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On the Determinants of Underwriting in Swedish Equity Offerings

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Abstract

This thesis studies the choice of floatation method using a dataset based on 703 public offerings in Sweden between 2006 and 2017. A logistic model is utilised to study the determinants of underwriting, an ordinary least square model to estimate the direct cost of floatation, and the cost of underwriting is estimated using the Heckman sample selection model. The results are generally aligned with existing research and suggest that underwriters are providers of signalling in equity offerings, but are for our sample to be considered imperfect in providing certification. In contrast to existing beliefs of shareholder takeup, the likelihood of underwriting is increasing in expected shareholder takeup from subscription precommitments. Our explanation for this is bilateral. On the one side, we argue that risk averse firms can ensure successful offerings by using a combination of subscription precommitments and underwriting. On the other side, we reason that high subscription precommitments indicate concentrations of large shareholders. Accordingly, we propose that underwriting in these equity offerings may be a result of agency problems between shareholders. Furthermore, a rights issue paradox is insinuated in the Swedish equity market. However, we limit our inference to mere indications as opposed to definite conclusions, and emphasise that an estimation of the indirect costs is needed to assert the presence of such paradox. Finally, we find that there are economies of scale of underwriting and that the cost of underwriting is decreasing in the insured share in the equity offering.

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2 Glossary

Equity offering/Equity issue – Issuing common stock.

Floatation method – Issuing equity with or without underwriting.

Fully underwritten/Firm committed underwriting – A floatation method prevalent in the U.S. in which a financial advisor buys all new issued shares in an offering.

Insured rights – A rights issue involving underwriting in a standby agreement.

Rights issue – A seasoned equity offering including right of priority to existing shareholders.

Standby agreement/Standby underwriting – An equity offering insurance in which an underwriter guarantees to buy all non-sold or non-subscribed shares.

Underwriter – A party that insures an offering, standby agreement, or buys a new issue in full, fully underwritten/firm committed underwriting.

Uninsured rights - A rights issue lacking underwriting.

3 Introduction

Despite being more expensive than uninsured rights issues, firms predominantly prefer to issue equity with insurance using underwriting (Smith, 1977; Eckbo and Masulis, 1992; Bohren et al, 1997; and Ginglinger et al., 2013). In the U.S., the most common method of floatation, issuing common stock with or without underwriting, is through firm committed underwriting (Eckbo, 2008; Lai et al, 2000). Using this floatation method, the financial intermediary initially buys all issued stock and subsequently sells the stock on the open market. However, the prevalence of this method, and other floatation methods involving underwriting, are not met without criticism. It is argued that firms are able to ensure full subscription in rights issues by offering appropriate discounts, which corresponds to a lower incurred cost than the direct cost of using underwriting. Therefore, utilising underwriting despite incurred higher costs is regarded as contradictory to wealth maximization. By this rationale, a rights issue paradox is said to be present across various domestic equity markets. The paradox is explained from perspectives of information asymmetries and adverse selection, as well as factors influencing the market performance of stock following floatation, and sometimes agency problems (Smith, 1977; Parson and Raviv, 1985; Hansen, 1989; Henkel and Schwartz, 1986; etc.).

On average, the Swedish equity market saw 70 stock offerings, initial public offerings (IPOs) and seasoned equity offerings (SEOs), per annum between late 2006 and early 2017, raising more than SEK 200 billion [2] in gross proceeds during the period. Firms issuing common stock on the Swedish equity market usually float shares uninsured or by employing standby agreement underwriting. Standby agreements are present in approximately 60 per cent of all new equity issues in Sweden and are offered in order to insure success of an equity issue. In standby arrangements, the underwriter commits to buying any shares unsold to existing shareholders or the public, thus mitigating risks of offering failure. In contrast to other markets, standby agreements in Sweden are not primarily solutions provided by underwriters in the form of financial intermediaries, such as investment banks, but are instead entered into between individual investors and the firm[3]. Moreover, the party employed as underwriter is compensated through a fee, usually some fixed per cent of the value of the insured amount of stock, which makes the contract similar to selling a put option. Likewise, underwriters are taxed accordingly (Swedish Tax Agency, 2017). Since alternatives to underwriting exist, and due to the unresolved issue of the rights issue paradox, Sweden's equity market serves as an interesting setting for studying determinants affecting the choice of floatation method.

[2] Not adjusted for inflation.

[3] The umbrella term for this arrangement is in Swedish called "*garantiåtaganden"* and the term for the party providing the underwriter is called *"garant"*.

In this thesis, we draw our empirical findings based on a uniquely extensive dataset and models inspired by existing research. The aim of this thesis is to shed light upon the floatation choice made by public firms listed on Swedish stock exchanges and to observe factors affecting the direct costs of floatation and underwriting, thus improving the understanding of firms' decision making when issuing equity. We first study the determinants of standby agreements by using a logistic model. Second, we estimate an ordinary least square (OLS) regression studying the cost of floating, in which standby agreements are serving as a dummy variable to test underwriting affects the direct cost of floatation positively. Thirdly, we estimate Heckmans's (1979) sample selection model testing the cost of standby agreements as a share of the gross proceeds in order to study factors affecting the cost of standby agreements. For our studies, we utilise a manually obtained dataset ranging from late 2006 to early 2017, covering all[4] new equity issues on Swedish stock exchanges. In order to use coherent assumptions affecting the choice of floatation methods and costs thereof, that are observable and comparable across all firms in the dataset, we utilise factors related to the equity issue itself. Additionally, we examine exogenous parameters of interest, such as economic sentiment, effects on the conditions. Our research therefore differ and complement a range of existing studies with regards to the explanatory factors in underwriting (Eckbo and Masulis, 1992; Bohren et al, 1997; Ginglinger et al, 2013).

In brief, our results indicate positive relationships between subscription precommitments, being listed on the primary exchange, issuing units, and underwriting. Accordingly, a contrast between findings in existing literature with regards to the perceived effects of shareholder takeup and issuing uninsured rights is observed. Moreover, there is a negative relationship between using lockup commitments, economic sentiment, and underwriting. In our OLS model, results are overall aligned with the existing literature and indicate the existence of a rights issue paradox on the Swedish equity market. Conclusively, our third model suggests that there exists economies of scale in underwriting and that existing subscription precommitments will decrease the cost of underwriting. Our findings contribute to the field of equity offerings and floatation methods, with particular implications to the standby decision and the rights issue paradox, and are to the best of our knowledge, unique for the Swedish setting. The thesis extends on the existing literature by using a uniquely comprehensive data set for Swedish equity offerings in terms of time relevance and quantity of observations. With additional efforts into developing the dataset, future research could focus on the shareholder dispersion of companies and the option to engage in standbys as well as other firm specific parameters such as industry classification.

The remainder of this thesis is structured as follows: In the next section, we present the literature review and thesis background; Subsequently, we present the method including a section on the data collection as well as three subsections covering the three studies conducted; Lastly, a conclusion to the study is

[4] All prospectuses approved by the Swedish FSA.

presented. In addition, we provide a last section with suggestions for future research based on our findings in the paper.

4 Literature review and thesis background

This thesis is primarily concerned with the behaviour of firms raising capital through equity issuance with particular emphasis on the floatation method and the relationships with financial intermediaries and investors. Here, the main focus is on the firms' employment of underwriters, which in the context of this thesis serve to be those parties that engage in insuring an equity offering, in part or in full. Underwriters of firms' equity offerings can accordingly be banks, other firms, or individuals. In the following section, we conduct a literature review of equity offerings and floatation methods. The literature review section is divided into two subsections, first covering literature relevant to underwriting in equity offerings and the second covering the most prominent literature regarding the choice of floatation. The section serves to provide a robust theoretical foundation for the development of this thesis. We then commence to provide a background for conducting this thesis with regards to the Swedish equity market setting.

4.1 Underwriting and equity offerings

Research concerned with firms' access to equity finance is, among other theories, often based upon adverse selection, its mitigation, and its effect on stock prices. In the role of equity offerings, Myers and Majluf's seminal 1984 article has served as an academic cornerstone, which theoretical mechanism is frequently used to explain phenomena in equity issuance, i.e. that firms may pass on issuing equity if information asymmetries between managers and shareholders are too large. Information asymmetries are expected to cause misevaluation of stock and consequently lead to issues such as adverse selection, hence requiring mitigation (Healy and Palepu, 2001). One such way to mitigate information asymmetries is arguably through the use of underwriters. The theoretical role of the underwriters in equity offerings, in the form of financial institutions or investment banks, can be explained in a multitude of ways. In practise, underwriters' roles are to gather information of investor interest, which is subsequently translated in to the valuation practises previous to the offering, according to Benveniste and Sprindt (1989). As stated previously, underwriters are also argued to possess a role in mitigating adverse selection and information asymmetries in offerings, thus aiding the firm in successfully raising capital (Booth and Smith, 1986). The underwriter can through its reputation certify the quality of the underwritten firm, and thus attract potential investors through improved information sharing (Booth and Smith, 1986). Consequently, the certification of underwriters exists as long as there are reputational costs incurred with underwriting low quality stock (Eckbo and Masulis, 1992).

