.3326 (0.2116)</td>
<td>-0.0941 (0.0973)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real interest rate</td>
<td>-0.0040** (0.0012)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N 120 120 120 120

Standard errors in parentheses
*p < 0.1, ** < 0.05, *** < 0.01

In Table 16 the econometric results for Southern Europe are illustrated. This table shows a significance level of 5 % for GDP per capita growth and 1 % level for real interest rate in model 1. All variables included, GDP per capita growth and the real interest rate shows a positive correlation to IPO volume to GDP. Noticeable is that GDP per capita growth changes from a significance level of 5% to 1% when the real interest rate is excluded from the model. Market capitalization to GDP and Log GDP per capita shows no significance in the model.

Table 16  Econometric results Southern Europe. Countries included: Greece, Italy, Portugal and Spain.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IPO volume to GDP</td>
<td>IPO volume to GDP</td>
<td>IPO volume to GDP</td>
<td>IPO volume to GDP</td>
</tr>
<tr>
<td>GDP per capita growth</td>
<td>0.0980** (0.0403)</td>
<td>0.0843*** (0.0210)</td>
<td>0.0823*** (0.01224)</td>
<td>0.1311*** (0.0452)</td>
</tr>
<tr>
<td>Market cap to GDP</td>
<td>0.0001 (0.0001)</td>
<td>0.0068 (0.0087)</td>
<td>0.0123 (0.0109)</td>
<td></td>
</tr>
<tr>
<td>Log GDP per capita</td>
<td>-0.2668 (0.6560)</td>
<td>-1.3474 (2.0581)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real interest rate</td>
<td>0.5435*** (0.1165)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N 60 60 60 60

Standard errors in parentheses
*p < 0.1, ** < 0.05, *** < 0.01
4.1.3 Summary of results
The results from the core model shows GDP per capita growth and market capitalization to GDP are statistically significant at 1% and 5% level respectively. Both variables show a positive correlation to IPO volume whereas the real interest rate and Log GDP per capita are not significant. For Northern Europe most variables has no significance, which is notable. However, the real interest rate is significant at the 10% level and correlates negatively with IPO volume. In Central Europe, GDP per capita growth, Log GDP per capita and the real interest rate are significant at a level of 1%. All variables are positively correlated with IPO volume and market capitalization to GDP is not significant at all. In Eastern Europe market capitalization to GDP and real interest rate are significant on a 1% and 5% level respectively. The real interest rate is negatively correlated with IPO volume and market capitalization to GDP is positively correlated. The results for Southern Europe can show that GDP per capita growth and the real interest rate are significant at a 5% and 1% respectively. These variables are positively correlated to IPO volume. Overall, the most influential macroeconomic variable is GDP per capita growth, with a significant positive impact on IPO volume to GDP in the core model, Central Europe and Southern Europe. Log GDP per capita is the variable that has the lowest impact on IPO volume with only one positive significant correlation in Central Europe.

4.2 Analysis of the results
The results illustrates that two of the four tested variables are significant in the core model. GDP per capita growth has a significant positive correlation at the 5 % level to IPO volume to GDP and this result is supported by previous studies. Table 3 illustrates that Lowry (2003), Bilson, Bailsford, & Hooper, (2001), Choe et al (1993), and Korajczyk and Levy (2003), have results in line with this finding. These studies state that IPO volume tends to fluctuate positively with GDP per capita growth, used as a proxy for business cycles.

Regarding the real interest rate, previous research show inconsistent results. Ameer (2012), Jensen and Johnson (1993) and Tran and Jeon (2011), find a negative correlation between real interest rate and IPO volume. In contrast, Brau et al. (2003), and Frank and Goyal (2007), find a positive correlation between real interest rate and IPO volume.
In addition to this, Jovanovic and Rousseau (2004), concludes an inversely u-shaped relationship between real interest rate and IPO volume. This thesis finds no significant correlation between real interest rate and IPO volume to GDP in the core model. However, the model for Eastern and Northern Europe shows a significant negative correlation, at the 5 % and 10 % level respectively, between real interest rate and IPO volume to GDP. Contradict to the result for Eastern and Northern Europe, the model for Central and Southern Europe shows a significant positive correlation at the 1 % level. The inconsistent results are difficult to analyze from the EQI perspective. Since Northern has the lowest ranking and Eastern has the highest ranking, and share the positive significant relationship to IPO volume to GDP, it is problematic to analyze the results for real interest rate. Due to the inconsistent results in previous research and in this thesis, H1 cannot be rejected or not rejected, hence no correlation can be found between real interest rate and IPO volume to GDP.

