Norwegian School of Economics
Bergen, Spring 2017

# Seasoned Equity Offerings in Regulated Industries

*Empirical Evidence from Europe*

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Master thesis in Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

## Preface

This thesis was written as a final contribution to our Master of Science degree in Economics and Business Administration at the Norwegian School of Economics (NHH). The scope and extent of the thesis has made the writing process both challenging and educational. The data gathering process was especially time-consuming, as our main data set comprise of close to all registered EU/EEA equity offerings above $20mn announced between January 1997 and January 2017, and entailed the matching of four different databases.

We would like to thank our supervisor, Associate Professor Tommy Stamland, for his constructive and valuable feedback. His insights and expertise have motivated us throughout this process and enhanced our knowledge in corporate finance. We would further like to thank family and friends for their continuous support throughout our educational years.

Bergen, June 2017

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## Abstract

We study 4,953 European SEO announcements over the period January 1997 to December 2016. Our results demonstrate that the announcement of equity offerings on average reduce stock prices. Cross-sectional analysis on the full sample indicate that the announcement returns are negatively related to pre-event market volatility, financial instability in the issuer's country of domicile, pre-event stock run-up, firm size and offering size, and positively related to the number of previous equity offerings. We find that SEO announcement returns have been lower for banks than non-banks in the sample period, but that differences in returns between regulated non-banks and unregulated firms are insignificant. Consistent with this, our results indicate that pre-event information asymmetries may have been higher for banks than for non-banks in the sample period. Some of the variation in CAR between the industries are found to be explained by firm-specific, market-specific and issue-specific characteristics. First, regulated firms are found to issue equity more frequently than unregulated firms in volatile periods and in locally depressed economies. Second, regulated issuers are found to have substantially larger mean market capitalization than unregulated issuers. Third, regulated issuers are found to undertake larger equity offerings on average than unregulated issuers, especially in crisis periods.

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# 1 Introduction

Numerous studies have investigated the announcement effect of seasoned equity offerings (SEOs) using event study methodology. Common to most of these studies are the observed negative stock price reactions, which have been subject to considerable debate in the literature. In explaining the negative SEO announcement returns, researchers often point to the presence of market imperfections such as taxes, bankruptcy costs, transaction costs, costs of illiquidity, agency costs, and adverse selection costs. This paper is dedicated to the investigation of the latter two market frictions. Motivated by the ongoing debate on capital structure regulation and its role in promoting financial stability, the focus of the study will be directed towards SEO announcement returns in regulated industries.

Firms that suffer from high adverse selection costs may be reluctant to issue equity capital and thus forego profitable investment opportunities (Myers & Majluf, 1984). The problem could be more evident for banks, which may choose to downsize balance sheets or seek less risky investments (Furlong & Keeley, 1989). This can in return affect loan and lending rates offered to the private sector and have adverse implications for the economy. Several researchers have argued that the information content in SEO announcements is different for regulated companies than for unregulated ones and that capital structure regulation may reduce pre-event information asymmetry (Smith, 1986) (Furlong & Keeley, 1989) (Cornett, Merhan, Pan, Phan & Wei, 2014). Yet, empirical evidence on the phenomenon remains limited, particularly in Europe. Research from the U.S. seem to suggest that regulated non-banks, and especially utility companies, exhibit less negative SEO announcement returns than unregulated companies (Masulis & Korwar, 1986) (Asquith & Mullins, 1986) (Pettway & Radcliffe, 1985). Furthermore, Cornett et al. (2014) and Li, Liu, Siganos and Zhou (2016) document that U.S. banks experience less negative announcement returns than non-banks, but does not provide sufficient empirical evidence on the determinants of the differences. In addition, most of these studies are based on a limited number of observations and a relatively short sample period. We will contribute to the existing literature by providing an empirical analysis on SEO announcement returns in regulated industries in the European Union. More specifically, we will study whether SEO announcement returns differ significantly between regulated and unregulated companies, and seek to answer whether the potential differences can be explained by variations in firm-specific, market-specific and issue-specific characteristics across the industries. This study will utilize the insights from findings provided by previous research, in what we believe will provide useful information for both practitioners and regulators.

Our thesis is structured as follows: Chapter two, three and four of this paper will be strictly theoretical, chapter five and six will present the event study methodology and our data, and chapter seven and eight will contain our analysis. Lastly, chapter nine will comprise of our concluding remarks. More specifically, chapter two outlines corporate finance theories relevant for understanding a firm's financing decisions and their implication for firm value. Chapter three provides an introduction to European regulated firms, and discusses the motivation behind why certain firms are regulated and the most important regulatory guidelines faced by these firms. Chapter four commences an introduction to seasoned equity offerings and a discussion of competing hypotheses and previous studies on the announcement effect of SEOs. In chapter five, we outline the methodology and discuss possible limitations, and in chapter six we describe the sample selection criteria and provide relevant properties and statistics on our data. Chapter seven contains the conceptual framework of our analysis, where we outline theoretical justifications for why and how the analysis will be structured. In chapter eight, we discuss the results of our analysis. Lastly, in chapter nine, we conclude on the analysis, discuss the practical relevance of our results, and present suggestions for further research.

# 2 Corporate Finance Theories

The theories presented in this section form the foundation for understanding the many factors affecting a firms' financing decisions and its effect on firm value. The theories will be described briefly, and more specifically related to equity offerings in chapter four.

## 2.1 Capital Structure in Perfect Markets

Capital structure is an important element in explaining the motivation behind the financial decisions of a firm. Modigliani and Miller (1958) established the foundation for the discussion on capital structure. Their main contribution to the debate was to highlight under what conditions capital structure is irrelevant for a firm's value, and thus what conditions that needs to be present for capital structure to matter. Modigliani and Miller theorize that the market value of a firm, in perfect markets, is independent of its capital structure and is given by the firm's earning power and by the risk of its underlying assets. Many of the assumptions behind the Modigliani and Miller model can be relaxed without major changes to the conclusions. However, the assumptions of no personal taxes, no bankruptcy costs, no agency costs and no asymmetric information are critical. Given these assumptions, Modigliani and Miller derived two propositions with respect to the valuation of securities in companies with different capital structures:

Proposition 1: "*The market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate appropriate to its risk class".*

Proposition 2: "*The expected yield of a share of stock is equal to the appropriate capitalization rate $p_k$ for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to-equity ratio times the spread between $p_k$ and r"*

Proposition 1 states that the method of financing is irrelevant. Modigliani and Miller (1958) use arbitrage-pricing arguments to support this proposition and claim that in a world without taxes, the market values of the levered and unlevered firms must be identical. Proposition 2 states that higher leverage will increase the required rate of return on equity as it becomes riskier. The fact that debt is cheaper than equity is therefore not a reason as to why capital structure matters, as the lower cost of debt will be offset by a higher cost of equity.

### 2.2 Taxes and the Trade-off Theory

Researchers have pointed to several market imperfections that may violate the assumptions of Modigliani and Miller (1958). In a correction paper published in 1963, Modigliani and Miller (1963) show that there is a potential benefit from debt since interest payments are tax deductible, referred to as the corporate tax shield. The corporate tax shield implies that a higher proportion of debt will increase firm value, ceteris paribus. Kraus and Litzenberger (1973) consider the tax shield theorized by Modigliani and Miller (1963) and argue that the benefits should be seen in relation with the potential bankruptcy costs imposed by higher leverage. This gave rise to the trade-off theory, proposing an optimal capital structure that balances the tax benefits of debt against the corresponding bankruptcy costs. Miller (1977) challenges the trade-off theory by questioning the size of the tax shield. He acknowledges that bankruptcy costs do indeed exist, but argues that these costs seem small relative to the tax savings they are supposed to balance. He substantiates his argument by referring to the considerable increase in tax rates for the last hundred years, but the relatively small change in debt-to-equity ratios. According to Miller, the models introduced by Modigliani and Miller (1963) and Kraus and Litzenberger lack some features that restrict the optimal debt level, other than bankruptcy costs. By introducing personal taxes into the model, Miller argues that the gain from leverage must be zero when the bond market is in equilibrium. This is because the rate of return offered on taxable corporate bonds in equilibrium will be “grossed up” to incentivize investors to hold bonds. The implication of Miller’s argument is that the gain from leverage may be much smaller than previously thought and that the optimal capital structure may be a trade-off between a small gain to leverage and relatively small bankruptcy costs.

### 2.3 Asymmetric Information

Information asymmetry occurs when one group of participants has better information than other groups (Copeland, Weston & Shastri, 2005). The phenomenon is prevalent in financial markets, where managers often have superior information about the value of the firm and its prospects compared to external investors (Berk & DeMarzo, 2007). A large amount of empirical research suggests that asymmetric information is an important determinant of capital structure decisions.

### 2.3.1 Signaling Theory

One of the first papers that relates asymmetric information with price and quality is George Akerlof's *"The Market for Lemons: Quality Uncertainty and The Market Mechanism"* (1970). He illustrates that the presence of asymmetric information can degrade the quality of products traded in a market. If a buyer cannot distinguish between a "high quality" product and a "low quality" product, he will only be willing to pay an average price. Since the seller knows the quality of the product, the only products offered in the market are of low quality (Akerlof, 1970). This is referred to as adverse selection. The same logic can be extended to the financial markets where managers of a firm have superior information compared to investors. Investors who are faced with the risk of buying low quality stocks will discount the price they are willing to pay, making equity issues costlier. Consequently, a manager may only issue equity if the firm is of "low quality" and thus overvalued in the market. This problem would evaporate if firms were able to credibly convey information to the market. However, the costs of supplying and verifying such information may be significant, particularly because such information may be useful to the firm's competitors.

An important contribution to the literature of asymmetric information and its implications for financing behavior is Myers and Majluf's article *"Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have"* (Myers & Majluf, 1984). They introduced the pecking order theory, suggesting that firms adhere to a hierarchy of financing sources based on degree of information sensitiveness. Firms will prefer internal financing to debt, and debt to equity. Raising equity is only implemented when internal funds are unavailable and when the firms' debt capacity is exhausted. Myers and Majluf (1984) show that, in a rational market, the decision to issue equity may give a negative signal to the market and cause negative stock price reactions when asymmetric information between managers and investors are present. As a result of the mispricing, firms that are required to issue equity to finance a profitable project may rationally forego the project if the loss associated with the underpricing offsets the gains from taking on the project. The underinvestment problem can be avoided by using internal financing, or debt which is less information sensitive. On the other hand, Myers and Majluf also show that managers, acting in the interest of existing shareholders, often have incentives to issue equity and invest in unprofitable projects if they perceive their stock to be overvalued, and if the gains from the stock mispricing offsets the loss from taking on the negative NPV project.

### 2.3.2 Agency Theory

Jensen and Meckling (1976) define a principal-agent relationship as a contract under which one or more persons (the principal) engage another person (the agent) to perform some service on their behalf. In economics, corporate managers act as the agents of shareholders. This relationship is often fraught with conflicts of interest. Agency problems arise when the agent has superior information and acts in the interest of other stakeholders rather than in the interest of the principal. Jensen (1986) shows that managers of firms with ample cash often have incentives to grow the firm beyond its optimal size and undertake unprofitable investments to the detriment of shareholders. This is referred to as the agency costs of free cash flow. Jensen's free cash flow theory predicts that unexpected increases in payouts to shareholders, or a committed promise to do so, will have a positive effect on stock prices. Jensen and Meckling consider the moral hazard problem and agency costs of outside equity and debt financing. They argue that a manager of a firm with outside equity claims will have incentives to undertake activities so that the value of the firm is less than it would be if the manager were the sole owner. Furthermore, managers of indebted firms often have incentives to take on risky projects in order to shift wealth from debtholders to equity holders. Rational investors will account for these incentive effects in pricing the equity and debt. Agency costs may therefore make it costlier for firms to obtain outside financing. Jensen and Meckling's theory gave rise to an optimal capital structure that balances the agency costs of debt against the agency costs of equity.

### 2.3.3 Time-Varying Asymmetric Information

Myers and Majluf (1984) also consider the implication of time-varying asymmetric information. They suggest that firms, in search of ways to reduce information costs, should seek to issue securities and build up financial slack in periods when asymmetric information levels are low. Following this reasoning, Korajczyk, Lucas and McDonald (1991) theorize that time-varying asymmetric information will influence both the timing and pricing of security offerings. Similarly, Bayless and Chaplinsky (1996) find empirical evidence that windows of opportunity with low asymmetric information exists, and that firms perceive these windows as favorable periods to issue securities.

### 2.3.4 The Market-Timing Hypothesis

The market-timing hypothesis predicts that firms choose the means of financing that seems to be, at that point in time, more valued by the financial markets (Berk & DeMarzo, 2014). A firm's capital structure will thus be a product of past attempts to time the equity market, and will depend on whether managers believe that their firm is currently under – or overpriced. The hypothesis builds on the idea that managers can detect mispricing better than the market can, and that a firm's decision to issue equity is driven by manager's desire to take advantage of overvalued stock[1].

## 2.4 The Efficient Market Hypothesis

The efficient market hypothesis (EMH) developed by Eugene Fama claims that asset prices will reflect all available information. The market will immediately adapt to new information, thus making it impossible for investors to earn abnormal returns and to beat the market. Whether the market is fully efficient or not is an empirical question. There are three forms of market efficiency: weak, semi-strong and strong form efficiency (Fama, 1970). The weak form efficiency claims that asset prices reflect all historical information. The semi-strong form states that asset prices reflect all public available information and that prices immediately adapt to new information. Lastly, strong form efficiency claims that asset prices reflect all public available information as well as insider information. The EMH has its theoretical weaknesses. Grossman and Stiglitz (1980) introduced the efficiency paradox. They argue that if security prices perfectly reflect all available information, then investors and analysts have no incentives to spend resources on information gathering since they receive no compensation for the effort. The consequence of this is an inefficient market where security prices no longer reflect all available information. Grossman and Stiglitz' findings indicate that an equilibrium exist where asset prices partly reflect new information and where those that actively analyze and search for information may be

[1] The empirical evidence for this hypothesis is mixed. We refer to appendix A for a brief introduction of previous findings with respect to the validity of this hypothesis.

compensated. However, the market cannot be efficient unless there are investors who believe that the market is inefficient. This implies that the degree of market efficiency will determine the effort made by market participants to gather and reveal price sensitive information.

Event studies are often used to test the degree of market efficiency. It is common to assume that financial markets are semi-strong efficient, and that security prices reflect all public available information and rapidly adapt to new information. Academics such as Scholes (1972) and Ball and Brown (1968) have confirmed this assumption empirically. However, departures from the EMH have been observed (Lo, 2007). A common explanation for these departures is that investors may misinterpret the implications or importance of the new information, leading to improper reactions. This may push prices away from their “intrinsic” value. The theory on stock price reversal suggests that rational investors, who take the other side of the trades, eventually will bring prices back to their fair value. De Bondt and Thaler (1990) find evidence of stock price reversal when investors overreact to new information. Bernard and Thomas (1989) study informational efficiency and finds that the information contained in earnings announcements can take up to several days to be fully impounded into stock prices.

# 3 Regulated Firms in Europe

## 3.1 The Banking Sector and Banking Regulations in Europe

The role of a bank is to facilitate for effective allocation of capital. Thus, banks function as intermediaries between lenders and borrowers. More specifically, banks are providers of maturity transformation services. Generally, we refer to three different types of banks. Commercial banks are banks focused on the facilitation of commercial transactions and supplementary services. Banks that are focused on underwriting and securities services are referred to as investment banks. Lastly, full-service banks provide investment banking activities in addition to commercial banking services (Bekaert & Hodrick, 2014).

The creation of the EU single market in the 1990s allowed for the integration of European financial services. This also entailed a consolidation of the European banking industry, which was mainly carried out within countries (Bekaert & Hodrick, 2014). Furthermore, regulatory regimes became increasingly harmonized. A necessary condition for effective maturity transformation services of banks is that there exists a mutual trust between the bank and depositors. For this reason, the Council and European Parliament adopted Directive 94/19/EC in May 1994, requiring all member states in the EU to implement deposit guarantee schemes covering up to 20,000 € per depositor in case of bank insolvency (European Parliament; Council of the European Union, 1994). The maximum amount covered under the schemes has since been increased by member states. In 2000, Directive 2000/12/EC was adopted, replacing seven previous banking directives (European Parliament; Council of the European Union, 2000). This directive was amended by two additional directives in 2006, whereby the Basel II guidelines were adopted (European Parliament; Council of the European Union, 2006). The integration process had several consequences for the European banking sector. Firstly, it led to an increase in bank interconnection. Secondly, European banks became more leveraged. Prior to the financial crisis in 2007-2009, many banks displayed equity ratios as low as 2 % to 3 % of assets (Admati, DeMarzo, Hellweig & Pfleiderer, 2013). Lastly, banking assets of EU banks grew to become a larger part of the economy (European Central Bank, 2008). This development increased the industry’s vulnerability to economic shocks. The financial crisis of 2007-2009 showcased how even a small decrease in asset values could potentially lead to distress and insolvency. The crisis also showcased the systematic risk in the banking sector, whereby one bank's insolvency rapidly could affect other banks and cause financial mistrust. Regulators became aware of the deficiencies in the Basel II and became focused at reducing systematic risk in the banking sector by requiring banks to hold larger portions of equity and greater liquidity buffers. Several legislative packages followed in the EU, aimed at the recovery of the financial sector and improving bank soundness. The European sovereign debt crisis between 2010 and 2012 demonstrated additional structural risks in the financial sector. The crisis originated from market concerns about the sustainability of peripheral European government debt, which was followed by increases in credit default swap spreads for European banks and large declines in European bank shares. Euro interbank interest rates also rose, increasing the overnight funding costs of European banks. Deposit withdrawals were particularly profound in peripheral Europe, impacting the liquidity positions of several banks. Concurrently, interest rates on household deposits increased. Moreover, the market for long-term wholesale funding deteriorated, which was reflected in the high swap spreads for covered bonds between 2010 and 2011. Tensions were partly alleviated by liquidity accommodations from the European Central Bank and government-guaranteed bond issuances in 2011 and 2012 (van Rixtel & Gasperini, 2013).

Importantly, the European sovereign debt crisis highlighted the interconnection between national economies and financial intermediaries. This influenced regulatory discussions about new banking guidelines in Basel III, which was later imposed on an EU level in the "Capital Requirements Directive IV" (CRD IV) in May 2013 (European Parliament; Council of the European Union, 2013). Risk-weighting of assets was improved, capital adequacy rules were tightened, and financial institutions were put under stricter disclosure requirements. Although the capital requirements were phased in gradually, large improvements in solidity were seen in the first few years after the imposition of CRD IV. As shown in table 3.1, the median CET1 ratio for Euro area banks increased by 220 basis points from 2012 to 2015. Cohen and Scatigna (2014) found that the improvement in regulatory ratios for large European banks between 2009 and 2014 can be attributed mainly to declines in risk-weighted assets. Consistent with this, we observe that total bank assets in the Euro area declined by 10.2 % between 2008 and 2015. This contrasts to emerging economies and the U.S., where capital increases were found to be the main force behind increases in bank solidity between 2009 and 2012 (Cohen & Scatigna, 2014)[2].

**Table 3.1: Overview of Euro Area Banking Statistics**

| | 2008 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|
| Num. of Credit Institutions in Euro Area | 6774 | 6100 | 5948 | 5614 | 5475 |
| Total Assets in € | € 33.5 tr | € 29.6 tr | € 26.8 tr | € 28.1 tr | € 27.7 tr |
| Median CET1 Ratio | N/A | 12,40 % | 13,00 % | 14,40 % | 14,60 % |

***Source**: European Central Bank (2014, October 13; 2015, October 29; 2016, October 27)*

At the same time, consolidation in the banking sector continued, although mergers and acquisitions activity in the sector declined from pre-crisis levels (European Central Bank, 2016). The consolidation coincided with several underlying changes in the industry. As part of measures aimed at reducing risk, several Euro zone banks cut back on investment banking services in favor of traditional commercial banking activities. In fact, between 2005 and 2015, the market share of European banks among the largest 20 investment banks in EMEA investment banking services moved from 54.7 % to 44.7 % (Goodhart & Schoenmaker, 2016). This trend was supported by technological changes and competition from the non-bank financial sector. Furthermore, European banks became focused on building leaner organizational structures through rationalization and digitalization. Even for these measures, many European banks struggled to sustain profitability, with headwinds from an unfavorable interest rate environment and high restructuring, litigation and compliance costs (European Central Bank, 2016). In recent years, the former may have motivated banks to adjust their product mix and increase their fee-based revenues (Kok, Mirza & Pancaro, 2017). This observation is consistent with previous empirical work that have suggested that non-interest income is negatively related to short-term and long-term interest rates (Arellan & Bond, 1991) (Covas, Rump & Zakrajsek, 2014). While studies have linked this type of bank income with better profitability, others have suggested that fee-generating activities are more sensitive to economic shocks (Coffinet, Lin & Martin, 2010).

[2] Cohen and Scatigna (2014) also found that large banks in emerging economies and the U.S. increased their assets between 2009 and 2012.

Research have indicated that the new directives have improved the soundness of the financial industry, but dismal effects of the regulations have also been pointed out. Some researchers have argued that the redefined Capital Requirements Directive, imposed in 2013, may have increased bank cost of capital. In assessing the empirical evidence on the former, Kashyap, Stein and Hanson (2010) argue that we should distinguish between "stock" and "flow" costs of capital. "Stock" cost of capital is the long-term balance sheet cost of holding more equity, while the "flow" costs of capital refer to the indirect and direct costs related to new issuances of equity. Theory and empirical evidence will suggest that the latter is an important consideration, both for bank investors and other stakeholders. If banks were suddenly required to hold larger capital buffers, they may be reluctant to issue more equity if the indirect or direct costs of capital are high. Thus, they may trim risky assets to improve regulatory ratios. The phenomenon is referred to as a "capital shock" by Kashyap et al. The result of it may be slower loan growth and higher borrowing costs for consumers and companies, with adverse effects on the economy. At the same time, bank investors may lose out on positive-NPV loans. Several studies have suggested empirically that shocks to equity capital may lead banks to adjust their lending (Peek & Rosengren, 1997) (Bernanke & Lown, 1991) (Houston, James & Marcus, 1997) (Baker & Wurgler, 2013). On the other hand, empirical evidence that capital requirements increase "stock" cost of capital remain indecisive. Still, some researchers have argued that substituting government-guaranteed bank deposits with equity reduces the market value of equity and increases the total funding costs for banks (Merton, 1977) (Keeley, 1989). Moreover, Diamond and Rajan (2001) argue that banks are especially vulnerable to agency problems, and maintain that more short-term debt could mitigate for these conflicts. Other advantages of bank debt are discussed by Gorton and Metrick (2010) and Stein (2010). However, effects due to tax treatment is less evident, as was also discussed in chapter 2.2.

## 3.2 Other Regulated Companies in Europe

The aim and extend of regulation in Europe vary between different regulated industries. In a capitalist economy, asset bases of private firms may be regulated if the economic rent is subject to monopoly powers, if the firm is considered vital to national interests, or if firm failure could have a severe adverse impact on the economy. As Mill (1909) argued, whereas monopolies are creations of circumstance, government should subject the firm to conditions so that the monopoly profit may be shared with the public. Building on similar principles, it has been the aim of several EU directives in the 1990s and 2000s to harmonize rules for and improve competitive conditions in many industries. It is useful to distinguish between financial and non-financial regulated sectors. Non-financial regulated sectors include power and water utilities, rail roads and public transportation, energy infrastructure, and telecom companies, most of which are regarded as natural monopolies. Moreover, in most economies, some firms are regulated due to high market concentration or high pricing power. An example of the latter is found in the European pharmaceutical sector (Danzon & Chao, 2000). While the aim of regulation could be the same across different industries, how the firms are regulated differs greatly. Firms in the power and water utility sector, rail road and public transportation sector and energy infrastructure sector are often designated a regulated asset base, in which the regulator decides the rate of return (Cambini & Rondi, 2010). Other methods used to tackle high market concentration include price control or additional taxation of profits. The insolvency of some regulated firms could prove costly to the economy, as government administration or involvement may be inevasible. Therefore, in some regulated industries, the capital structure of the firm is also subject to direct or indirect regulatory scrutiny or control. Following a push for market integration in non-financial regulated sectors in the 1990s, privatization of European regulated companies surged (Bortolotti, Cambini, Rondi & Spiegel, 2011). Yet, government ownership of European regulated firms remained high (Bortolotti & Faccio, 2009). Moreover, several publicly-listed regulated companies in the EU are still partially owned by the government. In some instances, the government even owns special voting rights within the privatized regulated firm, which limits the firm's discretion to appoint board members and accept offers from acquirers (Bortolotti et al., 2011).

### *Regulation of Non-financial Industries*

Recent EU legislation in the non-financial regulated sector include power and utilities regulation in Directive 2009/73/EC and 2009/72/EC, often referred to as the "Third Energy Package", which was adopted in July 2009 (European Parliament; Council of the European Union, 2009). The legislative package separated energy production from energy supply, and was aimed at increasing the transparency in electricity markets, improving independence of regulators, and creating an agency for cross-border cooperation between regulators. Even for this, large variations in national regulation remain in the European utilities sector. The regulations have had lasting consequences for how some of these companies do business, and as some researchers have noted, they may have impacted the capital structure decisions of these companies as well. Bortolotti et al. (2011) note that financial leverage of European regulated utilities and telecoms have increased drastically since the 1990s. Studies from the U.S. have previously argued that the imposition of rate regulation of utilities may have reduced uncertainty, resulting in higher optimal debt-to-equity ratios (Taggart, 1985). Other researchers have argued that increases in leverage may induce regulators to raise product prices, so to reduce the risk of firm bankruptcy (Taggart, 1981) (Spiegel & Spulber, 1994;1997). Bortolotti et al. find that European private firms that are subject to an independent regulatory agency may cause regulated prices to increase by increasing leverage, while the reverse does not hold true[3]. As the same authors note, regulators have expressed concern about these incentives in recent years.