The role of the underwriter can be studied in both initial public offerings (IPOs) and seasoned equity offerings (SEOs). In U.S. firm commitments, IPO and SEO underwriters are compensated through a spread or a fee. The underwriter buys the shares from the issuing firm at a discounted price, lower than the expected market price, and can subsequently sell the shares at a higher price to institutional investors and the public (Chen and Ritter, 2000). Moreover, compensation is also provided to investors in new issues. Investors in IPOs are typically rewarded through superior returns on the initial trading of the

shares, known as underpricing, or first-day returns (Rock, 1986). Observing this phenomenon in American IPOs, Ritter and Welch (2002) find that, on average, the first-day return in IPOs between 1980 and 2001 was 18.8 per cent and that IPOs during the Internet bubble during 1999 and 2000 generated an average first-day return of 65 per cent. In the Nordic stock markets, Westerholm (2006) found that first day returns on average are 7 per cent but are conditional on hot and cold markets, such as the internet bubble which drove returns higher. In theory, models of asymmetric information, among other corporate finance frameworks, are put forward to explain such behaviour of underpricing. However, there is little evidence that one model or theoretical interpretation should be dominant in explaining abnormally high first day returns (Ritter and Welch, 2002).

Nevertheless, investing in new issues is not a perfect investment opportunity for investors. Firms engaging in SEOs, as well as IPOs, serve as poor long-run investments and experience worse long-run performance than peers that for the same period did not offer equity (Loughran and Ritter, 1995; Spiess and Affleck-Graves, 1995). Spiess and Affleck-Graves (1995) argue that the underperformance can be explained by managers of the issuing firms exploiting opportunities of temporary overvaluation of the stock. Accordingly, new stock is issued when prices are expected to fall, thus resulting in poor long-run performance. Market timing as a cause for new issues is supported by Loughran and Ritter (1995), who in addition explain IPO underperformance as investors systematically misvaluating new stock due to blind optimism resulting in inflated prices.

4.2 Choice of floatation method and the rights issue paradox

In equity issues, firms are provided with a floatation choice of either offering equity by means of selling the whole issue to the underwriter, using insured rights, or uninsured rights (Eckbo and Masulis, 1992). The choice of floatation method subsequently conditions the underwriting. In American common stock offerings, equity issues are almost exclusively floated using firm committed underwriting, meaning that an underwriter buys all shares from the issuing firm and subsequently sells and allocates the shares on the market (Eckbo and Masulis, 1992). Rights with standby agreements, or insured rights, imply that the underwriter, i.e. the investment bank distributing newly issued shares, is responsible for selling all shares and reaching full commitment of existing and new shareholders. If the underwriter does not succeed in selling all issued shares, it has to buy the shares from the issuing firms and try to sell the shares on the market subsequent to the issue. Uninsured rights, imply issuing short-lived warrants to existing shareholders, through which the shareholders have the choice to subscribe to new shares offered. In this floatation method, no underwriter is utilised[5]. The amount of rights received per shareholder is often delivered on a pro rata basis, relative to the amount already held by the shareholder (Eckbo and Masulis, 1992). Historically, U.S. firms issued stock using either uninsured rights but by 1981, firm committed underwriting made up more than 95 per cent of equity issues (Eckbo and Masulis, 1992).

[5] Although, a financial advisor leading the issue is most often employed.

The underwriting used differs across domestic equity markets internationally. Similar to the U.S., firms in the U.K. have a preference for firm committed underwriting (Lai et al, 2000), while in other European domestic equity markets, uninsured rights issues and standby agreements are most prevalent in equity offerings (Bohren et al, 1997). In Norway, standby underwriting has become the most dominant form of floatation method since the 1980's and made up 61 per cent of all common stock offerings by 1993, while the rest was made up by uninsured rights (Bohren et al, 1997). Studying Swedish equity markets, Cronqvist and Nilsson (2005) found in their sample of 160 rights offerings during 1986 to 1999 that the majority 107 of the issues were unaccompanied by an underwriter while the remaining 53 were accompanied by standby underwriters.

The choice of floatation method was academically popularised after Smith (1977) first found that companies had a preference for floating shares by employing an underwriter rather than issuing uninsured rights. Since, uninsured rights issues are argued to imply significantly less direct floatation costs, which has since been supported by a range of literature (Eckbo and Masulis, 1992, Bohren et al, 1997), using firm committed underwriting should lead to less net issue benefits to the firm. Because, it is argued that the rights issuer can ensure successful offerings by adjusting the subscription price with a discount deep enough discount to attract full subscription from existing shareholders, firms would maximize net issue benefits from issuing uninsured rights rather than using underwriting. Divergent to this logic, Smith finds that underwriters are employed in over 90 per cent of offerings during the observed period 1971 and 1975 and that firm committed underwriting are more common than both standby offerings and rights issues, despite the two latter being associated with lower direct floatation costs. This academic puzzle is subsequently labelled the rights issue paradox. Since wealth-maximizing objectives do not explain the choice of floatation methods, Smith argues that agency problems do. Smith sets forth two hypotheses regarding agency problems. Firstly, that management and board of directors benefit privately from using underwriters, benefits that other shareholders are not receiving. Managers and board of directors may also receive benefits through wining and dining with underwriters, and receive bribe-like treatment for underwriting. Herman (1981) postulates that this is aligned with the possibly disproportionate presence of financial professionals on non-financial company boards in U.S. public companies, which could lead to excessive inclinations of underwriting in these firms' equity offerings. Secondly, Smith (1977) argues that the cost for employing underwriters is lower than the cost for shareholders to monitor management in the decision of choosing the wealth maximizing floatation method. Therefore, shareholders and firms are indifferent to employing firm committed underwriting or to choosing uninsured rights issues.

Further studies has been concerned with explaining the floatation method through other parameters. Hansen and Pinkerton (1982) explain the paradox through shareholder characteristics of the firm issuing equity. The rights issue paradox is argued to be a result of comparative costs associated with each form of equity financing. Uninsured rights offerings come at lower costs when the firms has a central shareholder

that holds a large amount of stock, to which a certain amount is guaranteed to be sold, and oppositely, underwriting is more beneficial when no such shareholder is present. Disputing this, Smith and Dhatt (1984) argue that Hansen and Pinkerton's empirical model is too sensitive in the functional form to provide coherent conclusions to the paradox.

Parsons and Raviv (1985) argue that firm commitment underwritten equity offerings are preferred to rights issues due to underwritten equity offerings possessing superior benefits in terms of price movements of the stock. The underwriter can initially sell stock to those investors holding new issues in high regard, those buying the stock at high valuation. If needed, the underwriter can sell the stock at a lower valuation if the issue should attract lower interest in the market. Rights offers are argued to lack this important aspect, serving as an explanation why firms have a preference for firm committed underwriting in stock issues.

Moreover, Hansen (1989) suggests that the price stability offered by underwriters comes at a lower transaction costs than what is incurred on investors in an uninsured rights issue. Thus, Hansen holds a similar view to that of Parsons and Raviv (1985), by suggesting that fully committed underwriting is compensated through favoured stock price movements. Furthermore, Hansen adds the potential costs of trading rights as another example why underwriters are employed, which would avoid this friction.

However, there are other views concerning the expensive use of underwriters, which disregards explanations related to the observed costs. Heinkel and Schwartz (1986) developing a model explaining floatation choices in equity offerings, argue that asymmetric information between investors and firms seeking equity financing will affect the firms' choice. Their model is consistent with the rights issue paradox, supporting that firms favour underwritten options despite being more costly than uninsured rights issues, and find that firms that do use uninsured rights issues do not set prices at low levels to ensure full subscription. Furthermore, Heinkel and Schwartz (1986) argue that the quality of the firms is revealed in its choice of equity offering method; firms that choose standby underwriting are of the highest quality since these firms are able to stay indifferent to subscription price; rights issues are utilised by the firms of intermediary quality, since the firm is able to set a subscription price that benefits from a signalling mechanism; and firms using fully underwritten agreements are those of lowest quality, since subscription and prices are unobservable by investors.

Aligned with Heinkel and Schwartz's (1986) arguments is Booth and Smith's (1986) hypothesis that underwriters serve as a certification of the issue being made at a correct price level when asymmetric information is present. Shareholders who are insiders and have influence an equity issue may have adverse incentives to overstate equity prices, inconsistent with inside information held. Outside investors can be made aware that the equity offering is correctly priced when certified by an utilised

underwriter. This is of course in contrast to theory regarding market timing, in which the exploiting of overvalued stock is a key driver of equity issues (Spiess and Affleck-Graves, 1995).