Focusing on the core model, the coefficient for Log GDP per capita is negative, with no level of significance. As mentioned, Lowry (2003), Bilson, Bailsford, & Hooper, (2001), Choe et al (1993), and Korajczyk and Levy (2003), finds a positive correlation between GDP and IPO volume. In contrast to this, GDP per capita is significant positive at the 1 % level in Central Europe. Even though one out of four regions shows a significant positive relationship between Log GDP per capita and IPO volume to GDP, the finding is not sufficient to determine H2. The finding in the core model is not in line with the hypothesis of this thesis. In lack of significance, H2 cannot be analyzed, hence the hypothesis cannot be rejected or not rejected.

The core model can show a positive relationship at the 5 % level between GDP per capita growth and IPO volume to GDP. This is in line with previous studies from Lowry (2003), Bilson, Bailsford, & Hooper, (2001), Choe et al (1993), and Korajczyk and Levy (2003). Considering the four regions, Central and Southern Europe shows a significant positive relationship to IPO volume to GDP. Referring to the sectioning of the four regions and the EQI rank for the countries in Central and Southern Europe, there is problematic to establish any pertinence to the GDP per capita growth and the significant impact on IPO volume to GDP. Noticeable for GDP per capita growth in the core model, is when variables are excluded from the model, the significance level alternates.
Based on the findings in this thesis and previous research H3 cannot be rejected, hence there is a positive correlation between GDP per capita growth and IPO volume to GDP.

The second variable with a significant impact on IPO volume to GDP is stock market capitalization to GDP. At the 5% in the core model stock market capitalization to GDP has a positive impact on IPO volume to GDP. As Table 3 illustrates, previous studies are in line with these findings. Ameer (2012), Loughran et al (1994) and Rees (1997), finds a significant positive correlation between stock market index and IPO volume. The model for Eastern Europe gives the same results and shows a significant positive relation at the 1% level between market capitalization to GDP and IPO volume to GDP. In the core model and the model for Eastern Europe, the market capitalization to GDPs significance level is constant throughout the different models. Contradicted to this finding is the high EQI rank for Eastern Europe, indicating low government quality and high corruption. Based on the findings in this thesis and previous studies with the same results, H4 cannot be rejected, hence there is a positive correlation between market capitalization to GDP and IPO volume to GDP.
5. Conclusion and suggestions for future research

5.1 Conclusion
This thesis examines the impact of four macroeconomic variables on IPO volume in 26 European countries. The thesis shows that GDP per capita growth and stock market capitalization in relation to GDP has a significant positive effect on IPO volume. These findings are in line with previous studies within the IPO field in other regions based on older datasets. Previous studies have been conducted on mostly the US market and this study contributes to widen the understandings of influential variables on IPO volume in Europe based on more updated datasets. High GDP per capita growth has a positive impact on IPO volume. This can be derived from both the core model, Central and Southern Europe. GDP per capita growth can be a suitable proxy of the economic outlook in the country and a high growth often indicates a great economic climate. Hence, this thesis shows that a good economic climate in a country will increase the IPO volume. Due to these significant results, H3 cannot be rejected that there is a positive relationship between IPO volume and GDP per capita growth.

The results show tendencies that the larger stock market capitalization in relation to GDP, the higher the IPO volume in the country. These results can be found in the core model and Eastern Europe. This implies that a country with a well-developed and well-functioning stock market tend to attract investors in a higher extent. Contradicted to this argument is the EQI rank of the countries in Eastern Europe, which implies that the government quality is low and corruption high. Due to the significance in the results of stock market capitalization, H4 cannot be rejected that there is a positive relationship between stock market capitalization and IPO volume.