### *Regulation of Financial Non-banks*

While some companies in the financial sector, such as financial exchanges, may have steep barriers to entry, most are regulated with the aim of upholding financial and economic stability. Problems related to systematic risk and moral hazard has been pointed out in the non-bank financial sector, particularly for insurance companies. Directive 94/19/EC and Directive 97/9/EC established basic levels of compensation for insurance policy holders in case of insurer insolvency (European Parliament; Council of the European Union, 1994; 1997). Yasui (2001) argues that protection funds for insurance policy holders make consumers less risk-averse in selecting an insurer. Moreover, the author argues that these policy measures may loosen the pressure on supervisors to discipline insurance companies. As a result, insurers may have incentives to increase risk-taking, for instance by offering risky insurance products or by increasing leverage. In fact, a U.S. study points to evidence that the degree of price regulation has a positive effect on the leverage of property-liability insurers (Klein, Phillips & Shiu, 2002). It has therefore been the intention of several legislative packages to reduce the risk that insurance companies are unable to meet its claim obligations and provide regulators with tools of intervention (European Parliament; Council of the European Union, 2002). Notably, the regulation of European insurance companies today resembles the regulation of banks and other credit institutions. Directive 2009/138/EC and

[3] The authors define a private regulated firm as one where the state holds less than 50 % of the control rights.

2014/51/EU, referred to as the “Solvency II Directive”, was adopted in November 2009 and April 2014 (European Parliament; Council of the European Union, 2009; 2014). As with the Basel framework, the Solvency II framework consists of three pillars. The first pillar includes a new set of capital requirements, requiring insurers to have enough equity capital to cover 99.5 % value-at-risk, referred to as the solvency capital requirement (SCR). The second pillar aims at improving governance and risk management standards in the industry. Lastly, the third pillar contains requirements for disclosure and transparency. Because measures of risk will change over time, the solvency ratio of insurance companies is more volatile than the capital adequacy ratio of banks. As with banks, several European insurance companies have seen structural headwinds in the last decade. The low-interest rate environment and weak growth in premiums have pressured the profitability of insurers (European Insurance and Occupational Pensions Authority, December 2016). Still, most European insurers have been able to meet the SCR coverage, as of June 2016 (European Insurance and Occupational Pensions Authority, December 15, 2016). In addition, all participating companies covered the minimum capital requirement (MCR) of 85 % value-at-risk in the baseline stress test in 2016, with only two out of 236 companies failing to meet the SCR of 99.5 % value-at-risk.

# 4 Seasoned Equity Offerings

## 4.1 Introduction to Seasoned Equity Offerings

Access to the capital markets is essential for firms that rely on external capital to fund investment opportunities, strengthen liquidity or improve their solidity. In general, there are two ways that a firm can raise capital: either through debt issues or equity issues. A seasoned equity offering (SEO) is an issue of additional equity from a firm whose securities already trade in the secondary market. An SEO may be dilutive or non-dilutive to existing owners depending on the offer discount and whether the shares are sold to existing shareholders or not. Asquith and Mullins (1986) define a primary offering as an issue of new shares in which the firm receives the proceeds from the offer. A secondary offering, on the other hand, involves the resale of stock from existing shareholders. Such an offer does not alter the number of shares outstanding in the firm and the proceeds accrues to the shareholders undertaking the offer. There are several types of equity offers within the realm of primary offerings. The most common ones are rights offerings, public offerings and private placements.

In a rights offering, existing shareholders are given a warrant that entitles them to purchase additional shares on a pro rata basis directly from the company within a pre-determined period. The price at which the shares can be purchased is generally at a discount relative to the current market price and the warrant is typically negotiable. If the firm believes that the risk of under-subscription is substantial, it may choose to undertake a standby rights offering. A standby rights offering entails employing an underwriter who guarantees that the required funds will be raised through an underwriting agreement. In the case of under-subscription, the underwriter will in general subscribe to the shares not purchased by existing shareholders. A public offering involves the sale of new equity by the firm to the public. Public offerings are usually conducted with the assistance of an underwriter, and must be registered with and approved by the competent authority under the jurisdiction in which the firm belongs to. In a private placement, a small number of select investors are given the opportunity to purchase shares in the firm. A private placement differs from a public offering in that the offer is made unavailable to the open market. Typical investors of private placements involve large banks and institutional investors such as mutual funds, pension funds and insurance companies.

A common denominator of the offering methods explained above is that they usually involve the employment of an investment underwriter. The underwriter will typically aid the firm through the issue process by performing due diligence, contribute to the design, pricing, distribution, marketing and registration of the issue, and provide necessary documentation to clients, investors, and regulatory authorities. There are several forms of investment underwriting agreements. In a best efforts agreement, the issuer bears the risk of offer failure and the underwriter simply acts as a marketing agent without guaranteeing the proceeds of the issue. In contrast, a firm commitment agreement entails that the underwriter bears the full risk of the offer and take responsibility for the sale of the issue (Eckbo & Masulis, 1995). The choice of flotation method will to a large extent depend on the direct and indirect costs associated with the offering and its potential for raising the required funds. The direct costs of equity offers can be substantial, and will in most cases involve underwriting, legal and accounting fees, listing and registration fees, and governmental taxes and fees. The underwriting costs will usually constitute a significant portion of the direct costs. Indirect costs often stem from adverse selection and signaling effects associated with the presence of asymmetric information. These indirect costs are in general more severe for offerings that are not underwritten, which may explain the increasing preference for underwritten offerings despite the higher direct costs (Eckbo & Masulis, 1995).

## 4.2 Stock Price Behavior Around Seasoned Equity Offering Announcements

Primary equity offerings have three major impacts on a firm: (1) the increase in equity lowers firm leverage, (2) the proceeds are often used to finance capital expenditures or improve liquidity and solidity, and (3) stock offerings usually alter management's fractional ownership in the firm (Masulis & Korwar, 1986). There is substantial empirical evidence that equity offerings on average have a negative impact on stock prices. In the following sub-chapters, we present competing hypotheses and previous studies on the announcement effect of SEOs for both regulated and unregulated firms.

### 4.2.1 Hypotheses on Seasoned Equity Offering Returns

Following Modigliani and Miller (1958), Asquith and Mullins (1986) argue that, in efficient and perfect capital markets, equity offerings that does not alter the expected risk or return of cash flows should have no impact on a firm's market price. The theoretical argument for this deposition assume that securities with similar risk and return characteristics are either directly or indirectly available in the capital markets, serving as approximate substitutes for a firm's shares (Asquith and Mullins, 1986). This assumption implies that the demand curve for a firm's shares is horizontal, and that an equity offering in itself should have zero impact on share prices. In contrast, the capital structure trade-off theories of Kraus and Litzenberger (1973) and Jensen and Meckling (1976) predict that the announcement effect from equity offerings is ambiguous. If the reduction in leverage is value-destroying, that is, if the reduction of the tax shield is greater than the reduction in bankruptcy costs, or if the agency costs of equity are substantial, the SEO may have a negative impact on stock prices. If the reverse holds true, SEO announcement returns may be positive.

A third class of capital structure hypotheses relies on information asymmetries and the premise that managers have superior information compared to outside investors. There are several models suggesting that capital structure changes signal information about management's expectations concerning future cash flows and firm value. The debt-signaling model by Ross (1977) propose that debt issues in general signal firm undervaluation, while equity issues signal overvaluation. This implies that leverage-increasing transactions will signal favorable information about firm value and thus lead to positive stock price reactions. Leland and Pyle (1977) consider the signaling effect of changes in ownership structure. They argue that a large management stock ownership in the firm constitutes a credible signal of firm quality because the willingness to invest own funds in the firm implies that the manager has positive expectations about future cash flows and earning power. On the other hand, Miller and Rock (1985) hypothesize that a security offer by the firm that is larger than expected reveals insufficient earnings, which is interpreted as a negative signal by the market. Under this theory, referred to as the *investment opportunity hypothesis*, the size of the offer is negatively related to the stock price reaction, regardless of changes in capital or ownership structure. The theory is often contrasted with Myers and Majluf (1984), who theorize that it is the type of financing that matters. However, the two theories are not inconsistent with each other. Both stem from the proposition that information asymmetries introduce adverse selection costs, which make external financing more expensive.

Another class of hypotheses, unrelated to capital or ownership structure changes, include the work of Scholes (1972), Galai and Masulis (1976), Jensen (1986), and Barclay and Litzenberger (1988). In contrast to the horizontal demand curve for a firm's shares contended by efficient and perfect capital markets, Scholes argues that close substitutes to a firms' shares do not exist, and that the demand curve is downward sloping. The implication is that an equity offering, which increases the supply of shares, should result in a decline in the firm's stock price. This is referred to as the *price-pressure hypothesis*. Galai and Masulis combine the option pricing model with the capital asset pricing model (CAPM) and hypothesize that an unexpected reduction in leverage results in a transfer of wealth from shareholders to debtholders as debt becomes less risky. This finding is referred to as *the wealth effect hypothesis*, and is based on Black and Scholes (1973) argument that common stock can be regarded as a European call option on a firm's assets. Barclay and Litzenberger outline *the wasteful investment hypothesis* based on the early work of Berle and Means (1932). They argue that managers have a tendency to overinvest, and that unexpected security issues signal a higher level of planned investment to the market. If the incremental investments are unprofitable or perceived to be wasteful, the security issue will constitute a negative stock price reaction. The magnitude of the price decline will be positively related to the size of the issue and negatively related to the net present value of the investment (Barclay & Litzenberger, 1988). The agency costs of free cash flow, introduced by Jensen, is directly related to *the wasteful investment hypothesis*. Jensen argues that free cash flows should be paid out since managers have incentives to overinvest and grow the firm beyond its optimal size.

The hypotheses propose competing and even contradictory arguments as to how and why stock prices should react following SEO announcements. We categorize the theories on SEO price reactions into three main categories:

***Zero price reaction hypothesis***

Consistent with a horizontal demand curve for a firm's shares in efficient and perfect capital markets.

***Negative price reaction hypothesis***

Consistent with (1) theories related to asymmetric information, signaling effects, and adverse selection associated with management's superior information, (2) trade-off theories based on a value destroying reduction in leverage, (3) the price-pressure hypothesis and a downward sloping demand curve for a firm´s shares, (4) the wealth effect hypothesis, (5) the wasteful investment hypothesis and the agency costs of free cash flow theory in the case of poor investment opportunities for the firm, and (6) large direct transaction costs associated with equity issues.

***Positive price reaction hypothesis***

Consistent with (1) the wasteful investment hypothesis in the case of profitable investment opportunities for the firm, (2) trade-off theories based on a value-enhancing reduction in leverage.

### 4.2.2 Previous Empirical Studies on Seasoned Equity Offering Returns

The stock price effect of SEOs has been extensively researched, with the majority of studies reporting evidence of negative abnormal stock returns around the announcement date. In this subchapter, we will present some of the major cross-sectional findings of previous empirical studies on SEO announcement returns. Table 4.1 provides a summary of the selected studies.

**Table 4.1: Summary of Selected Previous Studies**

| Author | Market | Sector | Period | Event Window | Number of SEOs | CAR |
|---|---|---|---|---|---|---|
| Masulis and Korwar (1986) | US | Industrials | 1963-1980 | (0, 1) | 690 | -3,25 % |
| | US | Utilities | 1963-1980 | (0, 1) | 716 | -0,68 % |
| Korajczyk et al. (1991) | US | Industrials | 1978-1983 | (-10, 10) | 1247 | 2,26%[a] |
| Choe, Masulis and Nanda (1993) | US | Industrials | 1963-1983 | (0, 1) | 669 | -2,62 % |
| | US | Utilities | 1963-1983 | (0, 1) | 787 | -0,75 % |
| Cornett, Merhan and Tehranian (1998)[b] | US | Banks | | | | |
| | US | *Voluntary issues* | 1983-1991 | (-1, 0) | 70 | -1,62 % |
| | US | *Involuntary issues* | 1983-1991 | (-1, 0) | 80 | -0,39 % |
| D'Mello, Tawatnuntachai and Yaman (2003) | US | Industrials | 1979-1996 | (-1, 1) | 1318 | -1,50 % |
| | US | Utilities | 1979-1996 | (-1, 1) | 432 | -0,77 % |
| | US | Financials | 1979-1996 | (-1, 1) | 478 | -0,81 % |
| Marinova, van Veldhuizen and Zwart (2014) | US | Banks | 2007-2013 | (-1, 1) | 111 | -0,82 % |
| | EU | Banks | 2007-2013 | (-1, 1) | 74 | -2,61 % |
| Li et al. (2016) | US | Non-banks | 1982-2012 | (-1, 1) | 3388 | -1,59 % |
| | US | Banks | 1982-2012 | (-1, 1) | 375 | -0,98 % |

[a] *CAR on the day preceding the SEO announcement*

[b] *Cornett et al. (1998) only report results for voluntary versus involuntary bank issues*

Masulis and Korwar (1986) find less negative abnormal returns for utilities than for industrials, and argue that the information content of SEO announcements is smaller for the former, partly because utility offerings to a greater extent are anticipated by the market, and partly because of the higher frequency of utility offerings. The study also find a positive relation between announcement returns and leverage changes, consistent with the signaling model of Ross (1977), and that changes in announcement returns are proportional to changes in management's ownership, consistent with Leland and Pyle (1977).

Korajczyk et al. (1991) study the phenomenon of time-varying asymmetric information, and find evidence suggesting there is a negative relation between announcement period returns and asymmetric information levels. They argue that asymmetric information will be lower in periods succeeding credible information releases such as earnings announcements or the announcement of security offerings. Consistent with this, they find that CAR is increasingly more negative as the time since last information release increases. Overall, their results suggest that asymmetric information will influence both the timing and pricing of equity offerings.

Choe et al. (1993) study how business cycles influence SEO announcement returns. They find that the frequency of equity offerings is higher and announcement returns less negative during business cycle peaks. They argue that SEO announcements will convey less adverse selection during periods of economic growth, as the firm’s investment opportunities are greater and since uncertainty about assets in place during such periods is likely to be lower. Moreover, they find that both market volatility and the size of the SEO is negatively related to CAR. The latter result is consistent with Miller and Rock (1985).

Cornett et al. (1998) study bank SEO announcement effects, and distinguish between voluntary and involuntary issues based on whether a particular bank meets the regulatory capital requirements or not. Involuntary issues are categorized as equity issues undertaken by capital deficient banks seeking to maintain minimum regulatory standards. They find evidence suggesting that investors are likely to make inferences based on banks’ pre-announcement capital levels, and that SEOs by banks under regulatory pressure to boost capital to a larger extent are anticipated by the market. In addition, the authors contend that SEO announcements by capital-deficient banks may signal positive information about the banks’ commitment to comply with regulatory standards, and thus that investors may have greater confidence in SEOs by such banks.

D’Mello et al. (2003) extend on the reasoning of Masulis and Korwar (1986), and argue that investors may differentiate between the first time a firm undertakes an SEO and subsequent SEOs by the same firm. They study the impact of offering sequence on announcement period returns, and find evidence of less negative stock price reactions for each successive equity offering in the sequence for industrials firms. They attribute this finding to diminishing pre-announcement asymmetric information levels for each subsequent issue, consistent with the model of Korajczyk et al. (1991). Overall, D'Mello et al. argue that the difference between industrial firms, utilities, and financial firms are primarily driven by the relatively low frequency of industrial offerings compared to utility and financial offerings. In addition, they find support for issue timing, in which firms seek to take advantage of periods with lower asymmetric information levels by raising more capital and by shortening the time interval between successive SEOs.

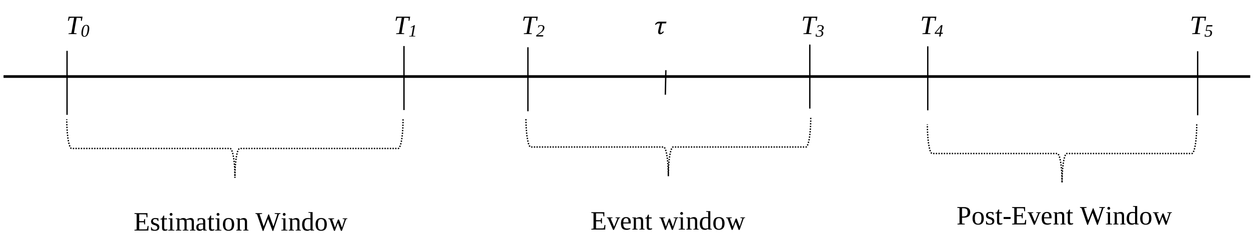
Marinova et al. (2014) find more negative SEO announcement returns for European banks than for US banks. They present three different arguments that may explain the difference in announcement returns. First, they find that banks with higher equity ratios experience less negative announcement effects. This is shown to be the case for U.S. banks, which is better capitalized than their European counterparts. Second, the European sovereign debt crisis is likely to have had an adverse effect on the ability of banks to raise capital. Third, they find that CAR is negatively related to the relative size of the offering, and show that European banks on average undertakes larger equity offerings relative to their firm size, compared to U.S. banks.

Li et al. (2016) study the difference in announcement returns between banks and non-banks in the U.S. They find that banks experience less negative CARs than non-banks. Consistent with previous studies on the same topic, they attribute the difference between the two groups to the influence of bank regulations on asymmetric information levels. They also find evidence in support of the theory that bank regulations limit managerial discretion with respect to timing equity offerings to periods of high stock valuations, and thus that investors are less likely to interpret bank SEOs as a signal of overvaluation compared to SEOs performed by non-banks.

# 5 Methodology

In efficient markets, the effect of an event will immediately be reflected in security prices (MacKinlay, 1997). An event study is a useful tool for measuring the impact of a specific event on the value of a firm, and is often used to test market efficiency (Kothari & Warner, 2006). We follow the procedure outlined by MacKinlay (1997) and Kothari and Warner (2006) in constructing the event study. We start by dividing the study into two time periods[4]:

**Figure 5.1: Event Study Timeline**




The estimation window $L_1 = T_1\text{-}T_0$ is used for calculating the abnormal returns over the event window $L_0 = T_3\text{-}T_2$, where the event date is denoted as $\tau$. To prevent the event from influencing the estimation of normal returns in the event window, fourteen days separate $T_1$ from $T_2$.

## 5.1 Event Window

The event window is the period over which the stock price of the firms involved in the event of interest is examined. MacKinlay (1997) argues that it is useful to define the event window to be larger than the exact event date. The presence of insider trading and information leakage may suggest that the effects from the event will be partly incorporated in stock prices prior to the announcement day. Moreover, some announcements may occur after the market has closed, delaying the stock price reaction until the following day. The speed at which stock prices adjust to new information is also an empirical question. Lo (2007) shows that the information contained in equity issues may take several days to be fully reflected in stock prices. However, Brown and Warner (1985) contend that using a longer event window reduces the power of the test statistics, which may lead to false inferences. A longer event window will also increase the likelihood that other effects than the event of interest is captured (McWilliams & Siegel, 1997). Several studies have shown that a short event window usually is sufficient. For example, Dann, Mayers and Raab

[4] We disregard the post-event window since it is less relevant for the purpose of our study.

(1977) argue that, in contrast to Lo, stock prices usually adjust rapidly to reflect the release of new firm-specific information. Kothari and Warner (2006) claim that a short event window in general will increase the significance of the abnormal return estimates given that the event date is precisely known and that the abnormal returns are concentrated around the event period. Given the length and age of our sample, we find it challenging to identify the exact announcement dates. Consequently, our best estimate of the event date is the filing dates obtained from the SDC Platinum database. Several researchers have pointed out discrepancies between the filing date of SEOs and the time at which the offering is first announced to the public. Guo and Mech (2000) find that the filing dates obtained from the SDC provided earlier announcements for 88 of the 99 issues examined, while the Wall Street Journal or other news wires had earlier announcements for only 8 of the issues. We account for the possibility that the filing dates may be incorrect by using an event window of (-5, 5) days. This is consistent with previous research, and seems long enough to capture the significant effects of the event, yet short enough to prevent confounding effects from biasing the abnormal return estimates. We will repeat our analysis with shorter event windows to test for robustness.

### 5.2 Estimation Window

The next step is to specify the estimation window. The estimation window is the period used to calculate the expected return, or the normal performance, for the firm in the event period. MacKinlay (1997) suggests using an estimation window of 200 days prior to the event. The length of the estimation window depends on several factors. A longer estimation window ensures a more reliable estimate of the normal return parameters, and may improve the statistical significance of the predicted return estimation. However, it also increases the likelihood that unrelated, firm-specific events will bias the estimates (Aktas, de Bodt & Cousin, 2007). Given our large sample size, the presence of unrelated events in the estimation window is unlikely to have a significant impact on our estimates. Thus, to ensure proper estimates of the return parameters we use an estimation window of 240 days, ending 20 days prior to the event date. Having a time interval between the estimation and event window prevents the price movements caused by the event from influencing the estimation of normal returns.

A detailed description of the methodology used to model the normal returns, abnormal returns, and the mean cumulative abnormal returns, as well as the tests applied to test the statistical significance of the cumulative abnormal returns is given in Appendix B.

### 5.3 Cross-Sectional Analysis

A cross-sectional analysis provides theoretical insight on the determinants of the cumulative abnormal returns. In the analysis section, we will utilize OLS in multivariate regression models to examine the relationship between the magnitude of the cumulative abnormal return and various firm-specific, market-specific, and issue-specific characteristics:

$$CAR(\tau_1, \tau_2)_i = \alpha_0 + \beta_1 X_{i1} + \cdots + \beta_j X_{ij} + u_i$$

The cumulative abnormal return over the event window is the dependent variable, and the explanatory variables consist of different variables of theoretical and economical relevance. Table 5.1 provides definitions of the explanatory variables utilized in the cross-sectional analysis on CAR. Summary statistics of all the explanatory variables applied in the analysis section and a cross-industry comparison of mean values are given in tables C1 to C5 in the appendices. The application of our cross-sectional regressions will depend on the assumptions of the classical linear regression model[5]. The results may be biased if any of these assumptions are violated. To account for this, we run our regressions with robust standard errors. The standard errors are estimated using Huber-White Sandwich estimators. According to Sorokina, Booth and Thornton (2013), such robust standards errors can deal with several minor concerns about failure to meet assumptions, such as concerns about normality, heteroscedasticity, and outliers.

[5] We refer to Appendix B.

**Table 5.1: Explanatory Variable Definitions for the Event Study**

| Variable | Database | Definition |
|---|---|---|
| ***Firm-Specific Characteristics*** | | |
| Market Cap. in bn. USD (-20) | Datastream | Firm market capitalization in billion USD, as recorded 20 days prior to the event date. Converted from local market capitalization using the foreign exchange rate to USD on the same day. |
| Stock Run-up (-262, -11) | Datastream | Stock return in the window (-262 to -11) relative to the event date. |
| Equity to Assets (lagged)* | Compustat | Equity to assets ratio, calculated as total equity divided by total assets, as reported in the latest available quarterly report prior to the SEO announcement. |
| Capital Adequacy Ratio (lagged) | Compustat | Capital adequacy ratio, as reported in the latest available annual report prior to the SEO announcement. Defined as tier 1 and tier 2 capital over risk-weighted assets. |
| Number of Days Since Last Financial Report | Compustat | Number of days since the release of the latest financial report at event date. |
| Number of Previous Offerings (-365, -1) | SDC | Number of previous offerings undertaken in the last 365 days before the SEO announcement. |
| Average Relative Price Spread (-10, -6) * | Datastream | Average relative bid-ask spread in the window -10 to -6 relative to the event date, calculated as the bid-ask spread divided by the closing ask price at each respective day. |
| ***Market-Specific Characteristics*** | | |
| Non-Investment Grade Sovereign Debt Rating (0/1) | S&P | 1 for equity offerings by issuers in countries with non-investment grade sovereign debt rating (less than BBB), 0 otherwise (BBB or greater). |
| Financial Crisis (0/1) | SDC | 1 for equity offerings announced during 2007-2009, 0 otherwise. |
| Euro Crisis (0/1) | SDC | 1 for equity offerings announced during 2010-2012, 0 otherwise. |
| Annualized Market Volatility (-71, -11) | Datastream | Annualized market volatility calculated from daily returns on the MSCI Europe price index in the window -71 to -11 relative to the event date. |
| Annualized Market Volatility (-262, -11) | Datastream | Annualized market volatility calculated from daily returns on the MSCI Europe price index in the window -262 to -11 relative to the event date. |
| ***Issue-Specific Characteristics*** | | |
| Offering Size in bn. USD | SDC | Offering size in billion USD, as reported by Thomson Reuters' SDC database. |
| Relative Size (-20) * | SDC / Datastream | Relative size of the equity offering, calculated as offering size in USD (as reported by SDC) divided by firm market capitalization in USD |

Variables marked by star (*) have been trimmed for the most extreme 1 % values in the top and bottom of the distribution.

## 5.4 Logistic Regression Analysis

In chapter 8.4, we will use logistic regression models to predict the marginal probability that firms will undertake SEOs based on relevant explanatory variables. For a detailed description of the logistic regression model and its statistical properties, we refer to Appendix B. Since the data in this analysis is longitudinal panel data, pooled OLS regression may be inefficient. We will therefore apply panel data estimators in the logistic regression analysis. A Hausman specification test suggests fixed effects is the appropriate estimator, as the difference between the coefficients from a fixed and random effects regression is statistically different from zero[6]. In choosing the fixed effects estimator, we are eliminating any firm heterogeneity. The definitions of the explanatory variables used in the logistic regression models are given in table 5.2. We refer to appendix C for yearly variable statistics.