Perhaps the most seminal paper regarding the rights issue paradox is Eckbo and Masulis's 1992 take on *adverse selection and the rights issue paradox*. Studying the rights issue paradox in practise, Eckbo and Masulis (1992) study the choice of equity floatation methods for U.S. exchange listed firms and find that the choice of method is largely dependent on information asymmetries in the market, shareholder characteristics, and direct floatation costs. The associated factors affecting the choice of equity floatation method are further dependent on the expected shareholder takeup, the new issued equity expected to be subscribed by shareholders. Alike Hansen and Pinkerton's (1982) theories of central shareholders' effect on floatation method, expected takeup increases with precommitments of stock subscription, serving as a substitute to underwriting. Furthermore, Smith's (1977) rights issue paradox is observed for their sample; Equity offerings through fully committed underwriting and standby commitments are significantly higher than that of uninsured rights, and standby commitments come at lower costs than that of fully committed underwriting, yet, uninsured rights disappears in the early 1980's. Partly explaining this is the adoption of dividend reinvestment plans, which provide existing shareholders new shares, argued to serve as a substitution to rights offerings when managers are reluctant to cut dividends. Eckbo and Masulis (1992) further argue that a trade-off in adverse-selection cost affects the reason for firms choosing underwritten floatation methods. By employing underwriters in equity offerings, firms may minimize adverse-selection costs implied from not reaching adequate subscription in rights issues. A failed offer would lead to less proceeds and a punished stock price. Standby underwriting can thusly be motivated through the insurance against risk of rights offer failure, and furthermore, Eckbo and Masulis argue that the use of underwriting can be rational when the volatility of the issuing firm is high and the risk for rights offer failure consequently is high. Hence, firms can avoid adverse-selection costs only by having shareholder precommitments or through the use of underwriters.

Similar to U.S. listed firms, Bohren et al (1997) find comparable results on the Oslo stock exchange; Underwriting is the dominating floatation method in Norway. Bohren et al (1997) study the probability of using a standby underwriting using a probit analysis, in which expected shareholder takeup serves as a key determinant and that the use of standby underwriting is more likely when expected shareholder takeup is low. Moreover, the authors also study the market reaction to floatation methods. The findings suggest that uninsured rights issues are premiered by the market compared to standby underwriting upon public announcement.

Studying the U.K. equity market, Lai et al (2000) find that rights offers were dominant up until 1986, during which firm commitment offerings became increasingly more popular. Furthermore, they argue that the reason for the forthcoming preference for this floatation method is due to the firm not having to issue discounted uninsured rights to existing shareholder while simultaneously signalling that an underwriter is

willing to fully commit funds to the firm for the offering, which has positive effects on the stock price, aligned with the arguments of Booth and Smith (1986). Additionally, Lai et al (2000) argue that the positive influence of underwriting as firm certification, through its implied role of monitoring and dispersion of ownership, offsets the problem of adverse selection associated with having concentrated ownership in equity issues, as argued by Myers and Majluf (1984).

Balachandran et al (2008), study market reactions of equity issues and choice of floatation methods on the Australian stock market. Similarly to Lai et al (2000), Balachandran et al (2008), find that there are significant signalling benefits of floatation methods in which fully underwritten methods provide the least unfavourable market reaction in an equity issue which serves as a contrast to the theories developed by Henkel and Schwartz (1989). Balachandran et al's empirical modular findings differ to those of Bohren et al (1997), indicating that there are varying results in different international settings, calling for additional studies in new settings. Moreover, they find that subscription price discount is positively related to firm idiosyncratic risks and observed by the market, which suggests that high-quality firms exhibit an aversion to too deep discounts in offer price.

Finally, Ginglinger et al (2013) find that the choice of floatation method is dependent on stock market liquidity and shareholder takeup. An important finding is that standby underwriting is said to provide improved liquidity in comparison to uninsured rights on the observed data set of public French firms.

4.3 Background to equity offerings in Sweden

Building on existing literature, we find that testing the rights issue paradox as well as investigating floatation choice in the Swedish equity market to be a relevant topic for this thesis, and given the availability of data, Sweden serves as a strong setting.

In Sweden, firm's equity issues are usually conducted together with a financial advisor, which produces the relevant and required material. The Swedish financial supervisory authority [6] must approve any prospectuses prepared before the firm is allowed to engage in an equity offering[7]. Within the prospectus, the firm discloses, among other things, the gross proceeds of the equity offering and the costs associated with raising capital. Moreover, the firm discloses any subscription precommitments as well as other agreements present, such as lock up agreements, as well as what series of stock is being offered. The use of standby agreements or underwriters is disclosed and, furthermore, the compensation for these arrangements is often presented as part of the total cost of the offering. The compensation is often disclosed in absolute figures but also as a percentage of the amount of stock insured by the standby agreement. In addition, the identities of standby agreement underwriters are presented.

[6] Sw. *"Finansinspektionen"*.
[7] Historically, some issues may not have been processed by FI but are not included in the sample.

In Sweden, firm committed underwriting is, to our knowledge, virtually non-existent, whereas new issues are usually floated through uninsured rights or by using standby agreements in SEOs and with or without standby agreements in IPOs. Thus, Sweden's conditions of underwriting are to a large extent alike that of what Bohren et al (1997) observed in the Oslo stock exchange. The Swedish equity markets and stock exchanges serve as an interesting setting for studying choice of floatation method and the rights issue paradox due to underwriting typically being conducted by individual investors. Moreover, the standby underwriter is taxed equivalent to a seller of a put option, since the mechanism for both contracts are the same (Swedish Tax Agency, 2017). Additionally, parties involved in the standby agreements can also be firms, banks and other financial advisors. Individual investors are many times existing shareholders holding significant share of stock the company, sometimes defined as blockholders (Ginglinger et al, 2013), but can also be investors that at the time lack ownership within the issuing company. Moreover, firms provided the opportunity to act as standby underwriters are many times representing some major shareholder within the issuing company. Banks and financial advisors, which represent a minority of underwriters, also have the opportunity to insure rights using standby agreements and act much like their international peers in the offering. Furthermore, these parties can also play a role in providing services adjacent to the offering, such as providing liquidity in the in the aftermarket. The process of finding and choosing individuals and parties for standby agreements is in this unobservable. A 2010 interview with Swedish financial advisors suggests that large shareholders in the issuing firm are often chosen as underwriters and in case where no such shareholders are present or interested, external parties are consulted (Gustavsson and Lindström, 2010).

4.4 Background to thesis

The issuer of stock will select the floatation method that maximizes the net issue benefits and thus, underwriting is justified when being more cost efficient than issuing uninsured rights (Eckbo and Masulis, 1992). Consequently, the direct cost of underwriting in standbys should be less than the indirect costs rights issues. Hence, the purpose of the standby underwriter is arguably to ensure successful equity offerings and, as a result of the firm employing an underwriter, instil more confidence among investors concerned with the success of the offering. Increased interest in subscribing to the offer should cause reduced indirect costs from risk of offering failure. Accordingly, arguments for using costly underwriters are founded on minimising information asymmetries through signalling and certification (Booth and smith, 1986; and Smith, 1989) and other ideas related to benefits of underwriting or decreasing indirect costs of rights issues. Should this not be true, a rights issue paradox might be prevalent and the use of underwriters could instead be explained by alternative theories, such as agency problems first suggested by Smith (1977).

Since firms in Sweden issue equity using uninsured rights or by using standby underwriting, where not only financial institutions but also individual investors can take on the roles of underwriters, the rationale for using underwriting becomes complex. While, Booth and Smith's (1986) theory of certification hold for

banks serving as underwriters in Sweden, helping to mitigate information asymmetries, the majority of Swedish underwriters are not banks. Naturally, this theory could be extended to include individual investors as providers of certification, similar to Leland and Pyle (1977) theory for investors with inside information willing to invest in projects and consequently signalling to other investors. In this case, individual investors serving as standby agreement underwriters could signal the quality of the company through their informational advantage and ability to signal the true quality of the firm and its investment opportunities. However, should the standby underwriter be unknown to the public and the exploits of little significance, the use of a standby underwriter could instead be explained by the existence of potential agency problems. Large shareholders with influence over choice the floatation method could promote standby agreements in which the influential shareholders themselves are elected as underwriters. Given the fee structure in standby underwriting, the underwriters can in successful offerings be remunerated without committing capital, and in unsuccessful offerings increase existing ownership at reduced share prices. Here, the influential shareholders serve as agents acting in the interest of the minor shareholders, the principals. The agency problem thus lies in the choice of underwriting, instead of maximizing net issue benefits. Based on existing theory, the use of underwriting can thusly be viewed from two rather conflicting perspectives; Firstly, the use for underwriters is justified as a means to mitigate information asymmetries through certification and other benefits; Secondly, the use of standby underwriters is due to existing agency problems in which major shareholders, representing the minor shareholders, can benefit from acting as standby underwriters.

Our research intends to explain the determinants of underwriting, investigating if a rights issue paradox is present, and to understand the drivers of underwriting compensation. Unlike some of the chosen independent variables, being to a large extent focused on firm specific information, in existing studies such as Eckbo and Masulis (1992), Bohren et al (1997) and Ginglinger et al. (2013), we have chosen to base our studies on issue specific variables, and added a variable that relate to the economic sentiment among Swedish firms and investors. Our independent variables are thus comparable across time and firms, and are not subject to, for example, different accounting standards across exchanges.

5 Method

In the following section, we present the data collection process and the nature of our data. Following this we present three subsections of our empirical models.

5.1 Data Collection

The data used in this study is manually derived from prospectuses that have been approved by the Swedish Financial Supervisory Authority[8] between October 2006 and January 2017, thus extracting a fully comprehensive data set with regards to the availability at the time of conducting this study. Because this study is based on observing how firms make use of underwriters when conducting equity offerings, we select a relevant sample where such transactions are identified. This section will cover the process applied to identify the relevant prospectuses and the steps conducted when collecting the relevant variables.