Real interest rate and GDP per capita are not significant explanatory variables in the model. However, the core model shows that the relationship between real interest rate and IPO volume would have been positive. The model for Northern and Eastern Europe shows a significant negative relationship between real interest rate and IPO volume to GDP, in contrast the model for Central and Southern Europe shows a significant positive relationship between real interest rate and IPO volume to GDP.
In summary these are inconsistent findings in the study. These results are not in line with H1 and due to the insignificance of real interest rate in the model; H1 and H2 cannot be rejected or not rejected.

5.2 Suggestions for future research

This thesis focused on four macroeconomic variables to explain the IPO volume in 26 countries in Europe. The used data in the thesis is highly updated and cover recent years to 2012. A proposal for future research is to perform the same study with data from the millennial years in a different geographical area. This is to add a more updated study from another part of the world and see if there are differences depending on the location.

Europe as a geographical area has surprisingly few studies within variables determining IPO volume or number of IPOs. Another interesting topic for future research would be to do an extensive study of all European countries and include both internal and external variables and see if IPO volume can be explained in a more efficient way. Since internal variables are more difficult to measure in a quantitative study, a qualitative and quantitative study would be preferable.
6. References

6.1 Academic Papers


Babich, Sobel. 2004, “Pre-IPO operational and financial decisions”, Management Science, 935-948


6.2 Literature


7. Appendix

IPO volume
Dataset of IPO volume was collected from Bloomberg terminal and the entered criteria to find the data was:
Region - Europe.
Offer type - IPO.
Offer Size - (M USD).
Period - 1996/01/01 - 2016/12/05.
Country - Full name.

These criterions resulted in a dataset of 44 European countries, 7644 individual IPOs and a total IPO volume of 1,298,597 M USD during the 20-year period. The countries were:
Austria, Azerbaijan, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, France, Georgia, Germany, Gibraltar, Greece, Guernsey, Hungary, Iceland, Ireland, Isle of man, Italy, Jersey, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.

Due to incomplete or missing data in the dataset of IPO volume the number of studied countries was reduced to 29. The remaining 29 countries were: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.
**GDP per capita**

The dataset for GDP per capita was collected from The World Bank. The currency of the data was USD. Search criteria for GDP per capita at The World Bank:

Database - World Development Indicators.
Country - Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.
Series - GDP per capita (constant LCU).

Complete data for all selected countries and year was established. No adjustments of the number of countries or years were required.

**GDP per capita growth**

The dataset for GDP per capita was collected from The World Bank. The data were presented in annual percentage growth.

Search criteria for GDP per capita growth at The World Bank:

Database - World Development Indicators
Country - Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.
Series - GDP per capita growth (annual %)

Complete data for all selected countries and year was established. No adjustments of the number of countries or years were required.

**Real interest rate**

The real interest rate was calculated by subtracting the annual GDP deflator from the three-month interbank rate. The annual GDP deflator was collected from World Data Bank and the three-month interbank rate was collected from Federal Reserve Bank of St. Louis (FRED). Search criteria at The World Bank for GDP deflator:

Database - World Development Indicators
Country - Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.
Series - Inflation, GDP deflator (annual %)

Search criteria at Federal Reserve Bank of St. Louis for the three-month interbank rate:
Database - Economic data
Country - Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.
Series - Interbank
FRED did not provide data for the three-month interbank rate for Cyprus. Due to this incompleteness in the data, Cyprus was removed from the entire data selection.

**Stock market capitalization**

Stock market capitalization data was calculated from two variables, Stock Market to GDP and GDP (Constant LCU) for respectively country. The data for Stock Market to GDP and GDP were collected from The World Data Bank. The data for stock market capitalization was provided under Financial Development and Structure Dataset at The World Bank, the last update for the data was June 2016.

Search criteria at Financial Development and Structure Dataset for stock market capitalization:
Database - Economic data
Country - Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.
Series - Interbank
Time - 1996 - 2016
Search criteria GDP (Constant LCU) at The World Data Bank:
Database - World Development Indicators
Country - Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, Ukraine and United Kingdom.
Series - GDP (Constant LCU)
The World Bank did not provide full data for the stock market to GDP data. Due to this incompleteness, the period of years was reduced to 1998-2012 and the countries Lithuania and Ukraine was dropped from all the data sets.