**Table 5.2: Explanatory Variable Definitions for the Logistic Regression Model**

| Variable | Database | Definition |
|---|---|---|
| Market Capitalization in bn. USD (-1q) | Datastream | Firm market capitalization in billion USD, as recorded at the end of the previous quarter (-1q). Converted from local market capitalization using the foreign exchange rate to USD on the same day. |
| Stock Run-up (-5q, -1q) | Datastream | The one-year stock performance in the previous quarter (-5q, -1q). Calculated using prices adjusted for dividends and splits from Datastream. |
| Equity to Assets (-1q) * | Compustat | Equity to assets ratio, calculated as total equity divided by total assets as reported by Compustat in the previous quarter (-1q). |
| Non-Investment Grade Sovereign Debt Rating (0/1) | S&P | 1 for equity offerings by issuers in countries with non-investment grade sovereign debt rating (less than BBB), 0 otherwise (BBB or greater). |

Variables marked by star (*) have been trimmed for the most extreme 1 % values in the top and bottom of the distribution.

## 5.5 Limitations of Methodology

Several limitations of the event study methodology can induce biases and affect the inferences from our results.

[6] See table D8 in the appendices.

### 5.5.1 Non-Synchronous Trading

Non-synchronous trading occurs when returns are measured over different trading intervals. For example, closing prices do generally not occur at the same time each day, but by using them as "daily prices" in event studies one is implicitly assuming that they are equally spaced at 24-hour intervals. This incorrect assumption can bias the OLS estimates of the market model parameters, and induce serial correlation in the excess return measures. However, biases in the parameter estimates do not necessarily imply misspecification. Brown and Warner (1985) find that serial correlation only play a minor role in event studies and that the benefits from adjusting for the serial correlation are limited.

### 5.5.2 Clustering

When aggregating the results we assume that the abnormal returns across different securities are independent. MacKinlay (1997) argues that this is a reasonable assumption as long as there is no overlap in the event windows across the securities in the study. If the event windows do overlap, the abnormal returns across firms will no longer be independent and the covariance between the abnormal returns will be different from zero. A consequence of clustering is that the variance can be biased downward and the test statistic upward, increasing the likelihood of falsely rejecting the null hypothesis (Brown & Warner, 1985). However, Campbell, Lo and MacKinlay (1997) argue that clustering is usually not a problem as long as the estimation window and event window does not overlap.

### 5.5.3 Relation Between Firm Characteristics and Event Anticipation

When performing the cross-sectional analysis, we seek to capture the relation between different explanatory variables and the SEO announcement returns. MacKinlay (1997) argues that rational investors, in many situations, will forecast the likelihood that an event will occur based on firm characteristics. The abnormal returns in the event window will in such cases be related to firm characteristics and the extent to which the event is anticipated based on these characteristics, in addition to the valuation effects of the event. If this is the case, the assumption that the regression residual is uncorrelated with the regressors is violated, returning inconsistent OLS estimators.

Despite the incorrect specification and under weak conditions, Prabhala (1997) argues that the OLS approach can still be used for inferences, and that the t-statistics can be interpreted as lower bounds on the true significance level of the estimates.

### 5.5.4 Outliers and High Leverage Data Points

Outliers are observations that lies distant from other observations, or data points that does not follow the general trend of the rest of the data (Sorokina et al., 2013). High leverage data points are outliers with extreme values that impact the slope of the regression line. These observations can have a disproportionate effect on statistical inferences from OLS regressions. In fact, inferences may be skewed toward such outliers, causing the majority of the sample observations to be underrepresented. To account for the potential problem associated with outliers, we apply robust standard errors to our OLS regressions. Moreover, we have trimmed some of the variables that showed high kurtosis or otherwise seemed to be heavily influenced by outliers and high leverage data points[7]. Yet, we recognize that while the removal of outliers and high leverage data points may improve the accuracy of statistical inferences, it may also eliminate valuable observations from the analysis (Sorokina et al., 2013).

### 5.5.5 Non-normality

The analysis relies on the assumption that returns are jointly normal and temporally independently and identically distributed (MacKinlay, 1997). The results of our OLS regressions would be asymptotic without the assumption of normality. However, MacKinlay (1997) argues that failure of meeting the normality assumption generally does not introduce any problems in event studies, as the test statistics will converge to the asymptotic distributions rapidly.

[7] We refer to table 5.1 and 5.2 for an overview of trimmed variables.

# 6 Data

## 6.1 Main Analysis

We study the stock price reaction to 4,953 SEO announcements made by 2,432 European firms over the period January 1997 to December 2016. The study does not consider initial public offerings, private placements, shelf registration issues, or issuance of American or global depository shares. The announcement dates are extracted from the *Thomson Reuters' SDC Platinum* database, daily stock data from *Thomson Reuters' Datastream* and relevant accounting data from *Standard & Poor's Compustat*[8]. Equity offerings with total proceeds below $20mn and firms with a market capitalization and/or total assets below $20mn are excluded. The market capitalization in USD was calculated at 20 days prior to the offering, using market capitalization in local currency from Datastream and exchange rates to USD from Datastream on the same day. All SEOs with an offer date more than 100 days later than the filing date reported by the SDC are excluded, as such discrepancies are likely caused by registration errors in the SDC database. The sample of firms is restricted to those having sufficient time series data in the estimation and event window. For example, several firms did not have a whole trading year of available stock prices prior to the offering and were thus dropped. Finally, firms in countries that are not currently a member of EU or the EEA are dropped. The relevant quantitative data from Datastream and Compustat was merged with the data set from SDC using the respective ISIN numbers of the companies. Overall, we were able to match 91.8 % of our ISIN numbers with accounting data from Compustat, of which 76.64 % were matched with quarterly accounting data. The final sample consists of 4,953 equity issues, out of which 430 are designated as issued by banks, 841 by regulated non-banks, and 3,682 by unregulated firms[9].

For the purpose of this study, regulations are defined as sector-specific rules enforced by the government that affect cash flows to equity holders and/or impact the firm's capital structure decisions. Firms designated as regulated non-banks include utilities (SIC codes 4900 - 4999),

[8] We note that stock prices used in calculating stock returns in the analysis are adjusted for stock splits and dividends.
[9] Our sample should therefore contain close to all registered EU/EEA equity offerings above $20m announced between January 1997 and December 2016.

telecommunications (SIC codes 4812 and 4813), non-bank financial firms (SIC codes 6100 – 6299 and 6300 – 6499) real estate (SIC codes 6500 - 6799), and other services such as equipment rental and leasing, petroleum pipelines and stations, and nursing care facilities. Table 6.1 summarizes the size characteristics for the full sample and the three company groups. Banks have a mean market capitalization of $14.67bn, which is substantially larger than that of non-banks. Moreover, banks issue more capital on average. The mean offering size of banks is $1.28bn, compared to $516mn and $228mn for regulated non-banks and unregulated firms, respectively. There is a broad range of firms in our full sample, with market capitalization ranging from a low of $21.17mn to a high of $256.67bn.

**Table 6.1: Size Characteristics**

| | **Full sample** | | **Unregulated** | | **Banks** | | **Reg. Non-Banks** | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Median | Mean | Median | Mean | Median | Mean | Median |
| Market Cap. in bn. $ | 5,36 | 0,96 | 3,64 | 0,68 | 14,67 | 6,36 | 8,11 | 1,65 |
| Offering Size in bn. $ | 0,37 | 0,11 | 0,23 | 0,09 | 1,28 | 0,36 | 0,52 | 0,15 |
| Relative Offering Size | 23,16 % | 11,68 % | 24,25 % | 12,76 % | 17,86 % | 7,43 % | 20,98 % | 9,92 % |

The table shows the size characteristics for the full sample and the three company groups. The market capitalization in bn. USD is calculated at 20 days prior to the offering, using market capitalization in local currency from Datastream and exchange rates to USD from Datastream on the same day. The offering size in bn. USD is retrieved from SDC. Relative offering size is defined as the offering size divided by the pre-vent market capitalization.

Table 6.2 shows the annual distribution of equity offerings for the full sample and the three company groups, and the total and mean amount issued each year.

**Table 6.2: Annual Distribution of SEOs**

| Year | Number of SEOs | | | | Amount issued ($mn) | Mean ($mn) |
|---|---|---|---|---|---|---|
| | Unregulated | Banks | Reg. Non-Banks | Total | | |
| 1997 | 133 | 15 | 24 | 172 | 58 427 | 340 |
| 1998 | 123 | 9 | 27 | 159 | 50 175 | 316 |
| 1999 | 95 | 10 | 26 | 131 | 49 784 | 380 |
| 2000 | 147 | 14 | 34 | 195 | 67 203 | 345 |
| 2001 | 128 | 10 | 24 | 162 | 51 058 | 315 |
| 2002 | 116 | 12 | 28 | 156 | 49 575 | 318 |
| 2003 | 144 | 25 | 28 | 197 | 76 738 | 390 |
| 2004 | 188 | 19 | 38 | 245 | 95 847 | 391 |
| 2005 | 207 | 36 | 63 | 306 | 105 833 | 346 |
| 2006 | 206 | 28 | 40 | 274 | 110 523 | 403 |
| 2007 | 260 | 26 | 53 | 339 | 98 331 | 290 |
| 2008 | 123 | 26 | 26 | 175 | 174 711 | 998 |
| 2009 | 283 | 40 | 63 | 386 | 182 348 | 475 |
| 2010 | 230 | 17 | 46 | 293 | 98 723 | 338 |
| 2011 | 166 | 19 | 43 | 228 | 98 929 | 436 |
| 2012 | 167 | 18 | 46 | 231 | 67 392 | 292 |
| 2013 | 246 | 29 | 55 | 330 | 115 928 | 351 |
| 2014 | 239 | 32 | 61 | 332 | 120 867 | 365 |
| 2015 | 255 | 20 | 63 | 338 | 90 498 | 268 |
| 2016 | 226 | 25 | 53 | 304 | 60 736 | 200 |
| **Total** | **3 682** | **430** | **841** | **4 953** | **1 823 626** | **368** |

The table shows the number of SEOs undertaken by each company group and the full sample for each year in the sample period, and the total and mean amount issued each year in mn. USD.

The number of SEOs each year for the full sample has increased substantially since 1997, reaching its highest point in 2009. Despite the small number of equity issues that took place in 2008, it is still the second biggest year in terms of amount issued. The rapid increase in the number of issues undertaken from 2008 to 2009 can be explained by the massive credit crunch that hit in the aftermath of the financial crisis. A tightened credit market may have made it difficult to obtain debt financing for firms, increasing equity issuance activity in public markets.

**Figure 6.1: Annual SEO Volume vs the MSCI Europe Price Index**


The figure depicts the annual SEO volume and the value of the MSCI Europe Price Index over our sample period (1997-2016). The price index represents daily closing prices from Datastream and is not adjusted for dividends.

Figure 6.1 shows the relationship between the total volume issued each year and the value of the MSCI Europe Price index. Notably, the volume of equity offerings reached its highest point in 2009, the same year as the market was at one of its lows. This seems to contradict theory that suggests it should be more attractive for firms to undertake SEOs in favorable market cycles, when there are more profitable investment opportunities and cost of financing is lower. However, the need for liquidity and solvency may have forced firms to raise capital and issue equity in this period.

Table 6.3 depicts the geographical distribution of SEOs by different sub-periods and the full sample period.

**Table 6.3: Geographical distribution of SEOs by period**

| Country | 1996-2006 | | 2007-2009 | | 2010-2012 | | 2013-2016 | | Full Sample Period | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. of SEOs | Amount Issued | No. of SEOs | Amount Issued | No. of SEOs | Amount Issued | No. of SEOs | Amount Issued | No. of SEOs | Amount Issued |
| Austria | 37 | 17 982 | 14 | 12 014 | 8 | 2 178 | 18 | 6 778 | 77 | 38 952 |
| Belgium | 31 | 9 924 | 21 | 7 664 | 24 | 4 169 | 49 | 6 826 | 125 | 28 582 |
| Bulgaria | - | - | 2 | 74 | - | - | 1 | 193 | 3 | 267 |
| Croatia | 1 | 214 | - | - | 2 | 2 796 | 2 | 85 | 5 | 3 095 |
| Cyprus | 4 | 1 148 | 5 | 981 | 5 | 1 493 | 5 | 2 221 | 19 | 5 843 |
| Czech Republic | 2 | 983 | - | - | - | - | - | - | 2 | 983 |
| Denmark | 50 | 10 991 | 30 | 5 523 | 23 | 10 743 | 23 | 9 855 | 126 | 37 113 |
| Estonia | 1 | 41 | - | - | - | - | - | - | 1 | 41 |
| Faroe Islands | - | - | 1 | 37 | - | - | 2 | 190 | 3 | 227 |
| Finland | 55 | 15 102 | 25 | 5 558 | 17 | 2 630 | 20 | 5 983 | 117 | 29 274 |
| France | 230 | 141 061 | 81 | 69 741 | 69 | 20 528 | 139 | 55 982 | 519 | 287 313 |
| Germany | 208 | 109 208 | 73 | 33 781 | 104 | 71 434 | 130 | 50 546 | 515 | 264 969 |
| Gibraltar | - | - | 2 | 401 | 1 | 169 | - | - | 3 | 571 |
| Greece | 43 | 15 321 | 33 | 14 168 | 9 | 7 655 | 18 | 12 914 | 103 | 50 059 |
| Guernsey | 7 | 1 106 | 19 | 3 076 | 18 | 1 640 | 65 | 8 838 | 109 | 14 661 |
| Hungary | 9 | 1 683 | - | - | 1 | 121 | 1 | 135 | 11 | 1 939 |
| Iceland | 5 | 2 201 | - | - | 1 | 23 | - | - | 6 | 2 224 |
| Ireland-Rep | 33 | 4 958 | 12 | 3 133 | 17 | 4 843 | 15 | 4 880 | 77 | 17 814 |
| Isle of Man | 1 | 382 | 4 | 506 | 10 | 684 | 19 | 3 682 | 34 | 5 254 |
| Italy | 89 | 71 140 | 40 | 22 594 | 36 | 30 291 | 80 | 24 540 | 245 | 148 565 |
| Jersey | 4 | 1 117 | 7 | 2 428 | 10 | 1 163 | 21 | 2 632 | 42 | 7 340 |
| Latvia | 1 | 135 | 1 | 23 | - | - | - | - | 2 | 159 |
| Lithuania | - | - | 2 | 53 | - | - | - | - | 2 | 53 |
| Luxembourg | 16 | 4 465 | 2 | 130 | 9 | 950 | 15 | 6 909 | 42 | 12 455 |
| Malta | - | - | 4 | 192 | - | - | 1 | 48 | 5 | 240 |
| Netherlands | 117 | 59 588 | 38 | 7 810 | 22 | 5 227 | 34 | 13 395 | 211 | 86 020 |
| Norway | 60 | 10 725 | 52 | 11 928 | 49 | 6 308 | 53 | 7 240 | 214 | 36 201 |
| Poland | 24 | 2 622 | 19 | 1 424 | 23 | 6 601 | 31 | 8 021 | 97 | 18 668 |
| Portugal | 32 | 13 704 | 13 | 5 949 | 10 | 3 620 | 19 | 7 550 | 74 | 30 824 |
| Romania | - | - | 1 | 45 | 3 | 788 | 9 | 760 | 13 | 1 593 |
| Serbia | - | - | - | - | 1 | 45 | - | - | 1 | 45 |
| Slovenia | - | - | - | - | 1 | 150 | - | - | 1 | 150 |
| Spain | 68 | 43 663 | 46 | 28 729 | 47 | 25 077 | 79 | 49 027 | 240 | 146 496 |
| Sweden | 120 | 18 396 | 44 | 13 855 | 52 | 16 076 | 91 | 18 721 | 307 | 67 048 |
| United Kingdom | 749 | 157 299 | 309 | 203 571 | 180 | 37 642 | 364 | 80 078 | 1 602 | 478 589 |
| **Total** | **1 997** | **715 163** | **900** | **455 390** | **752** | **265 044** | **1 304** | **388 029** | **4 953** | **1 823 626** |

The United Kingdom (UK) accounts for more than 26% of the total equity issued and 32% of the number of SEOs undertaken, while Spain has the highest mean issue size over the full sample period. The geographical distribution of SEOs seems to be relatively stable over the sample period. UK, France and Germany accounts for approximately two-thirds of the equity issues over the full period. This changes relatively little in the financial crisis (2007-2009) and the European sovereign debt crisis (2010-2012). However, we observe few SEO announcements in eastern European countries like Croatia, Lithuania, Romania, Serbia, and Slovenia. While it is possible that equity issuance activity has been low in these countries during our sample period, the SDC database may have failed to register deals in these countries.

### 6.2 Supportive Analysis

In the analysis on bid-ask spreads, we use the same sample of companies as outlined in chapter 6.1. The relative bid-ask spreads were determined by subtracting the closing bid price from the closing ask price, divided by the closing price. We used a pre-event window of (-10, -6) days prior to the offering to measure the average relative bid-ask spread for each company.

In the logistic analysis, we look at an index of issuing and non-issuing European companies. The sample of European companies has been based upon the constituent companies in the Deutsche Börse's STOXX Europe 600 index each quarter from the fourth quarter of 1999 until the end of 2016. The index consists of of 600 small, medium, and large capitalization companies across 17 countries in the European region, and is designed to mirror the European stock market. We removed Switzerland from the sample, as to match the selection criteria used in the SDC database. Data containing ISIN number, country, industry, and currency code was gathered from Datastream. Using time series for currencies and market capitalization in local terms from Datastream, we converted the market capitalization of all companies to USD, using the latest available information at the end of each quarter. The industries were categorized in the groups of unregulated companies, banks and regulated non-banks using the same selection criteria as in chapter 6.1. The panel data was then matched with our data on event dates from SDC using the ISIN numbers of the respective companies, so to determine which companies announced an equity offering in the respective quarters. Moreover, accounting data was gathered from Compustat and matched by using each respective company's ISIN number.

# 7 Conceptual Framework of Analysis

The analysis draws upon the hypotheses related to asymmetric information and signaling effects of financing decisions outlined in chapter 4.2.1, and the previous empirical studies introduced in chapter 4.2.2. The analysis will follow a "specific to general" approach, where we start by estimating CAR for the full sample and the three company groups, and then extend the model by including various explanatory variables. We divide the analysis into four parts. In the first part, we analyze the possible influence of explanatory variables related to firm-specific, market-specific and issue-specific characteristics on SEO announcement returns for the full sample. The second part studies cross-industry differences in CAR. The third and fourth part serves as supportive analyses, where we study cross-industry differences in bid-ask spreads and investigate differences in SEO activity by looking at both issuing and non-issuing firms in the STOXX Europe 600 index.

***SEO Announcement Returns in The Full Sample***

As we showed in chapter 6.1, SEO volumes were at high levels during some of the significant market downturns in the period 1997 to 2016. Given the findings of Choe et al. (1993) and Marinova et al. (2014), we start by controlling for the possible influence of market risk factors and financial instability on SEO announcement returns. Moreover, some of the studies outlined in chapter 4.2.2 have found a negative relation between the size of the equity offering and CAR, consistent with the theory of Miller and Rock (1985). Based on this, we include both firm-specific and issue-specific size characteristics in our model. Some studies have attributed the observed differences in SEO announcement returns between industrials and utilities to the relatively higher frequency of utility offerings. As such, we proceed by analyzing how firm's capital market activity may impact CAR, by including a variable for the number of previous equity offerings within a year. We also include a variable for the number of days since the release of the latest financial report. Lastly, the findings of Masulis and Korwar (1986) and Cornett et al. (1998) would suggest that investors make inferences based on firm's equity capitalization levels prior to SEO announcements. Therefore, we finalize our regression model by including the equity-to-assets ratio of each firm.

*The Cross-Industry Differences in SEO Announcement Returns*

In chapter 8.2, we divide our sample into unregulated firms, banks, and regulated non-banks, and study whether any potential differences in CAR can be explained by variations in firm-specific, market-specific and issue-specific characteristic across the three company groups. Moreover, we use linear predictions to estimate CAR for the company groups using fixed market-specific, firm-specific and issue-specific characteristics.

*The Cross-Industry Differences in the Pre-event Bid-ask Spread*

In chapter 8.3, we study whether pre-event bid-ask spreads differ between the three company groups analyzed in chapter 8.2. The relative bid-ask spread has been used by several researchers as a proxy for asymmetric information. As a conceptual framework, we will use the theoretical model of Glosten and Milgrom (1985), outlined in appendix A. We note that later empirical research has found evidence of a positive relationship between bid-ask spreads and asymmetric information (Glosten & Harris, 1988). Furthermore, the framework is supported by Brooks and Patel (2000) and Gregoriou, Ioannidis and Skerratt (2005) who argue that market makers will protect themselves from informed traders by increasing spreads prior to new information releases.

*The Cross-Industry Differences in SEO Activity*

In chapter 8.4, we analyze the SEO activity of constituent companies in the STOXX Europe 600 index each quarter from the fourth quarter of 1999 to the fourth quarter of 2016. The purpose of the analysis is to investigate the market-specific and industry-specific conditions that have affected issuing and non-issuing unregulated and regulated firms in the sample period. In addition, a fixed effects logistic regression will be used to bring insight into the potential determinants of an SEO announcement for the different company groups.

# 8 Results and Discussion

## 8.1 SEO Announcement Returns in the Full Sample

We examine the impact of 4,953 SEO announcements made by 2,432 firms on stock prices during the period January 1997 to January 2017. We note that the most extreme 1 % observations in the bottom and top distribution of CAR have been removed from the sample used in chapter 8.1, 8.2 and 8.5. Table 8.1 displays the mean cumulative abnormal return (CAR) in the event window of (-5, 5) days for the full sample and the previously defined company groups. For the full sample, we find a mean CAR of -1.65%, significant at the 1% level.

**Table 8.1: OLS Regression on CAR (-5, 5)**

| | Full sample | Unregulated | Banks | Reg. Non-banks |
|---|---|---|---|---|
| Constant | 0.0165*** | -0.0154*** | 0.0256*** | 0.0167*** |
| | (0.00130) | (0.00159) | (0.00416) | (0.00243) |
| Number of SEOs | 4,953 | 3,682 | 430 | 841 |
| Number of SEOs with CAR>0 | 1,933 | 1,471 | 155 | 307 |
| Number of Firms[10] | 2,432 | 1,969 | 143 | 344 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

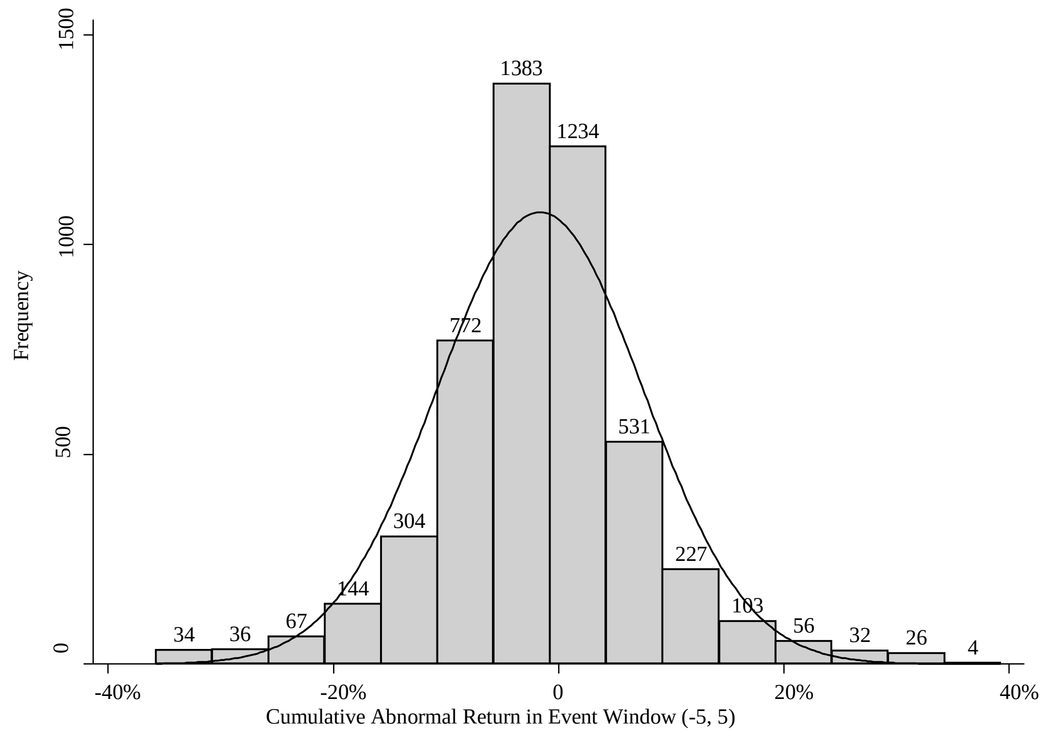
The table shows the results from an ordinary least squares regression on CAR for the full sample and the three company groups in the event window (-5, 5).

While the average negative stock price reaction could be consistent with the signaling effects theorized by Myers and Majluf (1984), other theories outlined under the *negative price reaction hypothesis* in chapter 4.2.1 may also explain the observed results. The results in table 8.1 are consistent with previous empirical research, such as Asquith and Mullins (1986) and D’Mello et al. (2003), who find average SEO announcement returns of -2.7% and -1.2%, respectively. We note that banks and regulated non-banks have on average more negative announcement returns than unregulated companies. Moreover, the CAR of these companies exhibit a higher standard error than unregulated companies, suggesting that the variation in observed announcement returns

[10] We note that the SIC codes of some firms have changed over the course of our sample period, resulting in changes in company categorizations. Thus, the sum of the number of firms in the three company groups is higher than the number of firms in the full sample.

may be greater. Even so, more of the observations in the unregulated group exhibit a positive CAR. We will discuss the differences between the company groups in chapter 8.2. Figure 8.1 depicts a histogram of CAR, and suggests that the distribution of returns is negatively skewed as relative to a normal distribution.