According to the Swedish FSA, there are two occurrences when firms must prepare prospectuses. The first being that tradable securities are offered to the public, for example through an equity issuance, and the second being that tradable securities are admitted to trading on a regulated market. Since our study builds on transactions and corresponding prospectuses where firms have issued equity, all prospectuses connected to not issuing equity, such as take-over bids, switching exchanges, and bond offerings will be excluded. Furthermore, offerings exclusively targeted towards a particular group of people, such as employee stock purchase plans or direct equity issues will be excluded because underwriters will not be able to take a part in such a transaction.

Upon having applied the above stated conditions, the sample is further scrutinized and additional prospectuses are excluded. In line with Bohren et al (1997), we only include firms that are listed on the major exchanges, thereby excluding firms from alternative trading platforms such as *Alternativa aktiemarknaden*, *Mangoldlistan,* as well as other public firms which shares are not regularly traded. The underlying reason is that firms traded infrequently are unaffected by the market's efficient pricing of their shares, and furthermore, that such firms' information sharing is rather limited, not least due less strict demands from regulators. Included transactions comprise of the ones made by firms that are or are to be traded on a regulated market or a multilateral trading facility (MTF)[9,10].

[8] Transactions of the nature included in this study may be conducted without establishing a prospectus such as when the offering is spread among less than 150 retail investors in a state within the EEA. However, to our knowledge prospectuses admitted by the Swedish FSA represent a majority of all public equity transactions.

[9] Aktietorget (MTF), First North/First North Premier (MTF), NGM Equity (Regulated Market), Nordic MTF (MTF) and Nasdaq Stockholm (Regulated Market).

Furthermore, we exclude transactions where preferred shares are issued. Since preferred shares do not render any ownership in the issuing firm, but instead implies a liability towards for the issuer the instrument does not have the same properties as common shares. Applying this as our last selection criteria, we reduce our sample from approximately 1 100 to 703 prospectuses representing an equally large number of equity offerings, that have been conducted between October 2006 until January 2017.

From the sample of prospectuses, we derive a number of issue-specific variables, such as if underwriters have been employed. We also include a macro-related variable that aims to measure the overall economic sentiment through the confidence among consumers and corporates. Moreover, the information on floatation costs is extracted from the prospectuses of the associated offerings, in which direct cost of floatation is provided including a specification of the cost of underwriting if applicable. Although some of the firms included in our sample conduct seasoned equity offerings multiple times during the period, the vast majority only occur once and the data set does therefore not exhibit a panel data structure. In conclusion, the information provided in our sample should serve as a relevant and sufficient foundation for our estimations.

5.1.1 Data reliability

The dataset used in this study consists of manually collected data, as well as data derived from the *National Institute of Economic Research's* (NIER, Sw. "*Konjunkturinstitutet*") Economic Tendency Survey Indicators. There is always a downside risk related to collecting data manually, not least due to human errors in the collection process. However, collecting the data manually also implies a higher probability that the data has been less exploited in prior studies. Although the Swedish FSA does not guarantee the content of a prospectus, there is a fairly rigorous scrutiny process the proceeds the publication of a prospectuses, and therefore we suggest that that part of our data set is to be considered as reliable. We also find it reasonable to assume that the data from the NIER is reliable.

5.1.2 Limitations to sample

There are some areas of limitations with regards to the existing sample. For example, limitations are made due to the lack of historical records to some of the companies existent in the sample. Many of the firms do not exist in present day and we have lacked the resources needed for retrieving some parameters of interest, such as stockholder composition. To counterpart some of the limited parameters we use proxy variables supported by academic theory instead. Furthermore, with respect to certain variables that involve monetary values we have not made any adjustments for inflation. Fortunately, the inflation rate in Sweden

[10] Prospectuses that have been passported from other EU countries have been excluded if the firm is not primarily listed on any of the mentioned exchanges or MTFs. This limitation also implies that depositary receipts are excluded from this study since such an instrument is used when the firm is cross-listed.

has been relatively low during the period from which we have taken our sample and furthermore we have been able to utilize fractions rather than absolute numbers in most of the models, so the overall effect should not impact our results in a significant manner.

A goal of our dataset is to find relevant information that explains firms' choice of underwriting. The decision of making an equity offering is taken by the board of directors and shareholders at a general shareholders meeting at a time specified in the prospectus. However, the time when the firm made a decision on floatation method is not disclosed. From insights of our sample, we believe that the choice of floatation method is secondary to the choice of making an equity offering and the decision is likely to have been made between the choice of issuing equity and the publication of the prospectus. Although, firms have the opportunity to provide a prospectus supplement (*Sw. Tilläggsprospekt*) in which changes to the original prospectus has occurred, such as the choice of employing standby underwriters. In summary, since we cannot extract the timing of the decision of floatation method, we cannot make an exact inference on when the decision has been taken place and we have to rely on general assumptions with regards to the time coverage of our economic sentiment variable.

5.2 Empirical models

Departing from the data described above, we will in the following sections present the three models that this thesis is based upon. Quantitative methods are employed for all research. The first model is a logistic model aiming to estimate the probability that a firm makes use of underwriting when issuing equity. That model makes use of 703 observations, while models two and three are based on 517 and 407 observations respectively. The second model is estimated using the OLS method and covers costs regarding floatation, while the last specification, for which we apply Heckman's sample selection method, estimates the cost of underwriting. Furthermore, because our samples are relatively large in all models we will, in accordance with Brooks (2015), throughout the thesis assume that the data is normally distributed.

5.3 Logit model for the standby decision

In the following section, we aim to study the floatation choice among Swedish firms offering equity. We study the determinants of using a standby agreement based on our sample of 703 observations of equity offerings in Sweden during the period late 2006 to early 2017. All equity offerings from our data collection are used and include both SEOs and IPOs as both offerings frequent standby decisions as a floatation choice. Table 1 presented below sets forth some interesting statistics regarding Swedish floatation methods.

Year	No offerings	SEOs	IPOs	Per cent standbys, All offerings	Per cent standbys, SEOs	Per cent standbys, IPOs
2006[11]	14	9	5	43%	44%	40%
2007	77	40	37	40%	55%	29%
2008	61	49	12	64%	78%	8%
2009	78	75	3	65%	67%	33%
2010	79	68	11	63%	71%	18%
2011	62	50	12	61%	72%	17%
2012	55	51	4	65%	71%	0%
2013	42	36	6	67%	75%	17%
2014	60	39	21	62%	79%	29%
2015	69	36	33	52%	78%	24%
2016	101	60	41	50%	68%	24%
2017[12]	5	4	1	80%	100%	0%
Total	**703**	**517**	**186**	**58%**	**71%**	**23%**

Table 1. Statistics on floatation methods in Sweden between late 2006 to early 2017. The data is derived from the 703 prospectuses on which this thesis is built.

As table 1 shows, equity offerings in Sweden are made up of a mix of SEOs and IPOs, in which SEOs make up the majority of offerings. Underwritten offerings for all years constitute a majority of offerings as a total. However, regarded separately, it is apparent that underwritten issues are more common in SEOs than IPOs. A majority of SEOs included in the sample are accompanied by an underwriter, with highest share of underwriting in 2008, 2014, and 2015, and lower shares of underwriting in 2007 and 2016. This is

[11] The prospectus register was launched by the Swedish FSA in October 2006.
[12] Sample cut-off point January 31st 2017.

in contrast to what Cronqvist and Nilsson's (2005) 1986-1999 samples of Swedish equity offerings exhibited, in which 53 SEOs out of 160 were underwritten, indicating that there is a clear increased propensity to utilize underwriting over time. However, in our sample, little intuition is provided to weather an increased propensity for underwriting is observable as a trend across 2007-2016 for Swedish firms. Similar levels of standby underwriting is although found in Bohren et al's (1997) 1980-1993 in which roughly 60 per cent of common stock issues were accompanied by standby underwriters.

As firms issuing equity on the Swedish stock market has a binary floatation choice, using or not using underwriting, a logistic model aligned with existing literature to estimate determinants is deemed appropriate. Bohren et al. (1997) use a two-step analysis involving an OLS and a probit model to explain firms' standby decision in SEOs. After having estimated shareholder takeup in an initial model, a probit regression is estimated. Here, shareholder takeup as well as stock and market volatility are used as independent variables. Bohren et al (1997) find shareholder takeup and firm volatility to be significant in explaining a lower probability in using a standby while market volatility is insignificant. Cronqvist and Nilsson (2005) use a nested logit model to study the firm choice between issuing equity in SEOs or in private placement. As opposed to Bohren et al (1997), Cronqvist and Nilsson's coefficient for idiosyncratic risk is positive but insignificant. Ginglinger et al (2013) use a multinomial logit analysis to study three floatation choices in French companies issuing equity using standby rights, mixed and pure public offerings. Ginglinger et al's (2013) model includes issue specifics, such as gross proceeds as well as firm specific variables, such as shareholder concentration and stock liquidity. They find that high liquidity firms are more likely to use standby underwriting.

5.3.1 Variables

Due to existing literature's results concerning firm specific characteristics and a lack of possibility in extracting similar information for many of the firms, such as shareholder characteristics and idiosyncratic risks, our model is developed with the issuing environment in mind.