**Figure 8.1: Histogram of CAR (-5, 5)**

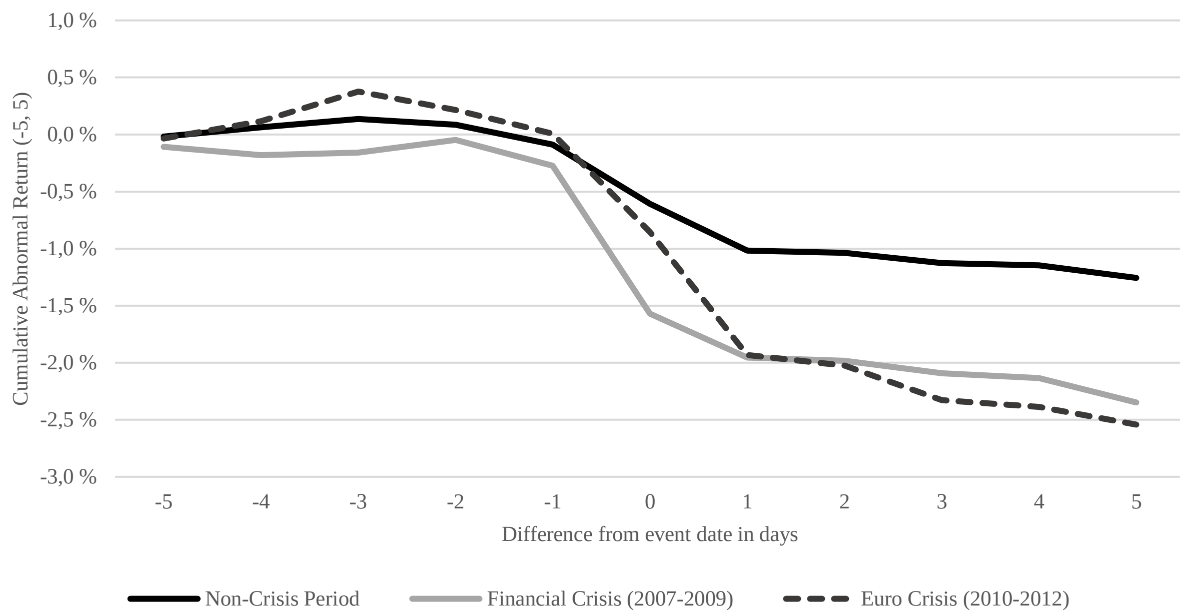



The figure shows a histogram over the 4,953 observations of cumulative abnormal return (CAR) in the event window (-5, 5) with 5 % bin width and a normal curve.

### *The Impact of Market Risk and Financial Instability on SEO Announcement Returns*

Figure 8.2 indicates that equity offerings made public during periods of financial crisis have more immediate and absolute negative announcement returns.

**Figure 8.2: Mean CAR Around the Event Date, by Period**




The figure shows the mean cumulative abnormal return (CAR) on the different days in the event window (-5, 5) for SEOs announced during non-crisis periods, the financial crisis and the Euro crisis.

This is reinforced by table 8.2 (1), which suggests that CAR is more negative for SEOs undertaken during crisis periods and for SEOs by firms whose country of domicile does not have an investment grade sovereign debt rating. Moreover, table 8.2 (2) suggests that CAR is negatively related to pre-event market volatility and pre-event stock run-up[11]. Notably all variables are statistically significant on at least a 5 % level. Yet, the second model in the table seems to be more properly specified, as we observe an incremental increase in explanatory power[12]. Moreover, indicator variables for time periods are likely to also capture other time effects, which may distort inferences.

[11] We attempted to use one-year market run-up as an explanatory variable. However, this variable was replaced with one-year stock run-up, due to multicollinearity issues. We refer to table D1 in the appendices for a correlation matrix.
[12] We note that the increase in $R^2$ may be attributed to less variability in CAR due to a smaller sample.

**Table 8.2: OLS Regressions on CAR (-5, 5) – Market Risk and Financial Instability**

| | (1) | (2) |
|---|---|---|
| Financial Crisis (0/1) | -0.0114*** | |
| | (0.00377) | |
| Euro Crisis (0/1) | -0.0126*** | |
| | (0.00374) | |
| Non-Investment Grade Sovereign Debt Rating (0/1) | -0.0297** | -0.0409** |
| | (0.0133) | (0.0183) |
| Annualized Market Volatility (-71, -11) | | -0.0596** |
| | | (0.0233) |
| Stock Run-up (-262, -11) | | -0.00286** |
| | | (0.00136) |
| Constant | -0.0121*** | -0.00534 |
| | (0.00153) | (0.00449) |
| | | |
| Number of SEOs | 4,953 | 2,489 |
| Number of Firms | 2,432 | 1,112 |
| R-squared | 0.005 | 0.008 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from ordinary least squares regressions on CAR for the full sample in the event window (-5, 5), with explanatory variables related to market risk and financial instability[13].

The crisis years of 2007-2009 and 2010-2012 were marked by heightened market volatility, increased risk premiums, decreasing asset prices, illiquidity in financial markets, slow or negative GDP growth and general financial instability. The elevated market volatility during times of crisis may reflect greater disparity among market participants on the outlook of the economy itself. Conversely, Choe et al. (1993) suggest that there will be more uncertainty about the individual firms' assets-in-place and investment opportunities in crisis periods. Moreover, increases in risk premiums and illiquidity is likely to increase costs of capital, resulting in reluctance or delay in investment decisions. As such, equity offerings announced during financial crisis may be more likely to signal *bad news* about assets-in-place and the firm's investment opportunities, consistent with the observed coefficients in table 8.2 (1). However, the negative relationship between stock run-up and CAR seems to be inconsistent with the theory that indirect equity issuance costs are lower in business cycle peaks (Choe et al., 1993). A possible interpretation is that stocks with

[13] A correlation matrix in table D1 in the appendices suggests that the indicator variables for the crisis periods and the variable for market volatility should not be included in the same model, which is reinforced by a regression on the pre-event market volatility in table D2.

large pre-event run-ups are more likely to signal overvaluation. Overall, both model 8.2 (1) and 8.2 (2) suggests that increased market risk and financial instability has a negative impact on CAR.

### *The Impact of Offering and Firm Size on SEO Announcement Returns*

Table 8.3 (1) and table 8.3 (2) indicate that both the size of the offering and the market capitalization of the firm is negatively related to CAR. On the other hand, table 8.3 (3) shows that the relative size of the offering, defined by the offering size to the pre-event market capitalization, is positively related to CAR. However, this relationship is not statistically significant[14]. We note that the model in table 8.3 (1) has the highest explanatory power. Moreover, it is the only model where all explanatory variables are statistically significant on at least a 5% level.

**Table 8.3: OLS Regressions on CAR (-5, 5) – Offering and Firm Size**

| | (1) | (2) | (3) |
|---|---|---|---|
| Offering Size in bn. USD (log-transformed) | -0.00550*** | | |
| | (0.00135) | | |
| Market Cap. in bn. USD (-20) (log-transformed) | | -0.00241** | |
| | | (0.00115) | |
| Relative Size (-20) | | | 0.00485 |
| | | | (0.01000) |
| Non-Investment Grade Sovereign Debt Rating (0/1) | -0.0372** | -0.0401** | -0.0407** |
| | (0.0179) | (0.0182) | (0.0183) |
| Annualized Market Volatility (-71, -11) | -0.0589** | -0.0637*** | -0.0638*** |
| | (0.0231) | (0.0233) | (0.0238) |
| Stock Run-up (-262, -11) | -0.00272** | -0.00251* | -0.00260* |
| | (0.00138) | (0.00136) | (0.00135) |
| Constant | -0.0154*** | -0.00313 | -0.00622 |
| | (0.00494) | (0.00479) | (0.00452) |
| | | | |
| Number of SEOs | 2,489 | 2,489 | 2,449 |
| Number of Firms | 1,112 | 1,112 | 1,107 |
| R-squared | 0.015 | 0.010 | 0.008 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from ordinary least squares regressions on CAR for the full sample in the event window (-5, 5), with explanatory variables related to market risk, financial instability, offering size, firm size, and relative size. Relative size is defined as the size of the offering to the market capitalization 20 days before the offering.

[14] Notably, the explanatory variables for size in table 8.3 (1) and 8.3 (2) are log-transformed, suppressing outliers. The authors attempted to log-transform the variable for relative size as well, but the significance of the variable did not change in any notable way.

The negative coefficient of the log-transformed variable for offering size in table 8.3 (1) supports the theory of Miller and Rock (1985) that the size of the offering is inversely related to SEO announcement returns. However, if transaction costs increase with offering size, as suggested by Asquith and Mullins (1986), this relationship may be spurious. While we recognize this pitfall, we are unable to reliably control for transaction costs due to the size and age of our sample. Moreover, we fail to control for whether the offering is "larger than expected", as per Miller and Rock's suggestion.

The negative coefficient for market capitalization in table 8.3 (2) is somewhat curious. Larger companies tend to be more closely monitored by the market and may have longer operating histories, which may implicate that there is less information asymmetry between firm managers and the market. At the same time, smaller companies may have greater growth prospects at the time of the SEO and thus correspondingly greater motives for issuing equity. Walker and Yost (2008) find evidence that the market reacts more favorably to SEOs where the purpose of the proceeds is specified prior to the offer. The quality of the intended use of funds may be greater for smaller companies pursuing value-enhancing growth opportunities than for larger companies with limited investment opportunities. In line with this reasoning, the need for external equity financing may be lower for larger companies, leading to greater adverse selection costs. In addition, the agency costs of free cash flow, as theorized by Jensen (1986), may be more severe for larger companies than for smaller ones, supporting the negative coefficient for firm size in model 8.3 (2). On the same note, we observe that 32 out of 49 of the 1 % biggest SEOs were undertaken by companies in the financial industry (of which 27 were banks), while 13 out of 49 were undertaken by utility companies. Out of these 49, we also find multiple companies that at some point in time were affected by too-big-to-fail policy. Researchers have previously linked this type of moral hazard to the presence of informational asymmetry between risk-takers and policy-makers. Thus, it would not be surprising if these issues of new equity were associated with more negative CAR.

Both table 8.3 (1) and table 8.3 (2) fail to capture the relationship between firm size and offer size[15]. An immediate solution to this problem is to look at the relative size of the offering, captured by model 8.3 (3). Table D3 in the appendices shows that the coefficient for relative size is increasingly negative as the size of the company increases, yet none of the interactions are statistically significant. Thus, whether the negative relationship between offering size and SEO announcement returns can be explained by higher transaction costs, growth opportunities, agency costs, or by signaling theories as proposed by Miller and Rock (1985), remains uncertain. Even for these imperfections, we will continue to include the various proxies for size in the rest of the analysis.

### *The Impact of Capital Market Activity on SEO Announcement Returns*

Building on the OLS regression in table 8.3 (1), we include explanatory variables related to firm capital market activity. As a measurement window for the number of previous equity offerings, we use a period of one year prior to the offering[16]. Moreover, we include a variable measuring the time since the last information disclosure prior to the SEO, which is the lowest value of the number of days since the release of the latest quarterly or annual financial report. Since reporting requirements are likely to differ significantly between the companies in our sample, we have restricted the sample to only the companies reporting on a quarterly or semi-annual basis. We note that the number of observations in the regression drops by 418 (18 %) due to this restriction. Table 8.4 suggests that CAR is positively related to both the number of previous SEOs and the number of days since the release of the last financial report. However, only the former relationship is statistically significant.

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[15] The correlation between the log-transformed proceeds in USD and the log-transformed pre-event market cap in USD is 68.21%. As such, both variables should not be utilized in the same model.

[16] The relevance of information releases is likely to diminish with the time since the information was released, supporting the use of a relatively short measurement window. This contrasts to D'Mello et al. (2003), who used the full sample period of 17 years to measure the number of previous SEOs.

**Table 8.4: OLS Regression on CAR (-5, 5) – Capital Market Activity**

| | |
|---|---|
| Number of Previous Offerings (-365, -1) | 0.00673*** |
| | (0.00244) |
| Number of Days Since Last Financial Report | 6.08e-05 |
| | (7.88e-05) |
| Offering Size in bn. USD (log-transformed) | -0.00591*** |
| | (0.00150) |
| Non-Investment Grade Sovereign Debt Rating (0/1) | -0.0387** |
| | (0.0185) |
| Annualized Market Volatility (-71, -11) | -0.0532** |
| | (0.0250) |
| Stock Run-up (-262, -11) | -0.00214 |
| | (0.00133) |
| Constant | -0.0258*** |
| | (0.00703) |
| | |
| Number of SEOs | 1,892 |
| Number of Firms | 906 |
| R-squared | 0.020 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from an ordinary least squares regression on CAR for the full sample in the event window (-5, 5), with explanatory variables related to market risk, financial instability, offering size and capital market activity.

The coefficient of the first variable in table 8.4 is consistent with the empirical findings of D'Mello et al. (2003). A possible interpretation is that each SEO announcement reduces information asymmetry, resulting in increasing CAR for subsequent SEOs. Consistent with this, Korajczyk et al. (1991) and Dierkens (1991) argue that information asymmetry is time-varying and that the market's concern over adverse selection is lower after credible information releases. However, we recognize that firm characteristics might differ between multi-issuers and single-issuers, especially over a one-year period. As captured by table 8.5, one-year multi-issuers appear to be more profitable, have marginally higher revenue growth rates, and make relatively smaller offerings than one-year single-issuers[17]. Thus, it is possible that SEOs announced by multi-issuers are more likely to signal good news. In addition, we find that regulated companies constitute a larger portion of the firms undertaking multiple equity offerings within a year.

[17] Only the difference in the latter variable is found to be statistically significant.

**Table 8.5: Firm Characteristics of Single-Issuers and Multi-Issuers**

| | One-Year Single Issuer (0) | | | One-Year Multi Issuer (1) | | | **Mean of 1 vs mean of 0** |
|---|---|---|---|---|---|---|---|
| | Mean | Median | N | Mean | Median | N | |
| Revenue Growth % (Q/Q)[i] | 8,63 % | 0,00 % | 2337 | 9,11 % | 0,32 % | 617 | 0,48 % |
| Intang. Assets % of Assets[i] | 0,30 % | 0,16 % | 928 | 0,31 % | 0,11 % | 231 | 0,01 % |
| Current Ratio[ix] | 2,04 | 1,31 | 1819 | 2,16 | 1,34 | 388 | 0,12 |
| Gross Profit Margin %[x] | 19,16 % | 42,38 % | 1761 | 26,43 % | 48,33 % | 380 | 7,27 % |
| EBIT Margin %[ix] | 5,88 % | 3,02% | 234 | 16,85 % | 5,64 % | 52 | 10,97 % |
| Cash % Assets[ix] | 13,25 % | 7,48 % | 2165 | 12,75 % | 7,34 % | 530 | -0,50 % |
| Equity % Assets[i] | 39,46 % | 37,40 % | 2599 | 40,26 % | 38,32 % | 670 | 0,80 % |
| Relative Size % (-20) | 26,01 % | 14,41 % | 2638 | 15,68 % | 8,41 % | 680 | -10,36%*** |
| *Unregulated %* | 75,73 % | - | - | 65,80 % | - | - | - |
| *Banks %* | 8,46 % | - | - | 11,40 % | - | - | - |
| *Regulated non-banks %* | 15,81 % | - | - | 22,80 % | - | - | - |

*** p<0.01, ** p<0.05, * p<0.1

The table shows firm characteristics of one-year single-issuers and multi-issuers. Variables from financial statements are gathered from Datastream. All continuous variables are represented by the latest available value prior to the SEO announcement. Relative size is the size of the offering to the market capitalization 20 days before the offering. Variables marked by *i* has been trimmed for the most extreme 1% values in the top and bottom of the distribution. Financial firms are excluded from the statistics of the variables market by [x]. The significance levels in the right-hand column are obtained from two sample t-tests, using Welch's (1947) formula and assuming that the two samples do not have equal variance.

The positive relationship between the second variable in table 8.4 and CAR runs counter to the above-mentioned research. A possible explanation is that our event window also measures the price effect from the release of financial reports, distorting the measurement of SEO announcement returns. However, in contrast to Dierkens (1991), we find no evidence that firms in our sample tend to place their equity offerings shortly after the release of financial reports. Lastly, firms may have incentives to place their offerings close to other information releases, such as dividend announcements or press releases. Because of the size of our sample, we fail to control for either.

### *The Impact of Firm Leverage on SEO Announcement returns*

In table 8.6, we expand on table 8.4 by adding a variable for firm leverage prior to the offering. The equity-to-assets ratio represents the latest available value in a financial report prior to the SEO announcement. Our results suggest that CAR increases in firm equity capitalization, but the relationship is not statistically significant.

**Table 8.6: OLS Regression on CAR (-5, 5) – Firm Leverage**

| | |
|---|---|
| Equity to Assets (lagged) | 0.0103 |
| | (0.00863) |
| Number of Previous Offerings (-365, -1) | 0.00672*** |
| | (0.00248) |
| Number of Days Since Last Financial Report | 4.66e-05 |
| | (8.02e-05) |
| Offering Size in bn. USD (log-transformed) | -0.00488*** |
| | (0.00161) |
| Non-Investment Grade Sovereign Debt Rating (0/1) | -0.0386** |
| | (0.0186) |
| Annualized Market Volatility (-71, -11) | -0.0553** |
| | (0.0255) |
| Stock Run-up (-262, -11) | -0.00233* |
| | (0.00133) |
| Constant | -0.0267*** |
| | (0.00751) |
| | |
| Number of SEOs | 1,839 |
| Number of Firms | 897 |
| R-squared | 0.021 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

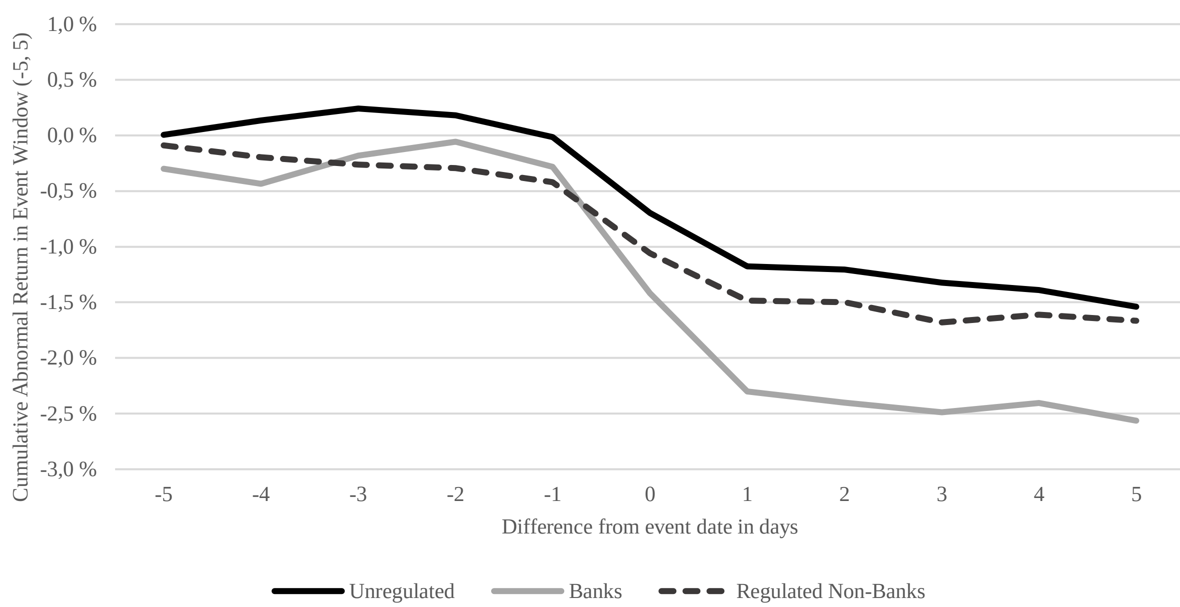
The table shows the results from an ordinary least squares regression on CAR for the full sample in the event window (-5, 5), with explanatory variables related to market risk, financial instability, offering size, capital market activity, and firm leverage.

SEOs by well-capitalized firms may be less likely to signal financial distress, and possibly more likely to signal growth opportunities. More specifically, investors may assign a higher probability that the proceeds from the offering will be used to finance value-enhancing investment opportunities that meets the required cost of capital. Moreover, Galai and Masulis (1976) argue that a reduction in leverage for heavily indebted firms may result in a wealth transfer from shareholders to debtholders. In addition, the potential for a reduction in the firm's tax shield is decreasing in an increasing equity capitalization (Kraus & Litzenberger, 1973). As such, SEOs by well-capitalized companies may be less costly to equity holders, consistent with a positive coefficient for the equity-to-assets ratio.

## 8.2 The Cross-Industry Differences in SEO Announcement Returns

Figure 8.3 displays the development in CAR for the different company categories in the event window (-5, 5). The figure suggests that banks have a more immediate and a more aggregated negative response to SEO announcements than unregulated companies. Moreover, regulated non-banks also show a more negative progress in CAR, although the difference from the unregulated companies appears to be smaller. A two-sample t-test on CAR for banks versus non-banks confirms that the difference in mean between the two company groups is statistically different from zero at a 5% level. However, the same test finds no statistically significant difference in CAR between regulated non-banks and unregulated firms[18].

**Figure 8.3: Mean CAR Around the Event Date, by Company Type**




The figure shows the mean cumulative abnormal return (CAR) for unregulated firms, banks, and regulated non-banks during the full sample period on the different days in the event window (-5, 5).

As we have seen so far in our analysis, there are indications that both firm-specific, market-specific, and issue-specific variables could explain some of the variation in CAR. We would therefore warn against making inferences from the two-sample t-test and figure 8.3, as they disregard the influence of explanatory variables related to such characteristics. Table 8.7 divides

[18] We refer to table D4 and table C5 in the appendices, respectively.

the sample into the previously defined groups and includes the same explanatory variables as in table 8.6, apart from offering size, which has been replaced with market capitalization. We have included regressions with offering size and relative size in table D5 and D6 in the appendices.

**Table 8.7: Cross-Industry OLS Regressions on CAR (-5, 5)**

| | Unregulated | Banks | Reg. Non-banks |
|---|---|---|---|
| Non-Investment Grade Sovereign Debt Rating (0/1) | -0.0220 | -0.0505 | -0.0482*** |
| | (0.0286) | (0.0361) | (0.0143) |
| Annualized Market Volatility (-71, -11) | -0.0409 | -0.0572 | -0.0689** |
| | (0.0364) | (0.0790) | (0.0334) |
| Stock Run-up (-262, -11) | -0.00309** | -8.70e-05 | 0.00979 |
| | (0.00138) | (0.00471) | (0.00649) |
| Market Cap. in bn. USD (-20) (log-transformed) | -0.00280 | -0.00317 | 0.00250 |
| | (0.00187) | (0.00448) | (0.00244) |
| Number of Days Since Last Financial Report | 0.000111 | -0.000162 | -8.38e-05 |
| | (0.000108) | (0.000235) | (0.000112) |
| Number of Previous Offerings (-365, -1) | 0.00529 | 0.0191** | 0.00742** |
| | (0.00353) | (0.00788) | (0.00356) |
| Equity to Assets (lagged) | 0.0129 | 0.0272 | 0.0118 |
| | (0.0109) | (0.168) | (0.0160) |
| Constant | -0.0217** | -0.0118 | -0.0179 |
| | (0.0103) | (0.0281) | (0.0138) |
| Number of SEOs | 1,236 | 220 | 383 |
| Number of Firms | 658 | 78 | 166 |
| R-squared | 0.011 | 0.056 | 0.064 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows a comparison of results between unregulated firms, banks and regulated non-banks from ordinary least squares regressions on CAR in the event window (-5, 5) with explanatory variables related to market risk, financial instability, stock run-up, company size, capital market activity, and firm leverage.

Overall, table 8.7 seem to suggest that some of the cross-industry differences in CAR can be explained by variations in the above explanatory variables. However, most of the variables do not exhibit statistical significance. Interestingly, the model for unregulated companies have a much lower explanatory power despite a larger number of observations. While this may be a result of heterogeneity within the sub-samples, we also note that insufficient variation in certain explanatory variables may compromise statistical significance.

### *Market Risk and Financial Instability*

We observe a negative relationship between the explanatory variables for market volatility, financial instability and stock run-up, and the dependent variable CAR (-5, 5) for almost all company categories. Notably, the sign and size of the coefficients do not change markedly from what we observed in table 8.6 in chapter 8.1. The exception is regulated non-banks, whereas the coefficient for stock run-up is positive. However, only three of the coefficients are statistically significant. Markedly, regulated companies, and especially financial companies, were at the epicenter of both the financial crisis of 2007-2009 and the Euro crisis of 2010-2012. Notably, banks and regulated non-banks in our sample are much more levered than unregulated companies[19]. Thus, it is possible that regulated companies were more adversely affected by the heightened market volatility in our sample period compared to unregulated companies. Table C5 in the appendices shows that the one-year market volatility prior to the SEO announcements is higher for banks than for regulated non-banks, and higher for regulated non-banks than for unregulated firms[20]. At the same time, banks were more exposed to locally depressed economies compared to unregulated companies. In fact, 5.35% of all bank SEOs over the sample period were undertaken by banks whose country of domicile did not have an investment grade sovereign debt rating, while the same number for unregulated firms and regulated non-banks is 1.09% and 1.19%, respectively. Moreover, 43.49% of the SEOs by banks in locally depressed economies were undertaken during the Euro crisis, compared to 20% and 10% for unregulated firms and regulated non-banks. Table 8.8 shows that SEOs announced by regulated firms, and especially banks, in locally depressed economies are associated with substantially more negative stock price reactions.

[19] The differences in the mean values of the equity-to-assets ratio are statistically significant at a 1% level between all company groups. We refer to table C5 in the appendices.

[20] The table also shows that the differences in the one-year market volatility between the three company groups are statistically significant.

**Table 8.8: OLS Regressions on CAR (-5, 5) by Financial Stability in Country of Domicile**

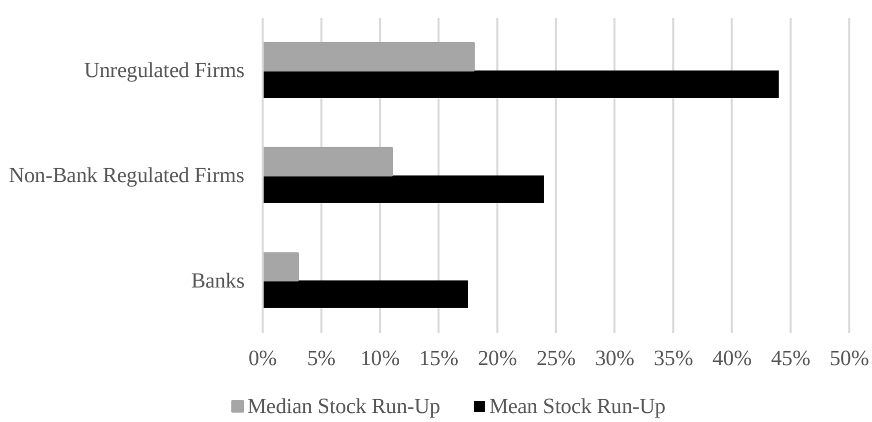
| | Unregulated | Banks | Regulated non-banks |
|---|---|---|---|
| ***Non-Investment Grade Sovereign Debt Rating*** | | | |
| Constant | -0.0264 | -0.0737** | -0.0539*** |
| | (0.0170) | (0.0287) | (0.0164) |
| Number of SEOs | 40 | 23 | 10 |
| Number of Firms | 30 | 13 | 5 |
| ***Investment Grade Sovereign Debt Rating*** | | | |
| Constant | -0.0153*** | -0.0229*** | -0.0162*** |
| | (0.00160) | (0.00405) | (0.00244) |
| Number of SEOs | 3,642 | 407 | 831 |
| Number of Firms | 1,947 | 141 | 341 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows a comparison of results between unregulated firms, banks and regulated non-banks from ordinary least squares regressions on CAR in the event window (-5, 5), based on whether the issuing firms are domiciled in a country with investment grade sovereign debt rating or not.

Our sample also suggests that regulated firms to a smaller extent issue equity succeeding periods with strong stock performance. Figure 8.4 shows the mean and median 251-day stock run-up prior to SEO announcements for the three groups of firms.

**Figure 8.4: Mean and Median Stock Run-up for Each Company group**




The figure shows the mean and median 251-day stock run-up (-262, 11) for unregulated firms, regulated non-banks, and banks.

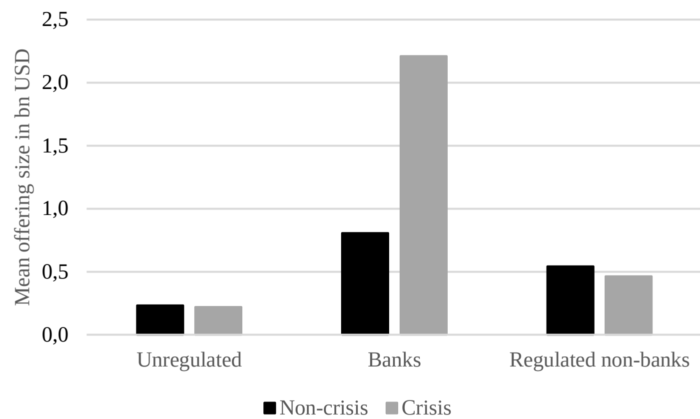
In chapter 8.1 we argued that stock run-up possibly could be related to business cycles. However, in reviewing the differences between the groups we also acknowledge that investors may make different inferences from the firm's stock run-up at the time of the SEO announcement. In some regulated industries, SEOs can be coerced by regulators. Thus, managers of regulated firms could be forced to undertake SEOs even though they perceive their stock to be undervalued. Knowing this, investors may be less likely to infer overvaluation from the SEO announcements by regulated companies. At the same time, we acknowledge that our sample period could be characterized by poor stock performance for firms in regulated industries. In fact, there may be insufficient variation in the pre-event stock returns of regulated companies to make accurate statistical inferences. Thus, it is not surprising that the coefficient of this variable in table 8.7 lacks statistical significance for banks and regulated non-banks.

***Firm and Offering Size***

In table 8.7, we observe that announcement returns are negatively related to the market capitalization of the firm for unregulated companies and banks, but not for regulated non-banks. Notably, the coefficient of the former two is close to what we found in table 8.3 in chapter 8.1. However, the variable is not statistically significant for either of the company types. As we described in chapter 6, regulated firms have larger pre-event market capitalizations. In chapter 8.1 we argued that the relationship between announcement returns and market capitalization may be somewhat ambiguous. While larger companies are more closely followed by market participants and have longer operating histories, the motives for issuing additional equity may be weaker for larger companies. In addition to this, larger banks may have a riskier product mix and be more integrated in international financial markets. Thus, it is plausible that the exposure to fragility in the financial system increases with the size of a bank.

Expanding the discussion on firm size, we run regressions containing offering size as an explanatory variable instead of the market capitalization in table D6 in the appendices. Notably, CAR is negatively related to offering size for all company types and the relationship is statistically significant for banks and regulated non-banks. Strikingly, figure 8.5 shows that banks made substantially larger equity offerings during the two crisis periods in our sample. In contrast, regulated non-banks and unregulated companies made marginally smaller offerings in these periods.

**Figure 8.5: Mean Offering Size in bn. USD for Each Company Group**




The figure shows the mean offering size in bn. USD for each company group during crisis periods, defined as the financial crisis of 2007-2009 and Euro crisis of 2010-2012, and non-crisis periods.

It is possible that offerings made by banks in these periods were larger than expected, signaling insufficient internal cash flows, as theorized by Miller and Rock (1985). We also suspect that some of the largest issues of equity in regulated industries were undertaken in conjunction with too-big-to-fail policy. In line with this reasoning, there may be more severe adverse selection signals and larger direct issuance costs in the largest SEOs announced by regulated firms[21]. Table 8.9 shows the median offering dilution for the full sample and the different company groups, defined as the reduction in equity value as a percentage of the offering size. Interestingly, banks suffer from a substantial offering dilution in crisis periods, while the same does not hold for the other company groups. Moreover, we do not observe significant differences in offering dilution between the groups in non-crisis periods. This supports our argument that the announcement returns of banks were more adversely affected by the crisis periods.

[21] For instance, the underwriting, legal and compliance costs may have been larger for these issues of equity.

**Table 8.9: Median Offering Dilution (-5, 5)**

| | Full Sample | Unregulated | Banks | Regulated non-banks |
|---|---|---|---|---|
| Full sample period | -9,06 % | -8,25 % | -16,93 % | -9,99 % |
| | (4939) | (3668) | (430) | (841) |
| Financial crisis | -9,39 % | -8,72 % | -30,84 % | -9,95 % |
| | (897) | (663) | (92) | (142) |
| Euro crisis | -11,78 % | -11,57 % | -26,13 % | -10,45 % |
| | (750) | (561) | (54) | (135) |
| Non-crisis period | -8,23 % | -7,75 % | -11,17 % | -9,84 % |
| | (3292) | (2444) | (284) | (564) |

The table shows the median offering dilution in the event window (-5, 5) for each company group, by period. Offering dilution is defined as the reduction in equity value as a percentage of the offering size. Number of observations is given in the parentheses.

### *Capital Market Activity*

Table 8.7 shows that CAR is positively related to the number of previous offerings for the three company groups and that the relationship is statistically significant for the regulated companies. Table C5 in the appendices shows that regulated entities on average tend to undertake a larger number of offerings within a one-year period, statistically significant at a 1 % level. The higher frequency of equity offerings may be a result of regulatory coercion or limited internal-financing abilities. Another interpretation is that regulated firms have better incentives to make multiple equity offerings. Our results are consistent with Masulis and Korwar (1986) and D'Mello et al. (2003), who attribute lower indirect equity issuance costs for regulated firms to a relatively higher offering frequency. To provide further insight, we test whether the mean CAR for each company group is statistically different from zero for each equity offering within a one-year period. The variable "Sequence of Offerings in One Year (365 days)" takes the value of 1 for the first offering during a year, the value of 2 for the second offering by the same firm within a year, and so on. We note that no explanatory variables are used in the regression. For the sake of statistical inference, we group all observations that exceed a fourth offering in the one-year sequence. Our results in table 8.10 indicate that CAR increases with the sequence for most of the company groups, but that the effect is reversed when the sequence of offerings becomes substantially large. A possible interpretation of the latter is that many equity offerings within a short window signal information about insufficient internal cash flows or solidity issues. Still, as we mentioned in chapter 8.1, multi-issuers may have different firm characteristics than single-issuers. As such, the above relationship could be a result of omitted variable bias. However, we note that CAR is not statistically significant for higher sequences, possibly because of a small sample size.

**Table 8.10: OLS Regression on CAR (-5, 5) for Each Issue in the One-Year Sequence**

| Sequence of Offerings in One Year (365 days) | Unregulated | Banks | Regulated Non-banks | Full Sample |
|---|---|---|---|---|
| 1 | -0.01640*** | -0.02702*** | -0.01847*** | -0.01759*** |
| | (3011) | (323) | (613) | (3947) |
| 2 | -0.00971** | -0.03187*** | -0.01246** | -0.01264*** |
| | (534) | (83) | (158) | (775) |
| 3 | -0.01268* | 0.00638 | -0.00926 | -0.00953* |
| | (105) | (20) | (44) | (169) |
| 4+ | -0.02458 | 0.05574 | -0.01232 | -0.01426 |
| | (32) | (4) | (26) | (62) |
| Total | -0.01540*** | -0.02563*** | -0.01667*** | -0.01650*** |
| | (3682) | (430) | (841) | (4953) |

Number of observations in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from ordinary least squares regressions on CAR for the full sample and the three company groups in the event window (-5, 5), over the different offering sequences in one year (365 days).

Table 8.7 also shows that the coefficient for "Number of Days Since Last Financial Report" is negative for banks and regulated non-banks, but positive for unregulated companies. Yet, the coefficients are not statistically significant for either group. Furthermore, we fail to find statistically significant differences in the mean values of the variable between the company groups[22]. As mentioned in chapter 8.1, an interpretation for a negative relationship is that information asymmetry is lower in periods succeeding credible information releases, which may result in less negative SEO announcement returns. However, there might exist other credible information releases in interim periods that we fail to control for, distorting the relationship.

[22] We refer to table C5 in the appendices.

***Firm Leverage***

The coefficient for the equity-to-assets variable in table 8.7 resembles what we found in table 8.6 in chapter 8.1. We note that the mean equity to assets ratio prior to the offering is 6.6% and 34.3% for banks and regulated non-banks, respectively. The same ratio for unregulated firms stands at 44.9 %. The role of banks in liquidity transformation allows for much more levered capital structures. As for regulated non-banks, several regulated non-financial industries are marked by stable cash flows and lower expected losses given default, which may implicate higher optimal debt levels. In chapter 3, we also pointed out several other advantages to debt that may be specific to regulated companies. Firstly, debt may have unique control functions for regulated companies that limits agency costs (Diamond & Rajan, 2001) (Bortolotti et al., 2011). Secondly, some regulated firms may have incentives to increase leverage to induce regulators to increase product prices. In addition, deposit insurance schemes of banks and insurance companies may encourage increased risk-taking through leverage. In fact, Merton (1977) have argued that an increase in the ratio of equity may reduce the option value of the implicit deposit insurance guarantee for banks. As a result, the indirect costs of an equity offering may decrease with the equity capitalization of a regulated firm.

We note that the standard error of the equity-to-assets ratio is substantial for banks. In fact, a negative coefficient is within one standard deviation from the mean. We should not exclude the possibility that investors make stronger inferences from the pre-event equity-to-assets levels of regulated firms. For instance, SEOs by banks that do not comply with capital requirements may be more anticipated by the market, so that the announcement constitute less news. Non-compliant financial firms are also more likely to be coerced by regulators to issue new equity, and the announcement could therefore be less likely to signal overvaluation. The latter two explanations would imply a negative relationship between CAR and equity-to-assets for banks. The large standard error of banks may reflect the variation in potential investor inferences[23].

[23] Interestingly, table D7 in the appendices suggests there is a non-linear relationship between CAR and the capital adequacy ratio of banks. In fact, the regression suggest CAR is negatively related to the capital adequacy ratio of banks for ratios below 9.61 %.

### *Adjusted Linear Predictions of CAR*

The analysis in chapter 8.2 indicates that some of the differences in announcement returns between regulated and unregulated firms may be explained by variations in market-specific, firm-specific, and issue-specific characteristics. In table 8.11, we assign a set of fixed characteristics to the sample observations within the three categories. We assign equal values to the variables for market capitalization and annualized market volatility across the three company categories, as to remove cross-industry differences. Furthermore, we eliminate the effects related to previous offerings, information disclosure, financial instability and stock run-up by assigning zero to these variables for each category.

**Table 8.11: Fixed Characteristics in Linear Prediction**

| | Unregulated | Banks | Reg. Non-banks |
|---|---|---|---|
| Equity to Assets (lagged) % | 50,0 % | 5,0 % | 50,0 % |
| Number of Previous Offerings (-365, -1) | 0 | 0 | 0 |
| Number of Days Since Last Financial Report | 0 | 0 | 0 |
| Market Cap. in bn. USD (-20) | 5,0 | 5,0 | 5,0 |
| Non-Inv. Grade S. Debt Rating (0/1) | 0 | 0 | 0 |
| Annualized Market Volatility (-71, -11) % | 20 % | 20 % | 20 % |
| Stock Run-up (-262, -11) % | 0 % | 0 % | 0 % |

The table shows the fixed characteristics used in linear prediction of CAR for unregulated firms, banks, and regulated non-banks.

Using these fixed characteristics, we run a linear prediction based on our model in table 8.7. The linear predictions are displayed in table 8.12 and suggests that the differences in announcement returns for regulated firms are within one standard error of unregulated firms. Additionally, banks are predicted to have a broader confidence interval, reflecting the high standard errors of the various coefficients observed in table 8.7.

**Table 8.12: Linear Predictions of CAR (-5 ,5)**

| | Predicted CAR | 95 % Conf. Interval | |
|---|---|---|---|
| Unregulated | - 2.7924 % ***<br>(0.6335 %) | [-4.0352 % | -1.5496 %] |
| Banks | - 2.6958 % *<br>(1.4349 %) | [-5.5243 % | 0.1326 %] |
| Regulated Non-banks | - 2.1788 % ***<br>(0.7271 %) | [-3.6086 % | - 0.7491 %] |

The table shows the linear predictions of CAR (-5, 5) for unregulated firms, banks, and regulated non-banks with fixed characteristics, using the coefficients and standard errors from table 8.7. Delta-method standard errors are given in parentheses. Significance levels are given by *** $p<0.01$, ** $p<0.05$, * $p<0.1$, indicating whether CAR is statistically different from zero.

We note that the linear prediction in table 8.12 is based on regressions with variables that lack statistical significance. Even so, we have seen that the sign and magnitude of the coefficients in table 8.7 resemble what was found in chapter 8.1. Moreover, most of the coefficients appear to have an economically feasible interpretation.

## 8.3 The Cross-Industry Differences in Pre-Event Bid-Ask Spreads

Table 8.13 shows the mean relative bid-ask spread in the pre-event window (-10, -6) and the mean pre-event market capitalization in billion USD for the full sample and the three company groups. We note that sample used in this analysis is the same as in chapter 8.1 and 8.2. Table C5 in the appendices confirms that the differences in the pre-event bid-ask spread between regulated and unregulated companies are statistically significant at a 1% level[24].

[24] The difference in mean bid-ask spreads between banks and regulated non-banks is statistically significant at a 5% level.

**Table 8.13: Relative Bid-Ask Spread (-10, -6) and Mark Cap. in bn. $ (-20)**

| | Mean Relative Bid-Ask Spread per 100 (-10, -6) | Mean Market Cap. in billion USD (-20) |
|---|---|---|
| Unregulated | 1.329 *** | 3.68 |
| | (3595) | (3590) |
| Regulated Non-banks | 1.009 *** | 8.31 |
| | (814) | (814) |
| Banks | 0.711 *** | 15.28 |
| | (404) | (404) |
| Full Sample | 1.223 *** | 5.44 |
| | (4813) | (4808) |

Number of observations in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the mean relative bid-ask spread in the pre-event window (-10, -6) and the pre-event market capitalization in USD (-20), by type of company. The sample is based on the observations that have available data on pre-event bid-ask spread.

The results from table 8.13 are consistent with the U.S. study of Li et al. (2016), which found that the average bid-ask spread 250 days prior to the announcement of an SEO was lower for banks than for non-banks, significant at a 10% level. However, our results change drastically when we control for the market capitalization, annualized stock volatility and the number of days since the release of the latest financial report in table 8.14. The model indicates that bid-ask spreads are negatively related to firm size, and positively related to stock volatility and the number of days since last information disclosure. Moreover, the constant terms of the model suggest that the intrinsic bid-ask spread may be higher for banks than for non-banks.

**Table 8.14: OLS Regressions on Average Relative Bid-Ask Spread (-10, 6)**

| | Full Sample | Unregulated | Banks | Reg. Non-banks |
|---|---|---|---|---|
| Market Cap. in bn. USD (-20) (log) | -0.00451*** | -0.00520*** | -0.00318*** | -0.00385*** |
| | (0.000209) | (0.000254) | (0.000665) | (0.000427) |
| Annualized Stock Volatility (-262, -11) | 0.000885* | 0.000722* | 0.000404 | 0.00357 |
| | (0.000483) | (0.000415) | (0.00213) | (0.00255) |
| Days Since Last Financial Report (-10) | 1.16e-05 | 1.79e-05 | -6.03e-05 | 1.37e-05 |
| | (1.20e-05) | (1.34e-05) | (5.78e-05) | (2.80e-05) |
| Constant | 0.0116*** | 0.0107*** | 0.0160*** | 0.0104*** |
| | (0.000620) | (0.000649) | (0.00328) | (0.00165) |
| Number of SEOs | 3,240 | 2,413 | 274 | 553 |
| Number of Firms | 1,726 | 1,378 | 104 | 253 |
| R-squared | 0.158 | 0.186 | 0.046 | 0.148 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from ordinary least squares regressions on the average relative bid-ask spread in the pre-event window (-10 to -6 days) with explanatory variables related to market capitalization (-20), annualized stock volatility (-262 to -11), and days since last financial report.

It is plausible that bid-ask spreads are lower for larger firms, as these firms may be more closely monitored by the market. The positive coefficient of annualized stock volatility is consistent with the reasoning of Glosten and Milgrom (1985), in that market makers hedge against losses from volatile stocks by increasing bid-ask spreads[25]. It is also consistent with previous empirical research (Brooks and Patel, 2000) (Stoll, 2000). However, the coefficients are not statistically significant for the regulated categories. As we discussed in chapter 8.1 and 8.2, information asymmetries may be lower in periods succeeding the release of financial reports. As the model of Glosten and Milgrom suggests, market makers also tend to hedge themselves against informed traders by increasing bid-ask spreads. Thus, it is conceivable that bid-ask spreads will be positively related to the number of days since last report. However, the variable is not statistically significant for either of the groups. Interestingly, the regression for the bank sample has considerably less explanatory power, suggesting that the determinants for the bid-ask spread of banks may differ from other categories. While Glosten and Harris (1988) and Brooks and Patel (2000) use bid-ask spreads as a proxy for asymmetric information, we note that other transitory

[25] We refer to appendix A for an explanation of the model by Glosten and Milgrom (1985).

effects may influence this variable. For instance, bid-ask spreads are likely to be affected by market liquidity and inventory costs for market makers, which may distort statistical inferences.

### 8.4 The Cross-Industry Differences in SEO Activity

The sample used in this chapter constitutes quarterly data of approximately 600 issuing and non-issuing European companies from the fourth quarter of 1999 to the fourth quarter 2016. We have excluded Switzerland from the index, so to match our sample selection with the sample used in chapter 8.2. We note that index constituents change over time and that not all companies are recurring in the index. The average marginal effects on the binary-dependent variable of "Seasoned Equity Offering Announcement (0/1)" are displayed in table 8.15 for each company classification. The standard errors are robust so to adjust for issues related to heteroscedasticity and serial correlation. Lastly, we note that all explanatory variables in the table have been lagged by one quarter.

**Table 8.15: Average Marginal Effect on Seasoned Equity Offering Announcement (0/1)**

| | Full Sample | Unregulated | Banks | Reg. Non-Banks |
|---|---|---|---|---|
| Stock Run-up (-5q, -1q) | 0.0924 % *** | 0.1354 % *** | 0.0297 % | 0.0523 % |
| | (0.0226 %) | (0.0327 %) | (0.0341 %) | (0.0417 %) |
| M. Cap. in bn. USD (-1q) | -0.3316 %*** | -0.3948 % ** | -0.2436 % ** | -0.1873 % |
| | (0.1065 %) | (0.2062 %) | (0.1129 %) | (0.1482 %) |
| Equity to Assets (-1q) | -0.4049 % *** | - 0.2489 % ** | -2.5970 % *** | -0.6181 % *** |
| | (0.1226 %) | (0.1730 %) | (0.7315 %) | (0.1119 %) |
| Observations | 13,376 | 8,500 | 2,001 | 2,875 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

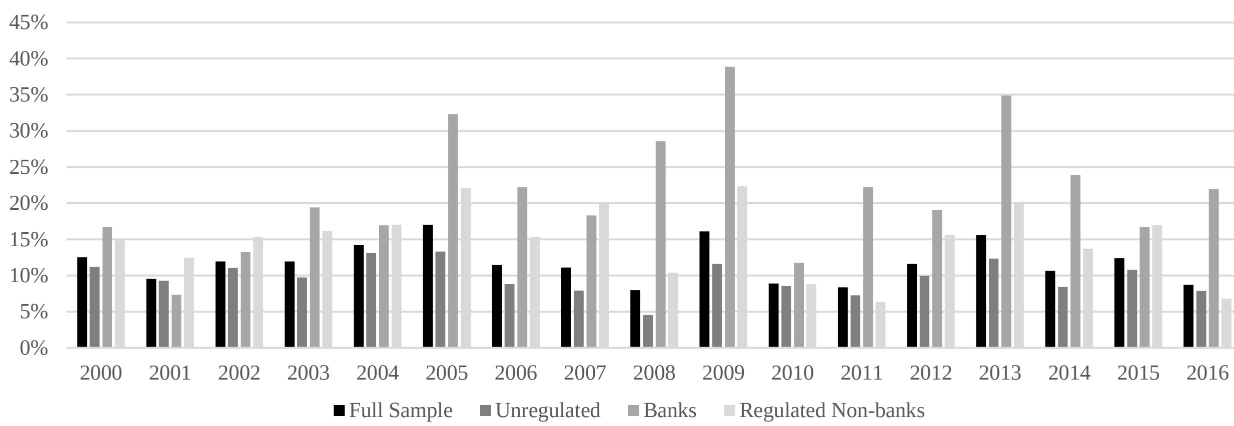
The table shows the results from a logistic regression model on the predicted average marginal effect of explanatory variables on the probability of an SEO announcement in a quarter between 2000 and 2016[26]. The marginal effects of equity to assets and stock run-up are given in one-hundreds. A correlation matrix for the explanatory variables can be found in table D9 in the appendices.

[26] 1999 is excluded from the regression due to the inclusion of one lag in the explanatory variables.

### ***Market Risk, Business Cycles and Financial Instability***

In table 8.15, we observe that stock run-up has a positive average marginal effect on the probability off issuing equity for all categories. However, the results are only statistically significant for the full sample and unregulated firms. Casual empirical observation confirms the propensity of firms to issue at market peaks. Figure 8.6 shows the percentage of total companies in the sample announcing one or more SEOs in each year between 2000 and 2016, by company group. Noticeably, the equity issuance activity for the full sample was particularly high in 2005, at which point there had been three consecutive years of double-digit returns in European equity markets[27].

**Figure 8.6: Annual Percentage of Companies Issuing Equity**




The figure shows the percentage of total constituent companies as of fourth quarter in each group that have announced an SEO during the year, between 2000 and 2016.

This observation is consistent with Choe et al. (1993), in that companies may prefer to issue equity in favorable business cycles, as adverse selection costs may be lower in such periods. However, crisis periods also left its mark on equity issuance activity. Strikingly, 38.9 % of the banks in the index issued equity in 2009. At the same time, we observe that only 11.6 % of the European unregulated companies announced an SEO in the same year. As pointed out in chapter 8.1, adverse selection costs could increase in periods marked by financial distress, making it costlier for companies to issue equity. Thus, it may be value-maximizing for companies to delay the issuance

[27] We refer to table C6, C7 and C8 in the appendices for the Y/Y stock performance of the three company groups, by year.

until markets recover and asymmetric information is reduced. At the same time, financial distress in financially unstable periods or financial unstable economies may prompt a capital need. As discussed in chapter 8.2, this may be particularly true for regulated firms. Firstly, these companies are more financially leveraged and possibly more sensitive to systematic risk, causing them to be more adversely affected by economic downturns. Secondly, regulators are likely to step in when equity buffers become too low.