We use subscription precommitments (*SPRE*) inspired by Eckbo and Masulis's (1992) and Ginglinger et al's (2013) variables for shareholder concentration. The variable is expressed as a per cent, and represents the percentage of shares presubscribed in the offering. Here, the mean observation is ca 26 per cent and the median ca 21 per cent. Subscription precommitments can be used as a substitute to underwriting, since a large expected shareholder takeup, which is the logical consequence to large precommitments, should imply lower risks of offer failure. Based on these assumptions, we expect subscription precommitments to add a negative relationship to the probability of using underwriting, the probability of underwriting decreases with precommitments. However, it is important to state that while literature such as Bohren et al (1997) argue that large shareholder concentration in firms should be aligned with the firm making value maximizing decisions from these shareholders monitoring management, and thus choosing not to use underwriting, underwriting in Sweden can in fact be engaged in by large shareholders. This

could instead present an agency problem among shareholders. Where major shareholders, the agents, represent the minor shareholders, the principals, and have incentives to engage in underwriting, despite being more costly for the firm, since they would benefit from remuneration of their underwriting. We therefore find that shareholder concentration as a parameter itself lacks purpose in this study, why we choose to ignore it in favour of shareholder precommitments.

In order to properly capture the level of information asymmetries, we use the variable *PRIMEX*, a dummy variable stating if the firm is listed on the primary exchange in Sweden. Furthermore, being listed on the primary exchange also implies a more thorough accounting disclosure than alternative exchanges and possibly improved liquidity. Here, we are inspired by the theories regarding certification (Booth and Smith, 1986), arguing that firms listed on this exchange are associated with a higher degree of quality. On the one hand, should firms listed on this exchange be more prone towards underwriting, theories of quality firms using underwriting to properly signal their quality could hold true (Heinkel and Schwartz, 1986). On the other hand, firms listed on exchanges associated with a lower degree of quality could be at higher risk of offer failure or adverse selection costs, and therefore be more at need of underwriting indicating that *PRIMEX* should serve to be negative. However, it is important to critically regard the certification and signalling benefits associated with underwriting in our study, since underwriters in our sample are imperfect at providing these benefits. Therefore, our initial expectations are that firms on the primary exchange are in lower need of underwriting due to their implied disclosure benefits that may mitigate adverse selection.

An additional variable that proxy information asymmetry is added. *UNITS* is a binary variable that register 1 if the issuing firm offers units, a combination of shares and warrants or other option-like instruments, and 0 if not. Byon and Moore (2003) use units as a dependent variable in a logit model and find that firms that experience higher volatility as well as young firms tend to issue units. We expect that units are associated with a higher degree of risk of offering failure as well as higher degrees of information asymmetries, and we therefore expect the *UNITS* coefficient to be positive in explaining the use of underwriting.

Mitigating information asymmetries between the firm and investors through preventing potential agency problems with invested managers, lockup contracts imply that key investors in the company are not to sell shares after the equity offering and thus communicating long-term intentions among these owners. Brav and Gompers (2003) study lockups as signals of firm quality, commitment devices to mitigate moral hazard, and lockups as a means for underwriters to extract additional compensation. The study finds that lockups are effective as commitment devices and for signalling purposes. The variable *LCKUP* is in our model a binary variable which takes on the value 1 if the firm has any lockup provisions outstanding and 0 if not. Based on the purpose of lockups and Brav and Gompers findings, we expect that *LCKUP* to have a negative relation to the probability of underwriting.

To complete our regression, we choose to add, *ETI*, for this type of estimation. The variable *ETI* represents economic sentiment based on the index *Economic Tendency Indicator (Sw. "Barometerindikator"),* as provided monthly by the Swedish NIER. The indicator is generated from a survey sent to Swedish businesses and households quantifying their beliefs and confidence in the Swedish economy. This variable is inspired by the idiosyncratic risks and market risk measurements existent in literature, aimed at explaining floatation choice (Eckbo and Masulis, 1992; Bohren et al., 1997; and Ginglinger et al, 2013). While not perfectly comparable across domestic markets, we find this to be a relevant complement in research, particularly since market risk having indicated to be insignificant in Bohren et al's probit model (1997)[13]. For the monthly indicator to be of relevance in our study, we take the mean of the six months previous to the last day of the subscription period. When estimating idiosyncratic and systematic risk, existing research use time frames between 310 (Bohren et al, 1997) to 5 days prior to equity offering announcement (Gingliner et al, 2013). We choose our time span to fully absorb the prevailing economic beliefs that are occurring when the firm decides upon using standby underwriting in its offering. Due to the fact that this indicator is based on monthly data, the variable is not unique for each issuance but is the same for firms issuing equity in the same period. This makes the variable interesting across the time dimension. A negative coefficient should be able to indicate if firms engage in standby underwriting as a means of mitigating risks of offer failure in times when the economy has poor expectations. Descriptive statistics are presented in table 2 below.

	Underwritten	*SPRE*	*PRIMEX*	*UNITS*	*LCKUP*	*ETI*
Mean	0.579	0.255	0.320	0.081	0.310	100.768
Median	1	0.211	0	0	0	102.500
Maximum	1	1	1	1	1	115.900
Minimum	0	0	0	0	0	69.367
Std. Dev.	0.494	0.258	0.467	0.273	0.463	10.870
Observations	703	703	703	703	703	703

Table 2. Descriptive statistics that cover variables included in the logit model for standby decision. The table contains the binary dependent variable *Underwritten* representing if the firm made use of an underwriter in the issue. Subscription precommitments (*SPRE*) represent the fraction of the issue that had been subscribed to upon issuing the prospectus, while primary exchange (*PRIMEX*), units and lock-up (*LCKUP*) are binary variables that take on the value one if correct, and zero otherwise. The macroeconomic sentiment is measured through the *ETI* variable.

[13] We initially tested for market risk but found that the measurement likely to be imperfect without support of idiosyncratic risk which resulted in insignificant coefficients in the model.

5.3.2 Model and execution

The first model is specified accordingly:

$$Underwritten_i = \alpha + \beta_1 * SPRE_i + \beta_2 * PRIMEX_i + \beta_3 * UNITS_i + \beta_4 * LCKUP_i + \beta_5 * ETI_i + \epsilon_i$$

Specification 1. Logistic regression.

In line with what has been discussed previously, a logistic approach is utilized when estimating the above specified model. A logistic model is a transformed version of the linear model that is based on the cumulative logistic probability distribution, which constrains the variables included in the specification to not take on values outside the scope of the binary dependent variable. The steps involved in the transformation from a linear model to a logistic model as well as a figure that illustrates the differences between the models can be found in appendix 1. Upon conducting a logistic model, it is important to pay attention to its underlying assumptions. Amongst them are that the model is assumed to be correctly specified, implying that it is neither over nor under specified. Another factor that must be taken into consideration is that this kind of non-linear model is known to be inconsistent if for example unmeasured heterogeneity or heteroscedasticity is present (Greene 2012). This implies that we add yet another assumption to the model. Although one could try to alleviate the potential issue with heteroscedasticity by estimating robust standard errors, it would not solve the actual issue since the robust standard errors for an estimation that is in other ways inconsistent will not solve the issue. Due to these circumstances, we conclude that heteroscedasticity is not dealt with in this particular model. However, other potential problems remain: one of them is the possible issue regarding the time series component of the model: the *ETI* variable. In order to decipher the actual effect rendering from the *ETI* variable, one must test if the observations are trend stationary (Greene, 2012). In line with this, an augmented Dickey Fuller test is conducted, see appendix 2, and results show that the data exhibits stationarity, which may partly be a consequence of the variable building on an index that reverts around 100. Following the stationarity test, we continue the diagnostic testing by utilizing a number of standard evaluations related to the potential problem stemming from multicollinearity. Because multicollinearity can result from bivariate relations between independent variables as well as from complex relations involving several of the independent variables, the issue is evaluated using three different methods. First of all, we conclude that no bivariate correlation is near the critical threshold of 0.8 (Franke, 2010), thereby exhibiting any risk of multicollinearity. Following this, we observe that no standard errors from the output are especially large relative their respective coefficient values. And lastly, variance inflation factors (VIF) are observed only to conclude that none of them pass any critical threshold such as the commonly used VIF>10 (Burns and Burns, 2011). Calculations are provided in appendix 3.

Based on the above presented information, the model is assumed to produce consistent and unbiased output. Following this, it is vital to evaluate the goodness-of-fit of the model relative the data applied. In doing so we first observe that the pseudo R^2 of the model is approximately six per cent. The pseudo R^2

differs slightly from the ordinary R^2 which is accompanied by ordinary linear models in that it is not based on minimizing the residual sum of squares, but instead is based on maximizing the log-likelihood function (Brooks 2015). A consequence of this is that the interval of what is an excellent fit of the model is reduced to an R^2-value of around 20 to 40 per cent (McFadden 1979), which implies that our result may be interpreted as a good enough fit. Second we estimate the models predictability properties and in that we apply a cut-off point at 0.5 rather than 1 because our data is approximately balanced between 0/1-observations. The output from the test shows that 65 per cent of the observations are correctly predicted, however, with a bias towards the observations where an underwriter is present that showed an 85 per cent predictability rate. See table 3 below, for illustration (complete output table can be found in appendix 4).

		Prediction (cut-off 0.5)	
		1	0
True value	1	344/85%	189/64%
	0	63/15%	107/36%

Table 3. Goodness-of-fit results for the logit model.