**Table 8.16: Percentage of Companies Domiciled in Financially Unstable Countries**

| Year | Unregulated | Banks | Regulated Non-Banks |
|---|---|---|---|
| 1999 - 2009 | - | - | - |
| 2010 | 0,5 % | 7,8 % | 2,2 % |
| 2011 | 0,2 % | 2,2 % | 1,1 % |
| 2012 | 1,0 % | 4,8 % | 1,0 % |
| 2013 | 1,0 % | 4,7 % | 1,9 % |
| 2014 | 1,0 % | 10,9 % | 1,0 % |
| 2015 | 1,0 % | 2,4 % | 1,0 % |
| 2016 | 0,7 % | 0,0 % | 0,0 % |
| Total | 0,3 % | 1,5 % | 0,5 % |

The table shows the percentage of companies domiciled in financially unstable countries, as defined by whether the country has investment-grade sovereign debt or not. The credit ratings are gathered from Standard & Poor's.

As detailed by table 8.16, sovereign financial instability was profound during the Euro crisis of 2010-2012. This period was marked by low equity issuance activity, also for banks. It is likely that the financial flexibility of banks and other regulated companies was better in this period, as substantial equity capital was issued by these companies in 2008 and 2009. Moreover, several European banks obtained liquidity assistance by national governments and the European Central Bank during the Euro crisis, reducing the need for additional equity (van Rixtel & Gasperini, 2013).

### *Firm Size*

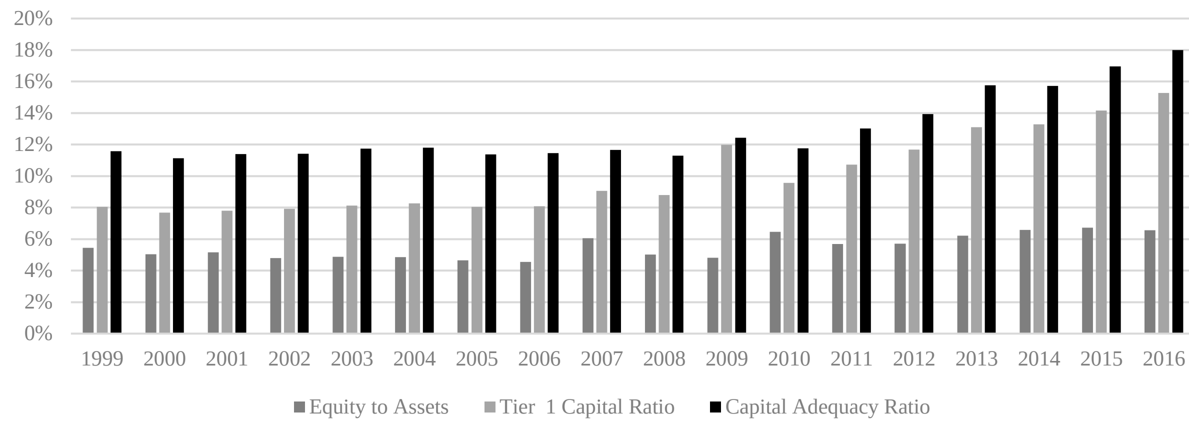
In table 8.15, market capitalization has a negative average marginal effect on the probability of issuing for all company groups. However, the coefficient is not statistically significant for regulated non-banks. A negative marginal effect is consistent with the interpretation that larger companies have weaker motives for issuing equity. As for banks, it is plausible that larger banks are more exposed to fragility in the financial systems and thus could have a greater capital need under certain circumstances. Moreover, some national regulators impose additional capital requirements for large and systematically-important banks, which might prompt a need for additional equity capital.

### *Firm Leverage*

The negative marginal effect of the equity-to-assets ratio in table 8.15 is consistent with the interpretation that the need for additional equity capital is lower for less levered firms. This likely implicates that investors expect some offerings more than others based on pre-event equity capitalization levels, which may explain the ambiguity of the equity-to-assets ratio in chapter 8.2. At the same time, the costs of undertaking an equity offering may be lower for some well-capitalized firms. As we pointed out in chapter 8.2, debt may have a distinct value for regulated firms. Consistent with the findings on European utilities by Bortolotti et al. (2011), we find that the mean equity capitalization of banks and regulated non-banks in the sample decreased with 14.5 % and 18.8 %, respectively, between 1999 and 2005. We fail to find a similar development for unregulated firms in the same period. The equity-to-assets ratio of regulated firms have since steadily increased, which may suggest that incentives to hold debt have changed[28]. However, we cannot disregard that changes in industry weights may have influenced these numbers. As displayed in figure 8.7, we also find that the mean tier 1 capital ratio of banks in the index have increased by 91.3 % between 1999 and 2016, while the equity-to-assets ratio have only increased by 22.2 %. This may suggest that banks in the sample have been reluctant to issue more equity in the period, and that the solidity of European banks has increased predominantly through decreases in risk-weights[29]. The finding is consistent with what Cohen and Scatigna (2014) found for large European banks between 2009 and 2012.

[28] We refer to table C6, C7, and C8 in the appendices for the equity-to-assets ratio for the firm categories, by year.
[29] The mean asset risk-weight of the sample in figure 8.7 has decreased from 67.5 % in 1999 to 43 % in 2016.

**Figure 8.7: Mean Capital Adequacy and Equity-to-Assets Ratio of Banks, by Year**




*N* *24* *25* *33* *32* *31* *34* *36* *28* *8* *7* *8* *9* *41* *38* *32* *41* *39* *25*

The figure shows the mean equity-to-assets ratio and mean capital adequacy ratio of banks in the index as of Q4, between 2000 and 2016. The data is gathered from financial statements in Compustat. Only observations where data are available for all variables are displayed. *N* refers to the number of firms[30].

### *Firm Profitability and Investment Opportunities*

Table C6 and C8 in the appendices demonstrates that the operating profitability of unregulated firms and regulated non-banks have increased between 2000 and 2016. Regulated firms, excluding financial companies, are found to have substantially larger EBIT margins and a higher growth in profitability between 2000 and 2016, compared to unregulated firms. This suggests that regulated non-banks may have better internal-financing capabilities. It is therefore curious to find that regulated non-banks have issued more equity than unregulated firms in most years of the sample period. A possible interpretation is that regulated non-banks have had better investment opportunities or are more capital-intensive. The latter is confirmed by figure 8.8, which suggests that the mean capital expenditure to assets is larger for regulated firms.

[30] We note that the number of banks reporting the capital adequacy ratio drops from 28 prior to 2007 to 7-9 between 2007 and 2010. This may be a result of measurement error or failure in matching the data between 2007 and 2010.

**Figure 8.8: Capital Expenditure to Assets %***

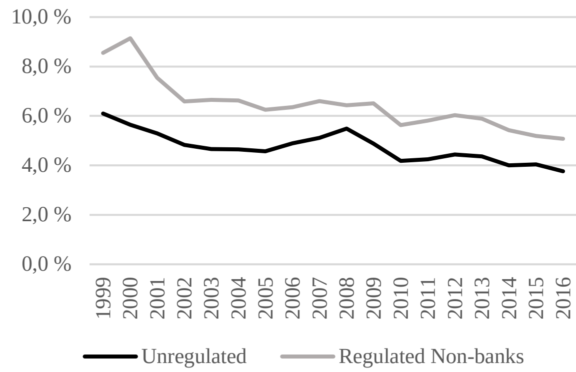



**Figure 8.9: Acquisitions to Assets %**

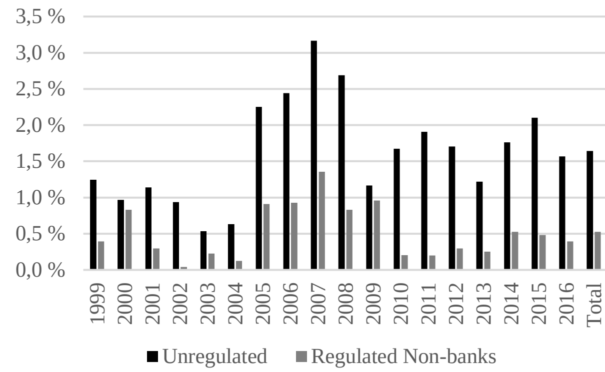



**Figure 8.10: Cash to Assets %***

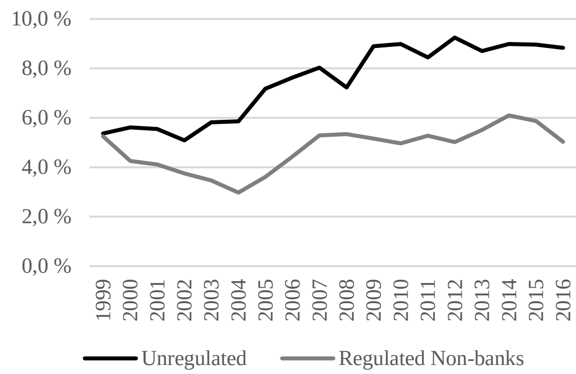
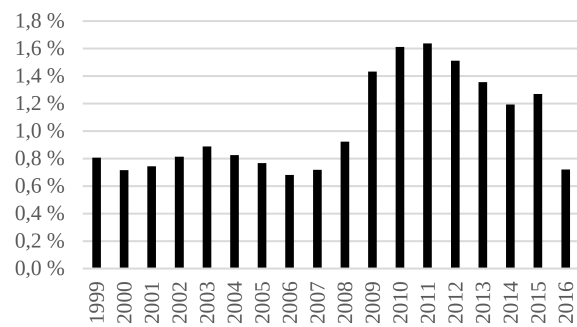



**Figure 8.11: Reserves for Credit Losses to Assets %**




Figures that are marked with (*) excludes financial firms from regulated non-banks. The data is based on annual financial statements gathered from Compustat.

At the same time, unregulated firms are found to do larger acquisitions relative to their asset values, as displayed in figure 8.9. However, both figure 8.8 and 8.9 may suggest that investment opportunities have been diminishing in recent years. Consistent with this, figure 8.10 shows that cash-to-assets has been increasing for unregulated firms and regulated non-banks since 2004. As such, it is possible that low equity issuance activity in the aftermath of the financial crisis of 2007-2009 may be partly explained by lacking investment opportunities. Another interpretation is that the business models of the sample firms have become less capital-intensive. Possibly, the industry constituents in the index have changed between 1999 and 2016. Moreover, high cash stakes may also be explained by changing tax incentives.

We also find some evidence that the internal-financing capabilities of banks may have been restricted in the sample period. As shown by table C8 in the appendices, we observe only two years with positive mean revenue growth for banks in the sample since 2008. Figure 8.11 also demonstrates that the reserves from credit losses have lingered since the outset of the financial crisis of 2007-2009. Notably, stricter capital requirements for banks were introduced at the same time as credit losses remained high. This demonstrates the constraints that the industry has faced since the financial crisis and underscores the external capital-need of banks in the sample period. We note that the logistic regressions in table 8.15 does not explicitly include variables related to firm profitability and investment opportunities, as the relevance of proxies will depend upon industry. At the same time, the stock run-up variable may capture some of the effects related to firm-specific and industry-specific investment opportunities and business cycles.

## 8.5 Robustness Test for SEO Announcement Returns

**Table 8.17: Robustness Test**

| | **(-5, 5)** | **(-2, 2)** | **(-1, 1)** |
|---|---|---|---|
| **Full Sample** | | | |
| *CAR (%)* | -1.65%*** | -1.48%*** | -1.41%*** |
| *Median (%)* | -1.53% | -1.43% | -1.26% |
| *Std. Dev* | 0.0917 | 0.0754 | 0.0680 |
| *Observations* | 4,953 | 4,953 | 4,953 |
| **Unregulated** | | | |
| *CAR (%)* | -1.54%*** | -1.45%*** | -1.36%*** |
| *Median (%)* | -1.46% | -1.46% | -1.26% |
| *Std. Dev* | 0.097 | 0.0791 | 0.0704 |
| *Observations* | 3,682 | 3,682 | 3,682 |
| **Banks** | | | |
| *CAR (%)* | -2.56%*** | -2.22%*** | -2.24%*** |
| *Median (%)* | -2.15% | -1.56% | -1.48% |
| *Std. Dev* | 0.0862 | 0.0676 | 0.0714 |
| *Observations* | 430 | 430 | 430 |
| **Regulated Non-banks** | | | |
| *CAR (%)* | -1.67%*** | -1.24%*** | -1.19%*** |
| *Median (%)* | -1.53% | -1.16% | -1.17% |
| *Std. Dev* | 0.0704 | 0.0611 | 0.0543 |
| *Observations* | 841 | 841 | 841 |

*** p<0.01, ** p<0.05, * p<0.1

The table shows a summary of findings on CAR for the full sample and the three company groups using different event windows.

Table 8.17 indicates that the SEO announcement returns tend to be less negative for shorter event windows. Notably, the regressions using the event windows (-2, 2) and (-1, 1) suggest that regulated non-banks experience less negative announcement returns than unregulated firms[31]. It is possible that the shorter event windows are unable to capture the significant effects of the SEO announcements. In fact, the models using shorter event windows exhibit lower explanatory power, and less statistically significant variables than the analysis with the (-5, 5) day event window. Even so, we see that the major findings of our analysis on the full sample and on the cross-industry differences in CAR seems to be robust for the shorter event windows.

### 8.6 Limitations of Analysis

Overall, the low explanatory power of our models suggest that we are unable to fully explain the SEO announcement effects with the utilized explanatory variables, and thus that our models may suffer from omitted variable bias. This is not surprising, as it is close to impossible to account for all factors that could influence variations in SEO announcement returns. Even though we have taken several measures to cope with the possible pitfalls and to improve the power of our analysis, we recognize that we are unable to account for them all, and that remaining statistical problems may bias our models and affect inferences. It is likely that the firms within the three company groups are heterogeneous, especially across countries with different risk exposures and regulatory regimes. This may be more profound for the sample of unregulated firms, where variations in firm-specific characteristics are larger. The firm-specific and issue-specific variables included in the cross-sectional regression in the event study should address some of these problems. Moreover, the indicator variable for non-investment grade sovereign debt rating will account for some of the heterogeneity with respect to differences in country risk. The degree to which the SEO is anticipated may also differ across firms. As pointed out in chapter 5.5.3, rational investors will often forecast the likelihood that an event will occur based on firm characteristics. This can be especially profound for regulated companies, and for firms whose pre-event stock run-up or leverage ratio have been substantially high. For these firms. the assumption that the regression residual is uncorrelated with the regressors is violated. It is also important to recognize that SEO announcements are endogenous, and that the decision to issue equity in most situations reflects the firms' self-selection, which in turn reflects insider's information (Kothari & Warner, 2006). As pointed out by Eckbo, Maksimovic and Williams (1990), estimates of the cross-sectional

[31] We refer to appendix E for the regression output for models that correct for the various firm-specific, market-specific and issue-specific variables in the event windows (-2, 2) and (-1, 1)

coefficients can be biased if the pitfalls above are not adequately accounted for. In fact, we observe that the statistical significance of many of the explanatory variables is compromised in the cross-industry analysis, where problems related to heterogeneity, outliers, and event anticipation are likely to play a larger role. The cross-industry analysis is also restricted to the companies reporting on a quarterly or semi-annual basis. This introduces two possible problems. First, we may exclude valuable information from the analysis. Second, our sample may be skewed towards a certain type of companies. Table C9 shows that the firms reporting on an annual basis have larger mean market capitalization and offering size than the firms reporting on a quarterly or semi-annual basis. However, our regression results did not change in any notable way as a result of the restriction.

We note that the logistic regression analysis may be affected by additional statistical problems. The constituent companies in the STOXX Europe 600 index vary depending upon the quarter. This renders our panel data unbalanced, which may result in biased estimators. Moreover, the index has a methodology for weighting in small, medium and large capitalization stocks, but the sector weightings vary depending upon the aggregated market capitalization of each respective sector. For instance, we see that the number of constituent banks in the index went down from 54 in the first quarter of 2010 to 42 in the first quarter of 2012. The non-recurring constituents of the index may introduce a survivorship bias, where companies that did issue equity may have been excluded from the index because of dismal performance, changes in country weights, or illiquidity. Lastly, the sample period used in chapter 8.4 does not correspond exactly to the sample period in the event study, restricting the comparison of these results.

## 9 Concluding Remarks

We demonstrate that the announcement of equity offerings on average reduce stock prices. The finding is credible in that over 60% of the sample SEOs experience negative announcement returns. Our results imply that SEOs have been costlier for banks than for non-banks in the sample period, but that differences in CAR between regulated non-banks and unregulated firms are insignificant. Consistent with this, we find indications that pre-event information asymmetry has been higher for banks in the sample period, but not for regulated non-banks. As demonstrated by the linear predictions, some of the observed differences in CAR between unregulated firms, banks and regulated non-banks may be explained by variations in firm-specific, market-specific and issue-specific characteristics. Regulated companies have issued more equity in volatile periods and in locally depressed economies, while unregulated companies appear to have been able to delay offerings to more favorable market conditions. In addition, the announcement effects from SEOs undertaken during dismal market conditions are found to be more negative for regulated companies, and especially banks, than for unregulated companies. As a possible measure for regulated firms, regulators could impose counter-cyclical capital buffers, so to encourage these firms to build up equity buffers when market conditions are stable. As suggested by previous research on banks, such policy measures may be beneficial both for equity holders and other stakeholders (Kashyap et al., 2010).

We also find indications that more of the SEOs by regulated firms have signaled adverse selection. Firstly, regulated issuers have substantially larger mean market capitalization than unregulated issuers, for which equity offerings may be less expected. Secondly, banks are found to undertake significantly larger equity offerings on average, especially in crisis periods. Thirdly, SEO activity have been higher for banks and regulated non-banks in most years since 2000. Furthermore, we find suggestions that debt may be more valuable to regulated firms, and especially banks. We find that banks and regulated non-banks in our sample are substantially more leveraged than their unregulated counterparts. We also find evidence that bank solidity has increased predominantly through reductions in risk-weights and increases in hybrid capital, suggesting additional equity has been the costlier option. We find it conceivable that the indirect costs of an equity offering decreases in the equity-to-assets ratio of regulated firms. Even so, we fail to find a statistically significant relationship, likely because of ambiguity in investor inferences. In fact, our results suggest that the probability of an equity offering decreases in the equity-to-assets ratio of the regulated firm, and thus that SEO announcements by poorly-capitalized regulated firms may signal less news. Yet, we argue that equity holders and other stakeholders could benefit from more slack in phase-in periods for stricter capital requirements, in which the firms have time to build capital buffers with less information-sensitive internal financing. Our results are inconsistent with previous studies from the U.S., where most researchers seem to suggest more favorable equity issuance costs for regulated companies (Masulis & Korwar, 1986) (Asquith & Mullins, 1986) (D'Mello et al., 2003) (Li et al., 2016). However, we note that a direct comparison with these studies may be obscured by differences in sample selection and choice of explanatory variables. Moreover, European regulated firms may differ significantly from their U.S. counterparts, especially with respect to internal-financing capabilities.

Our results do not provide definite answers on how and why indirect equity issuance costs differ among industries. While our linear prediction may suggest that differences in announcement returns may be explained by certain characteristics in the sample period, the model is based on several coefficients that lack statistical significance. Further research should consider an analysis based on a propensity-matched sample of European regulated firms with unregulated firms. Moreover, an analysis on the long-term post-SEO performance of European firms in the sample period could bring valuable insight.

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# Appendix A: Theory

## The Market Timing Hypothesis

The empirical evidence for the market timing hypothesis is mixed. Baker and Wurgler (2002) show that firms tend to issue equity when the market value of their shares is high, and repurchase equity when it is low, consistent with the timing hypothesis. Jung, Kim and Stulz (1996) find no support for market timing, but instead argue that financing decisions are explained by agency theory. Dong, ter Horst and Veld (2012) investigate the effects of market timing and pecking order simultaneously. They find empirical evidence that the two theories interact, and that both financial flexibility and stock mispricing tends to drive financing decisions. Support for the market-timing hypothesis is restricted to firms that are not financially constrained.

## The Glosten-Milgrom Model

Glosten and Milgrom (1985) showed that in the presence of market participants with superior information, the bid-ask spread will be positive even if the market makers are risk-neutral and perfectly competitive. The formulas and assumptions used in this section is based on Foucalt, Pagano and Röell (2013). We assume that the sole source of new information for the dealers (market makers) is the order flow. Moreover, we assume that all traders place order of fixed size. For simplicity, we assume that the value of the security has a binary distribution, $v^H$ and $v^L$, where $v^H > v^L$.

The dealer's estimate of the value of the security after order $t^{th}$:

$$\mu_t = \theta_t v^H + (1 - \theta_t) v^L$$

Where $\theta$ and $1 - \theta$ is the probability they assign the security will take value $v^H$ and $v^L$, respectively.

The bid and ask prices can be expressed as:

$$a_t = \mu_t^+ = E(v|\Omega_{t-1}, d_t = +1)$$

$$b_t = \mu_t^- = E(v|\Omega_{t-1}, d_t = -1)$$

For competitive dealers, the ask at time 1, will be such that the expected profit is zero:

$$a_1 = \mu_0 + \pi(v^H - \mu_0) = \mu_0 + \frac{\pi}{2}(v^H - v^L)$$

where $\pi$ is the probability of informed trades.

Conversely, the bid price will be:

$$b_1 = \mu_0 + \pi(v^L - \mu_0) = \mu_0 - \frac{\pi}{2}(v^H - v^L)$$

As a result, the bid-ask spread for the first transaction at time 1 will be:

$$S_1 \equiv a_1 - b_1 = \pi(v^H - v^L)$$

Thus, the bid-ask spread is the compensation required by the dealer to cover the loss from trading with investors that have better information. We see from the equation that the bid-ask spread will increase with (1) the proportion of informed traders, $\pi$, (2) the volatility of the security's value, $(v^H - v^L)$.

# Appendix B: Methodology

### Modelling Normal Return

There are in general two approaches that can be used to calculate the normal return in event studies. Statistical models rely on statistical assumptions concerning the behavior of asset returns. More specifically, the statistical models assume that asset returns are jointly multivariate normal and independently and identically distributed through time (MacKinlay, 1997). Even though this assumption is strong, empirically it has been shown to yield few difficulties as inferences tend to be robust to deviations from the assumption (MacKinlay, 1997). In contrast, economic models do not rely on statistical assumptions, but instead follow assumptions about investors' behavior. Economic models are therefore restricted statistically, and the results using such models are often sensitive to these restrictions. Because of this, we use a statistical model. The two most common statistical models are the market model and the mean return model. According to Brown and Warner (1985), the market model is usually the most properly specified of the two. Moreover, MacKinlay (1997) argues that the market model, unlike the constant mean-return model, reduces the variance of the abnormal return estimates by removing the portion of the return that is related to variation in the market´s return. This may make it easier to detect any abnormal returns associated with the event. In addition, more complex multifactor statistical models have shown to yield limited gains compared to the market model as they only marginally reduce the variance of the abnormal return, especially over short horizons. MacKinlay also contend that the market model dominates economic models such as the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) due to its simplicity and relatively strong explanatory power. We therefore use the market model in conducting our event study.

The market model assumes a linear relationship between the stock returns and the market index, given by the equation:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

$$E(\varepsilon_{it} = 0) \qquad\qquad var(\varepsilon_{it}) = \sigma^2_{\varepsilon_i}$$

Where $R_{it}$ is the return for security *i* in period *t* and $R_{mt}$ is the return for the market index in the same period. $\alpha_i$, $\beta_i$, and $\sigma^2_{\varepsilon_i}$ are the parameters of the market model, and $\varepsilon_{it}$ is the error term. We consider the MSCI Europe price index as a proxy for the market index[32].

Ordinary least squares (OLS) is used to estimate the market model parameters based on daily returns for the sample firms in the estimation window. Under general conditions, OLS is a consistent estimation procedure for the market model parameters. It is also efficient given the assumptions of the statistical models. The following formulas are applied:

$$\hat{\beta}_i = \frac{\sum_{\tau=T_{0+1}}^{T_1}(R_{i\tau} - \hat{\mu}_i)(R_{m\tau} - \hat{\mu}_m)}{\sum_{\tau=T_{0+1}}^{T_1}(R_{m\tau} - \hat{\mu}_m)^2}$$

$$\hat{\alpha}_i = \hat{\mu}_i - \hat{\beta}_i\hat{\mu}_m$$

$$\hat{\sigma}^2_{\varepsilon_i} = \frac{1}{L_1 - 2}\sum_{\tau=T_{0+1}}^{T_1}(R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau})^2$$

Where $L_1$ is defined as the length of the estimation window. The mean return of security *i* and the market portfolio over the estimation period are calculated as:

$$\hat{\mu}_i = \frac{1}{L_1}\sum_{\tau=T_{0+1}}^{T_1} R_{i\tau}$$

$$\hat{\mu}_m = \frac{1}{L_1}\sum_{\tau=T_{0+1}}^{T_1} R_{m\tau}$$

$R_{i\tau}$ and $R_{m\tau}$ are the returns in the event window for security *i* and the market portfolio respectively.

[32] Datastream did not have dividend-adjusted prices available for the MSCI Europe in our time frame. We note that this may have impacted the estimation of normal performance and CAR.

**Modelling Abnormal Return**

The estimated market model parameters are used to calculate the abnormal returns over the event window. The abnormal return is calculated as the difference between actual returns and the predicted returns in the event window, and corresponds to the disturbance term of the market model calculated on an out of sample basis:

$$\widehat{AR}_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau}$$

Under the null hypothesis and conditional on the market returns in the event window, the abnormal return will be normally distributed with a zero conditional mean and a variance equal to:

$$\sigma^2\left(\widehat{AR}_{i\tau}\right) = \sigma^2_{\varepsilon_i} + \frac{1}{L_1}\left[1 + \frac{(R_{m\tau} - \hat{\mu}_m)^2}{\hat{\sigma}^2_m}\right]$$

The conditional variance has two components; the disturbance variance $\sigma^2_{\varepsilon_i}$, and an additional variance due to the sampling error in $\alpha_i$ and $\beta_i$. Although the true disturbances are independent through time, MacKinlay (1997) argues that the sampling error leads to serial correlation of the abnormal returns. However, as the length of the estimation window $L_1$ becomes large enough, the variance of the abnormal return will approach $\sigma^2_{\varepsilon_i}$ as the second term in the equation approaches zero. The abnormal return observations will thus become independent through time for large enough estimation windows.