5.4 Direct cost of floatation

Having observed the probabilities of utilising standbys in equity issues, we follow the studies of Bohren et al (1997), Eckbo and Masulis (1992), and Ginglinger et al (2013), and estimate the costs of floatation. Estimating the direct cost of floatation, and the relationship underwriting has to this cost, is key to the investigation of a possible rights issue paradox within the domestic Swedish equity market. A positive effect of standby underwriting on the cost of floatation should provide support for the possibility of the existence of a rights issue paradox on the Swedish market. In order to determine that a rights issue paradox is present, indirect cost of floatation would have to be compared. However, this is outside the scope of this thesis.

In this study, we narrow the sample to those issues that involve rights, which therefore excludes IPOs, rendering a sample of 517 common stock issues made by 280 companies. As was disclosed in table 1, the majority of SEOs utilised underwriting, which suggests that the Swedish equity market too could be affected by a rights issue paradox. Some further insights are provided in table 4 below.

Issue characteristics *Disclaimer: Figures unadjusted for inflation*	Mean	Median
Gross proceeds, MSEK	342 713 482	45 000 000
Issuing cost, SEK	6 880 112	2 800 000
Underwriting cost, SEK	6 295 027	1 200 000
Cost of floatation (Total), SEK	13 175 139	4 000 000
Cost of floatation (Total), % (Cost of floatation/Gross proceeds)	9%	8%

Table 4. This table shows issue characteristics that have been observed in the sample. Gross proceeds as well as costs in absolute values have a relatively high variance, while the cost of floatation as a percentage indicates that it, no matter of issuing size, has a similar distribution.

The issue specific information in table 4 above provides some intuition to the sample at hand. Companies issuing equity in Sweden do so in substantially varying quantities, as is suggested by the large difference between the mean and median of gross proceeds. However, the difference between the mean and median in direct cost of floatation as a percentage show increased similarity among the companies, making this part of the estimation highly comparable.

Eckbo and Masulis (1992) first suggested to use a multivariate framework to estimate direct floatation costs, instead univariate model, such as Smith's (1977) comparisons. In Eckbo and Masulis (1992) model, they use an OLS specification with direct floatation costs as the dependent variable, expressed as a

percentage of the issue related expenses, including underwriter fees, as a share of gross proceeds. Firm specific variables such as shareholder concentration, new shares issued, the firm's idiosyncratic risk, expressed as the standard deviation of stock price over a specified period, and change in shares outstanding as a result of the offering, make up the majority of the independent variables. Additionally, they use issue specific information, such as natural log of gross proceeds as well as dummy variables on floatation methods. Most of the parameters are significant, indicating the model to be successful at estimating the cross sectional variability of floatation costs. Moreover, Bohren et al (1997) use a similar cross sectional model for their sample and add stock market standard deviation as a risk measure of market risk. Their model lacks significance in most of the explanatory variables but nonetheless generates an R^2 of 38 per cent. Ginlinger et al's (2013) model approximates that of the aforementioned authors' models but in addition adds a shareholder takeup and a liquidity component, based on floatation methods having different effects on share liquidity.

5.4.1 Variables

Significant and observed in all aforementioned methods is that underwriting is linked to higher floatation costs. We use a multivariate model inspirited by existing literature, but adjust for the information available to us. We use *DFC,* direct floatation costs, i.e. underwriter fees and other expenses paid in the issue, as a share of gross proceeds. The variable is normalized and thus comparable across the sample and is the dependent variable in this regression.

Regressing on *DFC*, we use a set of issue specific variables including the natural log of gross proceeds, *PRO,* as inspired by existing literature on direct cost of floatation (Eckbo and Masulis, 1992; Bohren et al, 1997; and Ginglinger et al, 2013). We include subscription precommitments, the *SPRE* variable from our logit specification, which can be said to substitute aforementioned literature's measurements of shareholder concentration and expected takeup. *UNITS* is added, and to our knowledge unique for estimating floatation costs in any setting. We use *UNITS* as a binary variable due to the combination of instruments it represents in an issue and because of its signal of firm characteristics; Young and volatile firms issue units according to Byon and Moore (2003). *ETI* is used as a substitute to risk and volatility measures used in existing literature, but also provides an intuition if economic sentiment help explain floatation costs. Lastly, *STAND* is a dummy variable that takes the value 1 if the firm has chosen to use a standby underwriter and 0 if not, which is inspired by the models of aforementioned research models (Eckbo and Masulis, 1992; Bohren et al, 1997; and Ginglinger et al, 2013).

Our expectations are aligned with the results of existing literature. We expect to see a negative relationship between gross proceeds and the cost of floatation as Eckbo and Masulis (1992) found in their study. This is motivated by the argument of economies of scale with regards to the associated services provided by the financial advisor. Consequently, we believe that firms issuing smaller gross proceeds will have higher relative costs of raising capital through equity.

We expect that subscription precommitments reduce the percentage cost due to larger precommitments leading to a higher expected takeup and, accordingly, less share distribution services provided by the advisor. This is aligned with the shareholder takeup ideas of Eckbo and Masulis (1992), which shaped Bohren et al's (1997) and Ginglinger et al's (2013) direct cost of floatation regressions.

Because units are associated with young and high-risk companies (Byon and Moore, 2003), we believe that they should lack bargaining power with regards to the costs linked to the issuance. Moreover, since units are combinations of stock and options, their generation could stipulate additional efforts by the financial advisor, thus leading to increased costs. Before using this variable, we have made sure that no noteworthy correlation between it and *PRO* exists.

With regards to the economic tendency indicator, *ETI*, we believe that issue-related expenses should decrease as economic sentiment rise. We assume, on a theoretical level, that confidence and optimism in the stock market should stipulate believes of improved offer success rates and therefore lead to decreased efforts by or reduced costs to the financial advisor. We assume that the financial advisors should in good times experience more business and therefore compete by reducing prices. It is important to mention that Bohren et al's (1997) measurement of the market's standard deviation proved to be insignificant in explaining both direct floatation costs and the standby decision. Here, we hope that *ETI* should be more effective in explaining direct floatation cost by being better at capturing aspects important of direct floatation costs.

Finally, we believe that the use of underwriters should be positive in affecting the cost of floatation, as is aligned with existing theory and serves as foundational to discourse of a rights issue paradox (Eckbo and Masulis, 1992; Bohren et al, 1997; and Ginglinger et al, 2013). Naturally, a positive relationship between using underwriters and direct floatation costs can be explained by the standby underwriter providing additional services through insuring the offering against risk of failure. However, the cost incurred will be dependent on who is underwriting. For example, an under diversified individual investor may require higher remuneration to provide underwriting than a diversified bank. Therefore, the remuneration made to underwriters, which we assume to vary between issues, will affect the outcome of this variable. An insignificant or negative coefficient should therefore suggest that a rights issue paradox is non-prevalent in the Swedish equity market. Descriptive statistics are provided in table 5 below.

	Direct cost of floatation	PRO	SPRE	UNITS	ETI	STAND
Mean	0.093	17.901	0.267	0.085	99.268	0.706
Median	0.088	17.622	0.242	0.000	102.017	1.000
Maximum	0.306	24.043	1	1	115.900	1
Minimum	0.000[14]	15.151	0	0	69.367	0
Std. Dev.	0.051	1.481	0.245	0.279	11.669	0.456
Observations	517	517	517	517	517	517

Table 5. Descriptive statistics covering variables included in the model estimating the direct cost of floatation. The first variable represents the cost of floatation, which is calculated as the issue costs though the gross proceeds. Remaining variables are presented in the following order: log of issue proceeds (*PRO*), subscription precommitments (*SPRE*), units, macroeconomic variable (*ETI*) and standby agreement (*STAND*).

5.4.2 Model and execution

The model described above is specified below.

$$Direct\ floatation\ cost_i = \alpha + \beta_1 * PRO_i + \beta_2 * SPRE_i + \beta_3 * UNITS_i + \beta_4 * ETI_i + \beta_5 * STAND_i + \epsilon_i$$

Specification 2. OLS model.

In contrast to our first model, where we observed the binary choice between using an underwriter or not, our second model has a dependent variable that can take on all values between 0 and 1. Although the independent variables still should not take on values that exceed or go beneath the 0 to 1 interval, we may not utilise a logistic regression due to its underlying assumptions, for example that the dependent variable must be dichotomous. Instead, we apply an ordinary least squares method, which also aligns with previous studies, such as Eckbo et al. (1992), and thereby allow for linear relationships as well as normally distributed independent variables.

The OLS technique aims at minimizing the residual sum of squares by fitting the most appropriate line through the regressors of the model. This implies that the explanatory factor R^2 can be interpreted as the per cent of the variation in the dependent variable that can be explained by the independent variables, which thereby makes it slightly easier to interpret compared to the McFadden version that is provided in the logistic model. Albeit that particular benefit associated with OLS estimations there are a number of potential risks, such as heteroscedasticity and multicollinearity, which must be controlled for in order for us to get an unbiased and reliable output. We test for heteroscedasticity by conducting White's (1980) test and render results, which are shown in appendix 5, that provide us with the information that the data is homoscedastic, and therefore we may estimate the equation using ordinary standard errors. Following that we evaluate possible multicollinearity within our sample. The first step in doing so is to observe bivariate linear correlations between the independent variables. However, because the variables *UNITS* and

[14] One issuer had its issuing costs paid by its main owner, second to smallest cost in the sample was 0.005.

STAND are binary, and therefore do not exhibit typical linear properties, we exclude those from this correlation matrix. Observing the correlations between the remaining variables, we find no values exceeding the threshold of 0.8 (Franke, 2010). In order to assess the binary variables potential impact on multicollinearity in the model we also study the variance inflation factors (VIF), which furthermore adds an additional aspect to the multicollinearity analysis as they depict the effect that each variable would have on its respective variance factor due to collinearity. Our findings show that none of the variables are associated with a VIF value that exceeds the acceptance range that is set at VIF>10 (Burns and Burns 2008). Finally, we utilize Klein's rule of thumb (Klein, 1962) by studying the auxiliary regressions and observing whether the explanatory factor (R^2) in any of the outputs exceeds the value observed in the main model, where all variables are included. Because this method demands a comparison between the main models R^2-value and auxiliary regressions' R^2-values, we chose to estimate all auxiliary regressions using ordinary least squares technique, independent of if the dependent variable is continuous or binary. By doing this, our results could deviate slightly from those that would have been found if we conducted the auxiliary regressions based on the optimal model for each dependent variable. Nevertheless in large, we assume that the results are similar and we instead focus on utilizing the optimal method for binary variables in the first main model of this study, the logistic model. Based on the above discussion, we however find that the results from the auxiliary regressions do not exhibit any signs that force us to believe that the overall model suffers from multicollinearity. The output from our estimations regarding bivariate correlations, VIF and auxiliary regressions can be found in appendix 6.

5.5 Cost of underwriting

Subsequent to having estimated determinants of underwriting and floatation costs, as well as concluded that a rights issue paradox could be prevalent in the Swedish equity market, we initiate a third complementary model that estimates the cost of underwriting. The model serves as a complement to the studies conducted thus far in this thesis and could contribute to improved understanding to our results. Here, we are concerned with examining the relative share of standby remuneration, the cost of underwriting, relative to the gross proceeds.

In this study, we have limited our sample to those issues that include standby underwriting, SEOs and IPOs. This restricts the number of observations to 403. Like the model for direct cost of floatation, we use a multivariate framework. We use variables from our preceding models and an additional independent variable.

5.5.1 Variables

To this model, an additional independent variable of interest is added, the natural logarithm number of standby underwriters in the offering, *UWRITERS*. We add this variable mainly for observational purposes and set no initial expectations on its outcome in the estimation. Arguably, larger numbers of underwriters could increase the underwriting cost, if the additional underwriter insures an additional amount of stock. Altınkılıc and Hansen's (2000) found that firms requiring additional underwriter services incur higher costs in their offerings. However, the number of underwriters could also be independent of the proportion the fees make out of the gross proceeds, as different shareholder characteristics and underwriter characteristics may be prevalent. For example, a poorly diversified underwriter may require higher remuneration for its engagement, should he alone bear the burden of underwriting. On the contrary, a larger number of underwriters could split the risk and thus requiring less compensation. There exists to our knowledge no limitations regarding the underwritten share allocated to each underwriter.

Again, we use *PRO* as an independent variable. On the one hand, we expect that firms with low gross proceeds, arguably smaller firms, to have higher costs associated with raising equity, such was the case in the estimation of direct floatation cost. Therefore, we believe the costs associated with utilising standby agreement to have a negative relationship with gross proceeds. On the other hand, smaller equity issues imply less committed capital for the underwriter, suggesting the coefficient to turn out negative.

In order to fully capture the underwriters' cost of commitment, we must include *SPRE*, subscription precommitments. Subscription precommitments should have a negative effect on the cost of underwriting since a greater expected shareholder takeup should be aligned with a lesser need of insurance of the offering.

Finally, we use *ETI* to see if economic sentiment has an effect on the cost of underwriting. Rationally, lower optimism or confidence in the economy could serve as an indicator of higher risk implied with equity offerings at the time of the issue. Therefore, we expect that this coefficient should be negative. However, a positive coefficient could indicate firms' increasing willingness to compensate underwriters for their commitment in assuring firm quality, aligned with Heinkel and Schwartz (1986) and Booth and Smith's (1986) arguments on certification and signalling. Descriptive statistics of the variables are provided in table 6 below.

	Cost of underwriting	UWRITERS	PRO	SPRE	ETI
Mean	0.062	1.670	17.921	0.276	99.824
Median	0.055	1.792	17.631	0.260	102.033
Maximum	0.229	3.850	24.043	0.894	115.900
Minimum	0.002	0.000	15.405	0.000	69.367
Std. Dev.	0.041	1.048	1.404	0.214	11.035
Observations	407	407	407	407	407

Table 6. Descriptive statistics covering variables included in the model cost of underwriting. The dependent variable is the costs associated with underwriting divided by the gross proceeds, while the number of underwriters (*UWRITERS*), log of issue proceeds (*PRO*), subscription precommitments (*SPRE*) and macroeconomic indicator (*ETI*) are explanatory variables.

5.5.2 Model and execution

The third main model of this thesis is specified below.

$$Cost\ of\ underwriting_i = \alpha + \beta_1 * UWRITERS_i + \beta_2 * PRO_i + \beta_3 * SPRE_i + \beta_4 * ETI_i + \epsilon_i$$

Specification 3. Heckman sample selection model.

This model is estimated using Heckmans's (1979) sample selection model. The method, which involves a two-step procedure, implies is that the output derived from this estimation is conditioned on the first logistic model where we tested if the firm had made use of an underwriter. By applying this method, we correct for potential selection bias resulting from the common properties among the firms that make use of underwriters.

In line with what was presented in the previous section regarding the first Direct cost of flotation model we conduct tests to identify potential issues resulting from multicollinearity. All findings[15], irrespective of observing variance inflation factors, pairwise linear correlation or auxiliary regressions, show no sign of multicollinearity. Furthermore, we test for heteroscedasticity by applying White's (1980) test and find that we have to reject the null hypothesis, therefore we conclude that the model suffers from heteroscedasticity. However, because the Heckman selection model is not compatible with robust standard errors we also compute an ordinary, unconditional estimation where we apply robust standard

[15] Calculations can be found in appendix 7.

errors. This allows us to compare the results and determine if the heteroscedasticity found in the data has any impact on the results. The output from the test can be found in appendix 8.

6 Results and analysis

The specification results are in the following section presented and analysed in accordance with previous sections.

6.1 Logit model for the standby decision

6.1.1 Results[16]

The nature of the logistic model implies that the coefficients derived from the estimation should be transformed in order to ease interpretation. There are multiple ways in which the coefficient can be transformed, including odds ratios and marginal effects. We choose to transform our coefficients into marginal effects and in the formula we make use of the mean value ($x_{ijk} = \bar{x}$)of the respective variables. The formulas used to transform coefficient values into marginal effects can be found in appendix 10.

Dep. var.	**α**	SPRE	PRIMEX	UNITS	LCKUP	ETI
Underwriter (0/1)	0,338*	0,216***	0,103***	0,129*	-0,225***	-0,003*
Significance: *=10%, **=5%, ***=1%						

Table 7. Results table: logistic model for the standby decision. Based on the output from the logistic model we calculate marginal effects, which are presented above.

The marginal effects, which are shown at the means in the above table 7, point toward that several values, ceteris paribus, have a significant positive impact on the likelihood that an issuer employs an underwriter. Regarding subscription precommitments we can, given our sample, conclude that there is a positive relation between the variable and the propensity to make use of underwriters. Furthermore, firms that issue units show an increased likelihood of using underwriters, and the same positive effect, although not equally large, is seen among firms that are listed on the primary stock exchange. At the same time, we see that an issuer whose shareholders are engaged in a lockup agreements are less likely to engage in contracts with underwriters when issuing shares. Finally, the effect from the macro variable, provided through the economic tendency indicator, shows a negligible negative yet significant effect on the binary choice of using underwriters.

6.1.2 Analysis

The results of the model are partly consistent with our expectations, but also provide insight and support to existing theories. The coefficient for subscription precommitments is positive and significant at the 1 per cent level of significance, indicating that an increase in precommitments leads to a higher probability that the firm also has chosen to make use of underwriters. The result is in contrast to our expectations

[16] Complete output to be found in appendix 9.

and, if seen as a proxy for shareholder takeup, in contrast to conclusions on shareholder takeup in literature (Eckbo and Masulis, 1992; Ginglinger et al, 2013). Although, as mentioned previously, underwriting in Sweden is often conducted by large existing shareholders or blockholders, suggesting that larger precommitments could be indicating that firms with larger influential shareholders are more likely to assign themselves as underwriters, for convenience or as a result of other incentives, perhaps misaligned with that of other shareholders. However, a more likely conclusion could be that firms' risk aversions correlates with subscription precommitments, and that risk averse firms tend to insure their offerings.