Given the null hypothesis that the announcement of seasoned equity offerings has no impact on stock returns, the distribution of the abnormal return for the sample firms of a given observation in the event window is given by:

$$\widehat{AR}_{i\tau} \sim N\left(0, \sigma^2\left(\widehat{AR}_{i\tau}\right)\right)$$

The abnormal returns are then aggregated through time and across securities so that we can analyze the average effect from the event and draw inferences for the whole sample. When aggregating the abnormal returns we assume that there is no clustering in the sample, i.e., no overlap in the event windows between the included securities. The absence of clustering implies that the abnormal returns and the cumulative abnormal returns will be independent across securities, implying that the covariance across securities will be zero. The cumulative abnormal return for each event window is calculated as the sum of the daily abnormal returns for a security:

$$\widehat{CAR}_i(\tau_1,\tau_2) = \sum_{\tau=\tau_1}^{\tau_2} \widehat{AR}_{i\tau}$$

Where $\widehat{CAR}_i(\tau_1,\tau_2)$ is defined as cumulative abnormal return for the sample from $\tau_1$ to $\tau_2$, where $T_1 < \tau_1 \leq \tau_2 \leq T_2$. For large enough estimation windows, the estimation errors in the market model parameters are approximately zero, so that the variance of the cumulative abnormal return for each event becomes:

$$\sigma_i^2(\tau_1,\tau_2) = (\tau_2 - \tau_1 + 1)\sigma_{\varepsilon_i}^2$$

The cumulative abnormal return for the whole sample of N events is formed security by security and then aggregated through time to find the mean cumulative abnormal return:

$$\overline{CAR}(\tau_1,\tau_2) = \frac{1}{N}\sum_{i=1}^{N} \widehat{CAR}(\tau_1,\tau_2)$$

and the variance defined as:

$$var\left(\overline{CAR}(\tau_1,\tau_2)\right) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_i^2(\tau_1,\tau_2)$$

The assumption of no clustering is used to set the covariance term of the variance estimators to zero. One can then draw inferences about the cumulative abnormal returns using:

$$\overline{CAR}(\tau_1,\tau_2) \sim N[0, var\left(\overline{CAR}(\tau_1,\tau_2)\right)]$$

**Significance Testing**

We use a standard t-test to test if CAR is statistically different from zero. Under the null hypothesis that $\overline{CAR}(\tau_1,\tau_2) = 0$, the test estimator is given by:

$$\theta_1 = \frac{\overline{CAR}(\tau_1,\tau_2)}{var(\overline{CAR}(\tau_1,\tau_2))^{1/2}} \sim N(0,1)$$

The test assumes that the correlation between the abnormal returns across different events is zero, i.e, that $cov(AR_{i\tau}, AR_{j\tau}) = 0$. This assumption may not hold if clustering is present. The consequences of violating the assumption is that the variance will be biased downward and the test statistic upward, increasing the likelihood of falsely rejecting the null hypothesis (Brown and Warner, 1985). We will illustrate the tests on a 1%, 5%, and 10% significance level. On the 5% level, the probability of falsely rejecting the null hypothesis is 5%. The critical limit for the test estimator is given by +/- 1.96, which can be interpreted as a 5% probability of observing $\theta_1$>1.96.

**Two-Sample T-test**

The two-sample t-test allows us to test for differences in the mean of relevant variables between subgroups in our sample and over different time periods. The two-sample t-test estimator is given by:

$$t = \frac{\overline{CAR}_1 - \overline{CAR}_2}{S_{x_1x_2}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where $\overline{CAR}_1$, $\overline{CAR}_2$, $n_1$, and $n_2$ are the mean CAR's and size of the two groups, respectively. $S_{x_1x_2}$ is the combined standard deviation for the two groups, and is defined as:

$$S_{x_1x_2} = \sqrt{\frac{(n_1 - 1)S_{x_1}^2 + (n_2 - 1)S_{x_2}^2}{n_1 + n_2 - 2}}$$

**Assumptions of the classical linear regression model**

1. The dependent variable is linearly related to the explanatory variables and the error term. (Linear parameter and correct model specification)
2. No explanatory variable has a perfect linear relationship with any of the other explanatory variables (no perfect multicollinearity)
3. The explanatory variables are uncorrelated with the equation error term (explanatory variables must be exogenous)
4. The error terms have an expected value of zero and a constant variance (independent and identically distributed error terms).
5. The error terms are normally distributed

The assumptions are based on Woolridge (2013). Given the assumptions 1-4, the OLS estimator will be the “best linear unbiased estimator” (BLUE). Here, “best” means giving the lowest variance of the estimate, as compared to other unbiased, linear estimators.

**Logistic Regression Analysis**

In a linear probability model, we use multiple regression analysis to predict a qualitative event (Woolridge, 2013). The logistic regression analysis is an example of a linear probability model, where the dependent variable is binary in a logistic function. That is, the dependent variable can only take the value “0” or “1”. The logistic function uses a logistic distribution to determine the relationship between the categorical dependent variable and the independent variables. We refer the reader to Woolridge (2013) for assumptions about the linear probability model. We can define the logistic function as:

$$G(z) = \frac{e^z}{1 + e^z}$$

In a linear probability model, we assume that the response probability is a linear function of the parameters, $\beta_j$:

$$P(y = 1|\, x) = \; G(\beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k)$$

For us to be able to explain the effect one $x_j$ has on the response probability $P(y = 1|\, x)$, we must derive the partial effect of the variable. Assuming $x_j$ is roughly continuous, the partial effect it will have on the response probability is found by taking the partial derivative with respect to $x_j$:

$$\frac{\partial p(x)}{\partial x_j} = g(\beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k)\beta_j,$$

where $g(z) = \frac{dG}{dz}(z)$.

### Average Marginal Effect of the Independent Variable on the Binary-Dependent Outcome

Based on Woolridge (2013), the average marginal effect of a continuous independent variable, $x_j$ will be:

$$n^{-1}\sum_{i=1}^{n} g(\hat{\beta}_0 + x_i\hat{\beta})\hat{\beta}_j$$

Thus, the scale factor is simply:

$$n^{-1}\sum_{i=1}^{n} g(\hat{\beta}_0 + x_i\hat{\beta})$$

### Fixed Effects Estimator for Panel Data

The equations in this section is based on Woolridge (2013). Panel data, or longitudinal data, refer to data where we observe the characteristics of statistical subjects, $i$, over multiple time periods, $t$. We thus have between-subject and within-subject information, referring to information reflected in the cross-sectional differences between the subjects and the information reflected within the subject over time, respectively. In panel data, we have something referred to as an *unobserved effect*, which can be defined as $\alpha_i$:

$$y_{it} = \beta_1 x_{it1} + \cdots + \beta_k x_{itk} + a_i + u_{it}$$

The unobserved effect contains all the time-invariant effects that affect $y_{it}$. As for the sample used in our analysis in 8.4, the unobserved effect will represent the firm heterogeneity for each firm, $i$. Unlike the unobserved effect, the idiosyncratic error, $u_{it}$, varies across time. This is similar to what we observe in a standard time series regression. Using pooled OLS to derive the coefficient in a regression on panel data may result in a violation of a Gauss-Markov assumption, even if $x_{it}$ and $u_{it}$ is uncorrelated. This is because $a_i$ and $x_{it}$ may be correlated as well. In such a case, the regression is affected by heterogeneity bias, in which the estimator will be biased and inconsistent. The best linear unbiased estimator (BLUE) would need to eliminate the unobserved effect. This can be accomplished by using a fixed-effects estimator, where we run an OLS estimator on the time-demeaned explanatory variables:

$$\ddot{y}_{it} = y_{it} - \bar{y}_i = \beta_1(x_{it1} - \bar{x}_{i1}) + \cdots + \beta_k(x_{itk} - \bar{x}_{ik}) + a_i - a_i + u_{it} - \bar{u}_{it}$$

$$\ddot{y}_{it} = \beta_1\ddot{x}_{it1} + \cdots + \beta_k\ddot{x}_{itk} + \ddot{u}_{it}$$

Notably, the unobserved effect is eliminated from $\ddot{y}_{it}$. However, for the estimator to be unbiased, $u_{it}$ still needs to be uncorrelated with the explanatory variables across time.

# Appendix C: Variable Statistics

**Table C1: Summary Statistics – Full Sample**

| | N | Mean | Std. Dev. | Median | Min | Max |
|---|---|---|---|---|---|---|
| Cumulative Abnormal Return (-5, 5) | 4953 | -0,017 | 0,092 | -0,015 | -0,358 | 0,359 |
| Non-Inv. Grade Sovereign Debt Rating | 4953 | 0,015 | 0,121 | 0,000 | 0,000 | 1,000 |
| Financial Crisis (2007 - 2009) | 4953 | 0,182 | 0,386 | 0,000 | 0,000 | 1,000 |
| Euro Crisis (2010 - 2012) | 4953 | 0,152 | 0,359 | 0,000 | 0,000 | 1,000 |
| Market Cap. in bn. USD (-20) | 4945 | 5,362 | 14,292 | 0,955 | 0,021 | 256,676 |
| Offering Size in bn. USD | 4947 | 0,369 | 1,101 | 0,106 | 0,020 | 24,355 |
| Relative Size % (-20) | 4841 | 23,16% | 30,62% | 11,67% | 0,37% | 241,27% |
| Average Relative Price Spread (-10 to -6) | 4813 | 0,012 | 0,021 | 0,007 | -0,122 | 0,162 |
| Annualized Stock Vol. (-71 to -11) | 4848 | 0,374 | 0,266 | 0,313 | 0,000 | 5,108 |
| Annualized Stock Vol. (-262 to -11) | 4848 | 0,496 | 0,588 | 0,380 | 0,008 | 26,048 |
| Annualized Market Vol. (-71 to -11) | 4848 | 0,184 | 0,087 | 0,161 | 0,075 | 0,732 |
| Annualized Market Vol. (-262 to -11) | 4848 | 0,234 | 0,141 | 0,193 | 0,078 | 1,574 |
| Stock Run-up (-262 to -11) | 2489 | 0,371 | 1,385 | 0,144 | -0,995 | 33,297 |
| Market Run-up (-262 to -11) | 2489 | 0,101 | 0,286 | 0,102 | -0,577 | 1,642 |
| Equity to Assets (lagged) | 3269 | 0,396 | 0,281 | 0,376 | -3,786 | 1,000 |
| Capital Adequacy Ratio (lagged) | - | - | - | - | - | - |
| No. of Days Since Last Financial Report | 3375 | 47,180 | 26,139 | 49,000 | 0,000 | 119,000 |
| No. of Previous Offerings (-365, -1) | 4953 | 0,269 | 0,634 | 0,000 | 0,000 | 9,000 |

**Table C2: Summary Statistics – Unregulated Companies**

| | N | Mean | Std. Dev. | Median | Min | Max |
|---|---|---|---|---|---|---|
| Cumulative Abnormal Return (-5, 5) | 3682 | -0,015 | 0,097 | -0,015 | -0,358 | 0,352 |
| Non-Inv. Grade Sovereign Debt Rating | 3682 | 0,011 | 0,104 | 0,000 | 0,000 | 1,000 |
| Financial Crisis (2007 - 2009) | 3682 | 0,181 | 0,385 | 0,000 | 0,000 | 1,000 |
| Euro Crisis (2010 - 2012) | 3682 | 0,153 | 0,360 | 0,000 | 0,000 | 1,000 |
| Market Cap in bn. USD (-20) | 3674 | 3,645 | 12,107 | 0,682 | 0,021 | 256,68 |
| Offering Size in bn. USD | 3676 | 0,228 | 0,468 | 0,089 | 0,020 | 9,857 |
| Relative Size % (-20) | 3614 | 24,25% | 30,82% | 12,76% | 0,37% | 241,27% |
| Average Relative Price Spread (-10 to -6) | 3595 | 0,013 | 0,021 | 0,007 | -0,122 | 0,162 |
| Annualized Stock Vol. (-71 to -11) | 3608 | 0,393 | 0,275 | 0,330 | 0,000 | 5,108 |
| Annualized Stock Vol. (-262 to -11) | 3608 | 0,515 | 0,636 | 0,399 | 0,008 | 26,048 |
| Annualized Market Vol. (-71 to -11) | 3608 | 0,183 | 0,084 | 0,160 | 0,075 | 0,727 |
| Annualized Market Vol. (-262 to -11) | 3608 | 0,230 | 0,134 | 0,191 | 0,078 | 1,574 |
| Stock Run-up (-262 to -11) | 1694 | 0,444 | 1,572 | 0,177 | -0,985 | 33,297 |
| Market Run-up (-262 to -11) | 1694 | 0,101 | 0,288 | 0,097 | -0,577 | 1,642 |
| Equity to Assets (lagged) | 2405 | 0,449 | 0,279 | 0,413 | -3,786 | 1,000 |
| Capital Adequacy Ratio (lagged) | - | - | - | - | - | - |
| No. of Days Since Last Financial Report | 2487 | 46,926 | 26,025 | 49,000 | 0,000 | 119,000 |
| No. of Previous Offerings (-365, -1) | 3682 | 0,230 | 0,546 | 0,000 | 0,000 | 4,000 |

**Table C3: Summary Statistics – Banks**

| | N | Mean | Std. Dev. | Median | Min | Max |
|---|---|---|---|---|---|---|
| Cumulative Abnormal Return (-5, 5) | 430 | -0,026 | 0,086 | -0,022 | -0,327 | 0,281 |
| Non-Inv. Grade Sovereign Debt Rating | 430 | 0,053 | 0,225 | 0,000 | 0,000 | 1,000 |
| Financial Crisis (2007 - 2009) | 430 | 0,214 | 0,411 | 0,000 | 0,000 | 1,000 |
| Euro Crisis (2010 - 2012) | 430 | 0,126 | 0,332 | 0,000 | 0,000 | 1,000 |
| Market Cap in bn. USD (-20) | 430 | 14,671 | 21,685 | 6,355 | 0,022 | 204,24 |
| Offering Size in bn. USD | 430 | 1,283 | 2,845 | 0,357 | 0,021 | 24,355 |
| Relative Size % (-20) | 410 | 17,86% | 27,86% | 7,43% | 0,37% | 204,70% |
| Average Relative Price Spread (-10, -6) | 404 | 0,007 | 0,025 | 0,003 | -0,103 | 0,144 |
| Annualized Stock Vol. (-71, -11) | 413 | 0,339 | 0,203 | 0,299 | 0,000 | 1,739 |
| Annualized Stock Vol. (-262, -11) | 413 | 0,497 | 0,470 | 0,373 | 0,025 | 5,743 |
| Annualized Market Vol. (-71, -11) | 413 | 0,187 | 0,095 | 0,163 | 0,077 | 0,721 |
| Annualized Market Vol. (-262, -11) | 413 | 0,260 | 0,163 | 0,210 | 0,079 | 1,167 |
| Stock Run-up (-262, -11) | 282 | 0,175 | 0,991 | 0,031 | -0,995 | 9,365 |
| Market Run-up (-262, -11) | 282 | 0,097 | 0,298 | 0,107 | -0,527 | 1,456 |
| Equity to Assets (lagged) | 296 | 0,066 | 0,034 | 0,061 | -0,017 | 0,197 |
| Capital Adequacy Ratio (lagged) | 209 | 13,435 | 3,826 | 12,600 | -6,100 | 27,100 |
| No. of Days Since Last Financial Report | 306 | 46,641 | 25,854 | 46,000 | 0,000 | 90,000 |
| No. of Previous Offerings (-365, -1) | 430 | 0,314 | 0,604 | 0,000 | 0,000 | 3,000 |

**Table C4: Summary Statistics – Regulated Non-Banks**

| | N | Mean | Std. Dev. | Median | Min | Max |
|---|---|---|---|---|---|---|
| Cumulative Abnormal Return (-5, 5) | 841 | -0,017 | 0,070 | -0,015 | -0,350 | 0,359 |
| Non-Inv. Grade Sovereign Debt Rating | 841 | 0,012 | 0,108 | 0,000 | 0,000 | 1,000 |
| Financial Crisis (2007 - 2009) | 841 | 0,169 | 0,375 | 0,000 | 0,000 | 1,000 |
| Euro Crisis (2010 - 2012) | 841 | 0,161 | 0,367 | 0,000 | 0,000 | 1,000 |
| Market Cap in bn. USD (-20) | 841 | 8,106 | 16,008 | 1,645 | 0,022 | 120,932 |
| Offering Size in bn. USD | 841 | 0,516 | 1,229 | 0,153 | 0,020 | 16,360 |
| Relative Size % (-20) | 817 | 20,98% | 30,74% | 9,92% | 0,38% | 227,69% |
| Average Relative Price Spread (-10, -6) | 814 | 0,010 | 0,019 | 0,006 | -0,070 | 0,152 |
| Annualized Stock Vol. (-71, -11) | 827 | 0,306 | 0,239 | 0,246 | 0,000 | 4,343 |
| Annualized Stock Vol. (-262, -11) | 827 | 0,410 | 0,376 | 0,315 | 0,018 | 5,170 |
| Annualized Market Vol. (-71, -11) | 827 | 0,188 | 0,094 | 0,163 | 0,075 | 0,732 |
| Annualized Market Vol. (-262, -11) | 827 | 0,240 | 0,154 | 0,195 | 0,078 | 1,270 |
| Stock Run-up (-262, -11) | 513 | 0,241 | 0,746 | 0,111 | -0,935 | 6,390 |
| Market Run-up (-262, -11) | 513 | 0,102 | 0,273 | 0,111 | -0,533 | 1,197 |
| Equity to Assets (lagged) | 568 | 0,344 | 0,223 | 0,342 | -1,067 | 0,974 |
| Capital Adequacy Ratio (lagged) | - | - | - | - | - | - |
| No. of Days Since Last Financial Report | 582 | 48,552 | 26,769 | 52,000 | 0,000 | 91,000 |
| No. of Previous Offerings (-365, -1) | 841 | 0,420 | 0,921 | 0,000 | 0,000 | 9,000 |

**Table C5: Summary Statistics - Comparison of Mean Values**

| | Mean of Banks vs mean of Unreg. | Mean of Banks vs mean of Reg. Non-Banks | Mean of Reg. Non-Banks vs mean of Unreg. |
|---|---|---|---|
| Cumulative Abnormal Return (-5, 5) | -0,010** | -0,009** | -0,001 |
| Non-Inv. Grade Sovereign Debt Rating | 0,043*** | -0,042*** | 0,001 |
| Financial Crisis (2007 - 2009) | 0,033* | 0,045** | -0,012 |
| Euro Crisis (2010 - 2012) | -0,027 | -0,035* | 0,008 |
| Market Cap in bn. USD (-20) | 11,026*** | 6,565*** | 4,461*** |
| Offering Size in bn. USD (-20) | 1,055*** | 0,767*** | 0,288*** |
| Relative Size % (-20) | -6,389%*** | -3,115%* | -3,274%*** |
| Average Relative Price Spread (-10, -6) | -0,006*** | -0,003** | -0,003*** |
| Annualized Stock Vol. (-71, -11) | -0,054*** | 0,033** | -0,087*** |
| Annualized Stock Vol. (-262, -11) | -0,018 | 0,087*** | -0,105*** |
| Annualized Market Vol. (-71, -11) | 0,004 | -0,001 | 0,005 |
| Annualized Market Vol. (-262, -11) | 0,031*** | 0,021** | 0,010* |
| Stock Run-up (-262, -11) | -0,269*** | -0,066 | -0,203*** |
| Market Run-up (-262, -11) | -0,004 | -0,044 | -0,000 |
| Equity to Assets (lagged) | -0,384*** | -0,278*** | -0,105*** |
| Capital Adequacy Ratio (lagged) | - | - | - |
| No. of Days Since Last Financial Report | -0,285 | -1,911 | 1,626 |
| No. of Previous Offerings (-365, -1) | 0,084*** | -0,106** | 0,189*** |

*** p<0.01, ** p<0.05, * p<0.1

The table shows the differences in mean values of the explanatory variables across the three company groups. Significance levels are obtained from two sample t-tests, using Welch's (1947) formula and assuming that the two samples do not have equal variance.

**Table C6 – Variable Statistics for Unregulated Firms in STOXX 600 Europe**

| Year | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 |
|---|---|---|---|---|---|---|---|---|---|
| Market Cap. in bn. USD | 12,1 | 11,3 | 9,3 | 7,6 | 10,2 | 12 | 12,5 | 15,7 | 18 |
| | (387) | (387) | (403) | (403) | (396) | (392) | (393) | (393) | (400) |
| Equity to Assets % | 36,9 % | 38 % | 37,3 % | 36,3 % | 35,9 % | 36,6 % | 35,7 % | 35 % | 35,7 % |
| | (205) | (224) | (241) | (246) | (257) | (263) | (274) | (287) | (292) |
| Revenue Growth % | 0 % | 15,1 % | 4,9 % | 2 % | 7,3 % | 8,3 % | 10,9 % | 12,7 % | 12,2 % |
| | (202) | (227) | (242) | (256) | (258) | (272) | (278) | (289) | (296) |
| EBIT Margin % | 11,9 % | 12,2 % | 10,9 % | 11 % | 11,2 % | 12,8 % | 14,9 % | 15,8 % | 15,7 % |
| | (206) | (223) | (238) | (250) | (261) | (269) | (281) | (289) | (296) |
| Stock Return Y/Y % | 63,7 % | 6,4 % | -6,4 % | -24,2 % | 29,3 % | 17,3 % | 30,3 % | 27,2 % | 6,9 % |
| | (372) | (371) | (392) | (394) | (391) | (388) | (385) | (384) | (398) |
| CAPEX to Assets % | 6,1 % | 5,6 % | 5,3 % | 4,8 % | 4,7 % | 4,7 % | 4,6 % | 4,9 % | 5,1 % |
| | (184) | (209) | (222) | (226) | (240) | (243) | (261) | (269) | (275) |
| Cash to Assets % | 5,4 % | 5,6 % | 5,5 % | 5,1 % | 5,8 % | 5,9 % | 7,2 % | 7,6 % | 8 % |
| | (208) | (224) | (244) | (249) | (261) | (264) | (273) | (285) | (293) |
| Acqusitions to Assets % | 1,2 % | 1 % | 1,1 % | 0,9 % | 0,5 % | 0,6 % | 2,3 % | 2,4 % | 3,2 % |
| | (206) | (224) | (241) | (253) | (261) | (270) | (276) | (278) | (279) |

| Year | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Market Cap. in bn. USD | 9,7 | 13,1 | 14 | 12,6 | 14,7 | 18,2 | 16,4 | 16,2 | 15,7 | 13,3 |
| | (395) | (400) | (406) | (408) | (409) | (405) | (405) | (407) | (405) | (878) |
| Equity to Assets % | 33,9 % | 36,2 % | 37,5 % | 38,4 % | 38,8 % | 38,4 % | 37,8 % | 37,9 % | 39,7 % | 37 % |
| | (277) | (287) | (291) | (297) | (299) | (295) | (301) | (301) | (157) | (517) |
| Revenue Growth % | 10,7 % | -3,3 % | 9,9 % | 9,8 % | 7,4 % | 1,6 % | 3,1 % | 5 % | 4,3 % | 6,9 % |
| | (277) | (282) | (290) | (299) | (301) | (299) | (305) | (308) | (166) | (520) |
| EBIT Margin % | 14,9 % | 12,5 % | 14,1 % | 14,8 % | 14,4 % | 14 % | 14,1 % | 14,5 % | 14,8 % | 13,7 % |
| | (277) | (285) | (291) | (299) | (301) | (300) | (305) | (310) | (160) | (521) |
| Stock Return Y/Y % | -40,7 % | 52,4 % | 22,6 % | -11,6 % | 23,2 % | 28,2 % | 3,6 % | 17,6 % | 9,1 % | 14 % |
| | (396) | (400) | (404) | (405) | (409) | (399) | (401) | (404) | (404) | (868) |
| CAPEX to Assets % | 5,5 % | 4,9 % | 4,2 % | 4,2 % | 4,4 % | 4,4 % | 4 % | 4 % | 3,8 % | 4,7 % |
| | (254) | (265) | (274) | (281) | (285) | (282) | (282) | (289) | (141) | (494) |
| Cash to Assets % | 7,2 % | 8,9 % | 9 % | 8,4 % | 9,2 % | 8,7 % | 9 % | 9 % | 8,8 % | 7,6 % |
| | (272) | (285) | (289) | (298) | (304) | (301) | (306) | (306) | (159) | (522) |
| Acqusitions to Assets % | 2,7 % | 1,2 % | 1,7 % | 1,9 % | 1,7 % | 1,2 % | 1,8 % | 2,1 % | 1,6 % | 1,6 % |
| | (270) | (283) | (291) | (293) | (301) | (298) | (300) | (304) | (188) | (529) |

The table shows the mean value of the variables for unregulated firms in STOXX 600 Europe as of fourth quarter. The data from financial statements is gathered from Compustat, while market data is from Datastream. Number of distinct firms is in parentheses. Stock return is calculated with a window of four quarters. Revenue growth is calculated Y/Y.

**Table C7 – Variable Statistics for Banks in STOXX 600 Europe**

| Year | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 |
|---|---|---|---|---|---|---|---|---|---|
| Market Cap. in bn. USD | 14,90 | 17,10 | 13,90 | 12,40 | 18,50 | 23,70 | 25,30 | 34,80 | 33,80 |
| | (72) | (65) | (67) | (67) | (66) | (64) | (64) | (62) | (59) |
| Equity to Assets % | 6,2 % | 6 % | 5,9 % | 5,7 % | 5,7 % | 5,6 % | 5,3 % | 5,6 % | 5,7 % |
| | (46) | (50) | (55) | (56) | (54) | (55) | (58) | (55) | (55) |
| Revenue Growth % | -10,3 % | 16,3 % | -1,6 % | -9,9 % | -1,2 % | 8,5 % | 23,3 % | 24,2 % | 18,1 % |
| | (43) | (47) | (48) | (53) | (52) | (55) | (57) | (55) | (55) |
| Reserves Credit Losses to Assets % | 0,8 % | 0,7 % | 0,7 % | 0,8 % | 0,9 % | 0,8 % | 0,8 % | 0,7 % | 0,7 % |
| | (46) | (50) | (55) | (56) | (54) | (55) | (58) | (55) | (55) |
| Stock Return Y/Y % | 13 % | 5,5 % | -12,9 % | -17 % | 33,4 % | 19 % | 25,8 % | 26,7 % | -11,5 % |
| | (72) | (66) | (67) | (67) | (65) | (64) | (64) | (63) | (60) |
| Tier 1 Capital Ratio % | 8,1 % | 7,8 % | 7,8 % | 8 % | 8,1 % | 8,2 % | 8 % | 8,2 % | 9,5 % |
| | (25) | (28) | (34) | (35) | (35) | (36) | (37) | (29) | (9) |
| Capital Adequacy Ratio % | 11,2 % | 11,7 % | 11,5 % | 11,4 % | 11,7 % | 11,9 % | 11,4 % | 11,5 % | 11,7 % |
| | (29) | (30) | (37) | (35) | (34) | (35) | (37) | (28) | (8) |

| Year | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Market Cap. in bn. USD | 13,90 | 24,50 | 22,70 | 17,40 | 25,20 | 32,80 | 28,50 | 27,60 | 26,50 | 22,40 |
| | (55) | (53) | (50) | (44) | (41) | (43) | (46) | (42) | (41) | (111) |
| Equity to Assets % | 5,4 % | 6,4 % | 6,5 % | 5,6 % | 5,7 % | 6,1 % | 6,5 % | 6,7 % | 6,5 % | 5,9 % |
| | (51) | (50) | (49) | (43) | (40) | (40) | (43) | (39) | (29) | (69) |
| Revenue Growth % | 8,2 % | -16,1 % | -6,2 % | 5,2 % | 1,7 % | -4 % | -3,6 % | -4,8 % | -12,5 % | 3 % |
| | (50) | (50) | (49) | (41) | (39) | (39) | (42) | (39) | (30) | (69) |
| Reserves Credit Losses to Assets % | 0,9 % | 1,4 % | 1,6 % | 1,6 % | 1,5 % | 1,4 % | 1,2 % | 1,3 % | 0,7 % | 1 % |
| | (51) | (50) | (49) | (41) | (33) | (29) | (29) | (28) | (30) | (69) |
| Stock Return Y/Y % | -63 % | 39,6 % | -13,5 % | -37,1 % | 21,4 % | 35,4 % | -1,9 % | 1,5 % | -7,5 % | 3,7 % |
| | (56) | (54) | (51) | (44) | (42) | (43) | (46) | (42) | (40) | (111) |
| Tier 1 Capital Ratio % | 10 % | 12 % | 9,6 % | 10,7 % | 11,7 % | 13,1 % | 13,3 % | 14,2 % | 15,3 % | 10,2 % |
| | (8) | (8) | (9) | (41) | (38) | (32) | (41) | (39) | (25) | (61) |
| Capital Adequacy Ratio % | 11,3 % | 12,4 % | 11,8 % | 13 % | 13,9 % | 15,8 % | 15,7 % | 17 % | 18 % | 13,2 % |
| | (7) | (8) | (9) | (41) | (38) | (32) | (41) | (39) | (25) | (60) |

The table shows the mean value of the variables for banks in STOXX 600 Europe as of fourth quarter. The data from financial statements is gathered from Compustat, while market data is from Datastream. Number of distinct firms is in parentheses. Stock return is calculated with a window of four quarters. Revenue growth is calculated Y/Y.

**Table C8 – Variable Statistics for Regulated Non-banks in STOXX 600 Europe**

| Year | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 |
|---|---|---|---|---|---|---|---|---|---|
| Market Cap. in bn. USD | 13,90 | 12,70 | 9,80 | 7,40 | 9,80 | 12,60 | 13,10 | 19,20 | 23,00 |
| | (100) | (97) | (86) | (85) | (92) | (94) | (95) | (98) | (94) |
| Equity to Assets % | 36,7 % | 33,7 % | 33,8 % | 32,7 % | 31 % | 30,1 % | 29,8 % | 30,6 % | 32,6 % |
| | (54) | (60) | (61) | (63) | (71) | (73) | (76) | (81) | (76) |
| Revenue Growth % | 6,4 % | 13,8 % | -0,5 % | -0,7 % | 12,7 % | 8,6 % | 21,5 % | 16,4 % | 3 % |
| | (54) | (55) | (59) | (62) | (70) | (72) | (72) | (79) | (75) |
| EBIT Margin % * | 27,2 % | 25,7 % | 28,7 % | 29,5 % | 30,5 % | 30,1 % | 34 % | 37,7 % | 37,9 % |
| | (42) | (43) | (43) | (49) | (54) | (55) | (58) | (61) | (57) |
| Stock Return Y/Y % | 29,2 % | 6,4 % | -15,5 % | -20 % | 25,4 % | 22,1 % | 24,4 % | 37,1 % | -2,8 % |
| | (96) | (93) | (86) | (83) | (91) | (91) | (93) | (97) | (94) |
| CAPEX to Assets % * | 8,6 % | 9,1 % | 7,6 % | 6,6 % | 6,7 % | 6,6 % | 6,2 % | 6,4 % | 6,6 % |
| | (28) | (32) | (31) | (32) | (35) | (36) | (38) | (37) | (37) |
| Cash to Assets % * | 5,3 % | 4,3 % | 4,1 % | 3,8 % | 3,5 % | 3 % | 3,6 % | 4,4 % | 5,3 % |
| | (41) | (42) | (46) | (48) | (52) | (50) | (58) | (61) | (59) |
| Acqusitions to Assets % | 0,4 % | 0,8 % | 0,3 % | 0 % | 0,2 % | 0,1 % | 0,9 % | 0,9 % | 1,4 % |
| | (54) | (61) | (61) | (64) | (72) | (74) | (78) | (83) | (78) |

| Year | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Market Cap. in bn. USD | 13,70 | 15,30 | 13,60 | 10,90 | 11,10 | 13,50 | 13,50 | 13,10 | 11,60 | 13,30 |
| | (96) | (94) | (91) | (94) | (96) | (104) | (102) | (100) | (103) | (224) |
| Equity to Assets % | 30,6 % | 31,6 % | 32,7 % | 34,2 % | 34,4 % | 36,1 % | 36,2 % | 36 % | 40,8 % | 33,4 % |
| | (79) | (78) | (75) | (80) | (83) | (90) | (88) | (87) | (44) | (148) |
| Revenue Growth % | 10,5 % | 7,8 % | 7,9 % | 2,6 % | 1,9 % | 2,5 % | 7,9 % | 10,5 % | 2,2 % | 7,6 % |
| | (69) | (69) | (64) | (77) | (83) | (88) | (85) | (85) | (44) | (144) |
| EBIT Margin % * | 25,5 % | 22,5 % | 35,9 % | 36,7 % | 35,3 % | 36,3 % | 35,4 % | 36,3 % | 44,6 % | 33 % |
| | (49) | (51) | (58) | (62) | (66) | (67) | (65) | (63) | (33) | (112) |
| Stock Return Y/Y % | -34,3 % | 27 % | 4,8 % | -14,9 % | 14 % | 23,1 % | 12,1 % | 9,7 % | -2,8 % | 8,4 % |
| | (95) | (94) | (91) | (94) | (95) | (104) | (101) | (100) | (99) | (218) |
| CAPEX to Assets % * | 6,4 % | 6,5 % | 5,6 % | 5,8 % | 6 % | 5,9 % | 5,4 % | 5,2 % | 5,1 % | 6,5 % |
| | (39) | (36) | (35) | (36) | (36) | (37) | (35) | (35) | (12) | (59) |
| Cash to Assets % * | 5,3 % | 5,2 % | 5 % | 5,3 % | 5 % | 5,5 % | 6,1 % | 5,9 % | 5 % | 4,8 % |
| | (57) | (55) | (56) | (60) | (64) | (64) | (63) | (63) | (33) | (108) |
| Acqusitions to Assets % | 0,8 % | 1 % | 0,2 % | 0,2 % | 0,3 % | 0,3 % | 0,5 % | 0,5 % | 0,4 % | 0,5 % |
| | (80) | (78) | (73) | (78) | (84) | (90) | (87) | (87) | (52) | (149) |

The table shows the mean value of the variables for regulated non-banks in STOXX 600 Europe as of fourth quarter. The data from financial statements is gathered from Compustat, while market data is from Datastream. Financial firms have been excluded from the sample for the variables marked by (*). Number of distinct firms is in parentheses. Stock return is calculated with a window of four quarters. Revenue growth is calculated Y/Y.

**Table C9: Mean Characteristics of Companies Reporting Annually vs Quarterly or Semi-Annual**

| Financial Reporting | Quarterly or semi-annually (1) | Annually (0) | Mean of 1 vs mean of 0 |
|---|---|---|---|
| Cumulative Abnormal Return (-5, 5) | -0.019 | -0.009 | -0.010*** |
| | (3,375) | (1,578) | |
| Market Cap. in bn. USD | 5.046 | 6.044 | -0.998** |
| | (3,375) | (1,570) | |
| Offering Size in bn. USD | 0.392 | 0.317 | 0.075*** |
| | (3,370) | (1,577) | |
| Stock Run-up (-262 to -11) | 0.363 | 0.398 | -0.035 |
| | (1,892) | (597) | |
| No. of Previous Offerings (365 days) | 0.264 | 0.282 | -0.018 |
| | (3,375) | (1,578) | |
| No. of Days Since Last Financial Report | 47.180 | 180.924 | -133.744*** |
| | (3,375) | (1,151) | |
| Total number of observations | 3375 | 1578 | - |

The table shows mean characteristics of the companies reporting on an annual basis, and of the companies reporting on a quarterly or semi-annual basis. The number of observations is given in parentheses. The right-hand column shows the differences in mean values between the two groups. Significance levels are obtained from two sample t-tests, using Welch's (1947) formula and assuming that the two samples do not have equal variance.

# Appendix D: Additional Regression Models and T-tests

**Table D1: Pair-Wise Correlation Matrix**

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | 1,0000 | 0,0332 | 0,0279 | -0,0066 | 0,0551 | -0,0130 |
| 2 | 0,0332 | 1,0000 | -0,1155 | -0,4314* | 0,3704* | 0,2441 |
| 3 | 0,0279 | -0,1155 | 1,0000 | 0,2828 | -0,0529 | -0,0137 |
| 4 | -0,0066 | -0,4314* | 0,2828 | 1,0000 | 0,0330 | -0,1186 |
| 5 | 0,0551 | 0,3704* | -0,0529 | 0,0330 | 1,0000 | -0,1994 |
| 6 | -0,0130 | 0,2441 | -0,0137 | -0,1186 | -0,1994 | 1,0000 |

The table shows a pairwise correlation matrix with all variables in model (1) and (2) in table 8.2. Correlation of above 30 % has been marked by a star (*).

1: Non-Investment Grade Sovereign Debt Rating, 2: Market Volatility (-71, -11), 3: Stock Run-up (-262, -11), 4: Market Run-up (-262, -11), 5: Financial Crisis (2007 - 2009), 6: Euro Crisis (2010 - 2012).

**Table D2: OLS Regression on Market Volatility**

| | **Market Volatility (-71, -11)** |
|---|---|
| Financial Crisis (2007 - 2009) | 0.0979*** |
| | (0.00452) |
| Euro Crisis (2010 - 2012) | 0.0799*** |
| | (0.00253) |
| Constant | 0.154*** |
| | (0.000951) |
| Observations | 4,848 |
| R-squared | 0.242 |

The table shows the results from ordinary least squares regression on the annualized market volatility in a pre-event window (-71, -11 days), with indicator variables related to the financial crisis and euro crisis. Robust standard errors in parentheses. Significance levels are given by *** p<0.01, ** p<0.05, * p<0.1.

**Table D3: CAR (-5, 5) – Relative Size with Interaction on Market Capitalization**

| | |
|---|---|
| Relative Size - Small Capitalization ($23mn, $428mn) | 0.00864 |
| | (0.0111) |
| Relative Size - Medium Capitalization ($429mn, $2.15bn) | -0.00657 |
| | (0.0185) |
| Relative Size - Large Capitalization ($2.15bn, $224.89bn) | -0.0308 |
| | (0.0225) |
| Non-Investment Grade Sovereign Debt Rating (0/1) | -0.0383** |
| | (0.0183) |
| Annualized Stock Volatility (-71, -11) | -0.0639*** |
| | (0.0237) |
| Stock Run-up (-262, -11) | -0.00260* |
| | (0.00135) |
| Constant | -0.00458 |
| | (0.00455) |
| | |
| Observations | 2,449 |
| R-squared | 0.010 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from ordinary least squares regression on CAR for the full sample in the event window (-5, 5), with explanatory variables related to market risk, financial instability, stock run-up, and relative size at each interaction with market capitalization (small, medium, large capitalization).

**Table D4: Two-Sample T-Test on CAR (-5, 5) for Non-Banks vs Banks**

| Group | Obs | Mean | Std. Err. | Std. Dev. | [95 % Conf. Interval] | |
|---|---|---|---|---|---|---|
| Non-banks | 4,523 | -0,0156321 | 0,001371 | 0,0922029 | -0,0183199 | -0,0129443 |
| Banks | 430 | -0,025635 | 0,0041559 | 0,0861793 | -0,0338035 | -0,0174664 |
| combined | 4,953 | -0,0165005 | 0,0013034 | 0,0917306 | -0,0190558 | -0,0139452 |
| diff | | 0,0100029** | 0,0043762 | | 0,0014059 | 0,0185999 |

diff = mean(0) - mean(1) t = 2.2857
Ho: diff = 0 Welch's degrees of freedom = 527.313

The table shows the results from a two-sample t-test on cumulative abnormal return (CAR) on banks versus non-banks, using Welch’s (1947) formula and assuming that the two samples do not have equal variance.

**Table D5: Cross-Industry OLS Regressions on CAR (-5, 5) – Relative Size**

| | Unregulated | Banks | Regulated Non-banks |
|---|---|---|---|
| Relative Size (-20) | 0.0187 | 0.00310 | -0.0669*** |
| | (0.0144) | (0.0306) | (0.0190) |
| Equity to Assets (lagged) | 0.0160 | 0.0697 | 0.00441 |
| | (0.0106) | (0.156) | (0.0137) |
| No. of Previous Offerings (-365, -1) | 0.00502 | 0.00886 | 0.00619* |
| | (0.00347) | (0.00747) | (0.00354) |
| No. of Days Since Last Financial Report | 9.81e-05 | -0.000130 | -9.68e-05 |
| | (0.000108) | (0.000239) | (0.000107) |
| Non-Inv. G. S. Debt Rating (0/1) | -0.0243 | -0.0466 | -0.0549*** |
| | (0.0295) | (0.0391) | (0.0142) |
| Annualized Market Volatility (-71, -11) | -0.0454 | -0.0646 | -0.0599* |
| | (0.0370) | (0.0815) | (0.0317) |
| Stock Run-up (-262, -11) | -0.00311** | 0.00106 | 0.00634 |
| | (0.00136) | (0.00435) | (0.00690) |
| Constant | -0.0311*** | -0.0304 | -0.00785 |
| | (0.0108) | (0.0258) | (0.0118) |
| | | | |
| Observations | 1,227 | 212 | 378 |
| R-squared | 0.012 | 0.037 | 0.121 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows a comparison of results between unregulated firms, banks, and regulated non-banks from ordinary least squares regression on cumulative abnormal return (CAR) in the event window (-5, 5 days) with explanatory variables related to market risk, stock run-up, relative size of the offering, capital market activity, and firm leverage. Log-transformed variables have been marked by (log).

**Table D6: Cross-Industry OLS Regressions on CAR (-5, 5) – Offering Size**

| | Unregulated | Banks | Regulated non-banks |
|---|---|---|---|
| Offering Size in bn. USD (log) | -0.00180 | -0.0132*** | -0.00582** |
| | (0.00214) | (0.00440) | (0.00255) |
| Equity to Assets (lagged) | 0.0139 | -0.152 | -0.000887 |
| | (0.0107) | (0.159) | (0.0145) |
| No. of Previous Offerings (-365, -1) | 0.00447 | 0.0123 | 0.00705** |
| | (0.00351) | (0.00813) | (0.00353) |
| No. of Days Since Last Financial Report | 0.000110 | -0.000131 | -7.02e-05 |
| | (0.000108) | (0.000228) | (0.000112) |
| Non-Inv. G. S. Debt Rating (0/1) | -0.0239 | -0.0444 | -0.0470*** |
| | (0.0281) | (0.0349) | (0.0150) |
| Annualized Market Volatility (-71, -11) | -0.0364 | -0.0407 | -0.0772** |
| | (0.0362) | (0.0790) | (0.0334) |
| Stock Run-Up (-262, -11) | -0.00350** | -0.00159 | 0.0105 |
| | (0.00141) | (0.00476) | (0.00644) |
| Constant | -0.0265*** | -0.0173 | -0.0198 |
| | (0.0103) | (0.0233) | (0.0125) |
| | | | |
| Observations | 1,236 | 220 | 383 |
| R-squared | 0.010 | 0.097 | 0.073 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows a comparison of results between unregulated firms, banks, and regulated non-banks from ordinary least squares regression on cumulative abnormal return (CAR) in the event window (-5, 5 days) with explanatory variables related to market risk, stock run-up, offering size, capital market activity, and firm leverage. Log-transformed variables have been marked by (log).

**Table D7: OLS Regression on CAR (-5, 5) for Banks - Capital Adequacy**

| | |
|---|---|
| Capital Adequacy Ratio (lagged) - Linear Term | -0.00661** |
| | (0.00327) |
| Capital Adequacy Ratio (lagged) - Squared Term | 0.000344** |
| | (0.000133) |
| No. of Previous Offerings (-365, -1) | 0.00873 |
| | (0.00866) |
| No. of Days Since Last Financial Report | -0.000259 |
| | (0.000306) |
| Market Cap. in bn. USD (-20) (log) | 0.00112 |
| | (0.00591) |
| Non-Investment Grade Sovereign Debt Rating (0/1) | -0.103** |
| | (0.0419) |
| Annualized Market Volatility (-71, -11) | -0.325** |
| | (0.145) |
| Stock Run-up (-262, -11) | -0.00597 |
| | (0.00641) |
| Constant | 0.0637* |
| | (0.0363) |
| | |
| Observations | 130 |
| R-squared | 0.250 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from ordinary least squares regression for CAR in the event window (-5, 5 days) for banks, with explanatory variables related to market risk, financial instability, market capitalization, stock run-up, capital market activity and capital adequacy ratio.

**Table D8: Hausman Specification Test**

| | (b) Fixed | (B) Random | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| Market Cap. in bn. USD (-1q) | -0.0162108 | -0.0028712 | -0.0133396 | 0.0040783 |
| Stock Run-up (-5q, -1q) | -0.0197524 | -0.0183234 | -0.001429 | 0.0058527 |
| Equity to Assets (-1q) | 0.0045152 | 0.0037525 | 0.0007627 | 0.0002572 |

Test: H0: difference in coefficients not systematic chi2(2) = 11.82
Prob>chi2 = 0.0080

Hausman specification test on fixed-effects and random-effects panel data logistic regression.

**Table D9: STOXX 600 – Pair-wise Correlation Matrix**

| | Market Cap. in bn. USD | Equity to Assets | Stock Run-up |
|---|---|---|---|
| Market Cap. in bn. USD | 1.0000 | -0.0659 | 0.0211 |
| Equity to Assets | -0.0659 | 1.0000 | 0.0672 |
| Stock Run-up | 0.0211 | 0.0672 | 1.0000 |

Pair-wise correlation matrix of the variables used in logistic regression in table 8.15. All variables are lagged.

# Appendix E: Robustness Test

**Table E1: OLS Regression on Cumulative Abnormal Return (-2, 2)**

| | Full sample | Unregulated | Banks | Regulated Non-banks |
|---|---|---|---|---|
| Constant | -0.0148*** | -0.0145*** | -0.0222*** | -0.0124*** |
| | (0.00107) | (0.00130) | (0.00326) | (0.00211) |
| | | | | |
| Observations | 4,953 | 3,682 | 430 | 841 |
| R-squared | 0.000 | 0.000 | 0.000 | 0.000 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from an ordinary least squares regression for CAR in event window (-2, 2) on the full sample and the different category companies

**Table E2: Cross-Industry OLS Regressions on CAR (-2, 2)**

| | Full Sample | Unregulated | Banks | Reg. Non-banks |
|---|---|---|---|---|
| Offering Size in bn. USD (log) | -0.00266* | | | |
| | (0.00141) | | | |
| Market Cap. in bn. USD (-20) (log) | | -0.000400 | -0.000913 | 0.00175 |
| | | (0.00163) | (0.00384) | (0.00232) |
| Equity to Assets (lagged) | 0.0141* | 0.0197* | -0.128 | 0.0104 |
| | (0.00816) | (0.0103) | (0.163) | (0.0166) |
| No. of Previous Offerings (-365, -1) | 0.00498** | 0.00287 | 0.0154*** | 0.00509 |
| | (0.00197) | (0.00272) | (0.00563) | (0.00320) |
| No. of Days Since Last Fin. Report | -5.99e-06 | 4.06e-06 | -0.000175 | -6.93e-06 |
| | (6.97e-05) | (9.21e-05) | (0.000187) | (0.000122) |
| Non-Inv. G. S. Debt Rating (0/1) | -0.0179 | -0.00800 | -0.0209 | -0.0306** |
| | (0.0159) | (0.0239) | (0.0295) | (0.0133) |
| Ann. Market Volatility (-71, -11) | -0.0218 | -0.00733 | -0.0710 | -0.00741 |
| | (0.0241) | (0.0338) | (0.0630) | (0.0380) |
| Stock Run-up (-262, -11) | -0.000588 | -0.00140 | 0.000960 | 0.00942 |
| | (0.00117) | (0.00107) | (0.00387) | (0.00669) |
| Constant | 0.0264*** | -0.0264*** | 0.000157 | -0.0248 |
| | (0.00692) | (0.00904) | (0.0258) | (0.0163) |
| | | | | |
| Observations | 1,839 | 1,236 | 220 | 383 |
| R-squared | 0.012 | 0.007 | 0.051 | 0.029 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows a comparison of results between the full sample, unregulated firms, banks and regulated non-banks from ordinary least squares regressions on CAR in the event window (-2, 2) with explanatory variables related to market risk, financial instability, stock run-up, offering size, market capitalization, capital market activity, and firm leverage. Log-transformed variables has been marked by (log).

**Table E3: OLS Regression on Cumulative Abnormal Return (-1, 1)**

| | Full Sample | Unregulated | Banks | Regulated Non-banks |
|---|---|---|---|---|
| Constant | -0.0141*** | -0.0136*** | -0.0224*** | -0.0119*** |
| | (0.000967) | (0.00116) | (0.00344) | (0.00187) |
| | | | | |
| Observations | 4,953 | 3,682 | 430 | 841 |
| R-squared | 0.000 | 0.000 | 0.000 | 0.000 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows the results from an ordinary least squares regression for CAR in event window (-1 to +1 days) on the full sample and the different category companies

**Table E4: Cross-Industry OLS Regressions on CAR (-1, 1)**

| | Full Sample | Unregulated | Banks | Reg. Non-banks |
|---|---|---|---|---|
| Offering Size in bn. USD (log) | -0.00397*** | | | |
| | (0.00151) | | | |
| Market Cap. in bn. USD (-20) (log) | | -0.000789 | -0.00399 | -0.000501 |
| | | (0.00150) | (0.00364) | (0.00210) |
| Equity to Assets (lagged) | 0.0101 | 0.0160 | -0.104 | 0.00273 |
| | (0.00805) | (0.0107) | (0.221) | (0.0134) |
| No. of Previous Offerings (-365, -1) | 0.00502*** | 0.00390 | 0.00983 | 0.00534* |
| | (0.00180) | (0.00240) | (0.00643) | (0.00277) |
| No. of Days Since Last Fin. Report | 4.01e-08 | -1.69e-05 | -5.27e-05 | 1.71e-05 |
| | (6.53e-05) | (8.17e-05) | (0.000259) | (9.56e-05) |
| Non-Inv. G. S. Debt Rating (0/1) | -0.0181 | -0.0304 | -0.0106 | -0.0212* |
| | (0.0172) | (0.0251) | (0.0312) | (0.0117) |
| Ann. Market Volatility (-71 to -11) | -0.0313 | -0.0139 | -0.0791 | -0.0352 |
| | (0.0201) | (0.0289) | (0.0525) | (0.0311) |
| Stock Run-up (-262 to -11) | 0.000305 | -0.000558 | 0.00501 | 0.00896 |
| | (0.000995) | (0.000799) | (0.00431) | (0.00748) |
| Constant | -0.0264*** | -0.0233** | 4.81e-05 | -0.0159 |
| | (0.00688) | (0.00923) | (0.0331) | (0.0130) |
| | | | | |
| Observations | 1,839 | 1,236 | 220 | 383 |
| R-squared | 0.017 | 0.009 | 0.030 | 0.038 |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The table shows a comparison of results between the full sample, unregulated firms, banks and regulated non-banks from ordinary least squares regressions on CAR in the event window (-1, 1) with explanatory variables related to market risk, financial instability, stock run-up, company size, firm size, capital market activity, and firm leverage. Log-transformed variables has been marked by (log).