The primary exchange is also positive and significant at the 1 per cent level and, because the variable is binary, we can easily interpret the effect it has on the likelihood of making use of underwriters. Here, we find that being listed on the primary exchange increases the probability with c. 10 per cent of using underwriters. Similar to *SPRE*, *PRIMEX* differ to our initial expectations but finds support in Heinkel and Schwartz's (1986) theories o, suggesting that standby agreements to be means of signalling used by high quality firms. Firms that are listed on the primary exchange could be viewed as being of higher quality than that of the alternative lists based on accounting standards and improved liquidity. However, primary exchange listed firms, being more likely to insure their offerings, is divergent to Booth and Smith's (1986) ideas of certification. This, since firms on the primary exchange arguably has lesser needs of certification. Of course, there could be reasons unobservable for this relationship as well, such as *PRIMEX* firms being owned by more risk averse shareholders, requiring insured rights issues, compared to peers on other markets.

Units are positive and significant, at the 10 per cent significance level, increasing the probabilities of underwriting with c. 13 per cent. The result is aligned with our expectations and suggests that Byon and Moore's (2003) findings of high volatility firms as issuers of units to be associated with firms having higher risk of offering failure, which in our study results in these firms insuring their offerings. Hence, we believe that firms issuing units have preferences for insuring their offerings due to higher implied risk of failure.

Our expectations regarding lockups are in line with the results, and the coefficient is negative and also significant at the 1 per cent significance level. Suggesting that lockups serve as substitutes to underwriting for signalling purposes with regards to Brav and Gomper's (2003) findings. Having a lockup agreement present among key management decreases, ceteris paribus, the probability of underwriting with c. 23 per cent.

Finally, economic sentiment serves to explain little of the probability of utilising underwriters, with a coefficient size that is negligible in relation to the variable mean and media, which are around 100. However, the variable is negative and significant at the 10 per cent level, suggesting that economic sentiment is at least to be considered relevant in the choice of floatation method. Here, a positive outlook

should provide better confidence in the offering, thus experiencing a lesser need of insurance. Accordingly, an improved economic sentiment should increase the likelihood of wealth maximization.

In conclusion, offerings including large subscription precommitments, offerings by firms listed on the primary exchange, and firms issuing units are more likely to result in standby underwriting, while lockups and beneficial economic sentiment decreases the likelihood of using standby underwriting. We argue that large subscription precommitments, combined with standby underwriting in the offering, could be a result of shareholders in the issuing firm being particularly risk averse, and thus favouring insuring the offering. However, we also regard this to be related to the dispersion of ownership among existing shareholders, with higher concentration of large shareholders leading to a greater individual influence on choice of floatation method. Accordingly, blockholders may perhaps have greater influence in signing up as underwriters themselves. This could further be a result of mere convenience in influential blockholders employing themselves in guaranteeing successful offerings. Yet, we cannot reject potential agency problems between blockholders and other shareholders as a cause in the decision of floatation method, since we lack qualitative information on this decision. Regarding the results related to theories of certification provided by underwriters, it is important to reiterate that Swedish underwriters are imperfect at delivering these services, but should not be underestimated due to their consequences of signalling from being insiders. The credibility underwrites have as superior investors is however difficult for us to observe, but should be of interest for further studies.

6.2 Direct cost of floatation

6.2.1 Results[17]

Dep. var.	**α**	PRO	SPRE	UNITS	ETI	STAND
Direct cost of floatation	0,384***	-0,016***	-0,040***	0,012*	-0,0003**	0,050***
	[0,024]	[0,001]	[0,007]	[0,007]	[0,0001]	[0,004]

Significance: *=10%, **=5%, ***=1%, [standard error]

Table 8. Results table: direct cost of floatation

The results from table 8 above show that all independent variables, no matter their respective direction, significantly contribute to explaining the cost of floatation. Among the factors that contribute positively to the cost of floatation, we find equity issuances where units are issued and we also find that the usage of standby underwriting tends to increase the cost of floatation, while issue proceeds and subscription precommitments take on negative values, thereby decreasing the cost of floatation. The explanatory ability of the model is also shown in the R^2 value, which presents that approximately 45 per cent of the variation in the dependent variable, is explained by the chosen independent variables, and in addition to that the

[17] Output table can be found in appendix 11.

overall F-statistic for the model reaches a level that allows us to reject its null hypothesis and thereby conclude that the independent variables all together contribute to the estimation of the cost of floatation.

In the above data section, we show that several of the firms conduct multiple issues during our sample period, while others only conduct one. Usually multiple observations across one firm calls for an estimation method involving fixed effects as that allows the observer to focus on the within variation among the cross section objects. However, due to the panel being too unbalanced, fixed effects would lead to a massive exclusion of observations and the above estimation is therefore instead based on a pooled OLS method where we use standard errors that are robust to potential variance and covariance problems, such as cross-sectional correlation of the residuals. This implies that we can control for potential biases such as large t-statistics and too low p-values, in a similar way that fixed effects do, that in turn could result in improved findings derived from our estimations. Although, upon assuming that the data is structured in a good enough way to simulate a panel, we conduct an estimation and apply cross section fixed effects and get similar results as were found when estimating the pooled version. The main differences between the different outputs are that the economic indicator as well as the dummy variable representing the issuance of units become insignificant when using fixed effects while the R^2 increases from 45 to approximately 85 per cent. Estimation output from the model where fixed effects are applied can be found in appendix 12.

6.2.2 Analysis

With complete results, analysis can be conducted for the study. The log gross proceeds coefficient is negative and significant at the 1 per cent significance level. This suggest that, like Eckbo and Masulis (1992) found, there exist economies of scale within stock issues and is therefore aligned with our initial expectations of the outcome. Aligned with Altınkılıc and Hansen's (2000) findings, we assume that the financial advisor's required remuneration is based on a percentage fee of the gross proceeds, and that larger proceeds by this assumption are more profitable.

Subscription precommitments likewise support our initial expectations and that of shareholder takeup in existing literature (Eckbo and Masulis, 1992; Bohren et al, 1997; and Ginglinger et al, 2013). The coefficient is negative and significant at the 1 per cent level of significance. We assume that higher subscription precommitments is linked to less efforts made by the financial advisor in allocating shares, thus leading to lower compensation.

With regards to the effort of the financial advisor in the stock issuance, in terms of generating and distributing instruments, the positive and significant *UNITS* coefficient suggests that financial advisors charge firms more from the extra work, as opposed to simply issuing common stock. Furthermore, it could also explain Byon and Moore's (2003) findings that firms issuing units are associated with higher risks. Perhaps the financial advisor offsets their own posed risk of a failed transaction by charging higher costs.

The economic sentiment variable, *ETI,* while weak, is negative and significant. This is aligned with our expectations and suggests that firms offering equity are charged less in times of greater economic confidence or optimism. An improved measurement or indicator of sentiment specifically designated for the equity market could possibly help explain the variation in floatation cost more effectively.

As expected, the most important independent variable, and moreover, also explaining the most cross sectional variation is the positive *STAND* variable, aligned with existing literature (Eckbo and Masulis, 1992; Bohren et al, 1997; and Ginglinger et al, 2013).

The positive coefficient of standby underwriting on direct floatation costs serves as the most important outcome of this regression. Here, the dummy variable standby results in 5 percentage points increase in direct floatation costs, which according to table 3 represent approximately half of the mean direct floatation cost. While an increasing underwriting cost is likely to be a logical outcome of underwriters providing additional services in the offering, a rights issue paradox cannot be discarded. Yet, we cannot ignore that the cost-benefits of using standby underwriting, compared to issuing rights, cannot be motivated by omitted factors in this study. For example, stock market performance post offering, as argued for by Parsons and Raviv (1985), could justify the use of underwriters. However, we do disregard Hansen's (1988) transaction cost of trading rights as inconsistent in justifying the use of underwriting. We find the argument invalid since competition among online stockbrokers in Sweden during the time of the sample has led to decreasing costs of trading rights (Bolander, 2017), and yet standby underwriting has not decreased in popularity. In conclusion, while the study indicate higher direct costs in underwritten offerings, we can only determine that a rights offer paradox could be present, but cannot determine that uninsured rights issues comes at cheaper indirect prices.

6.3 Cost of underwriting

6.3.1 Results[18]

Dep. var.	**α**	UWRITERS	PRO	SPRE	ETI
Cost of underwriting	0.128***	0.013***	-0.007***	-0.028**	0.0001
	[0.042]	[0.002]	[0.002]	[0.013]	[0.0003]
Significance: *=10%, **=5%, ***=1%, [standard error]					

Table 9. Results table: cost of underwriting. The results in the table are through the Heckman estimation conditioned upon the results from the first model.

[18] Output tables can be found in appendix 13.

The results in table 9 are based on the output from the Heckman estimation. In line with what was stated in the model description, an ordinary OLS estimation with robust standard errors has also been conducted. Because the results from those estimations do not differ significantly, we make the assumption that it is more important to correct for selection bias than for heteroscedasticity, and therefore the following interpretation and analysis of the results are based on the coefficient values in table 9.

The model involves slightly fewer explanatory variables compared to our previous model, which may contribute to the fact that this model also has a slightly lower R^2 value that reaches approximately 30 per cent rather than 45 per cent. In line this, the overall F-statistic is smaller albeit significant and we may therefore reject the null hypothesis and conclude that overall the explanatory variables contribute to determining the cost of underwriting.

Having interpreted the overall fit of the model we can see that two independent variables, issue proceeds and subscription precommitments, have a negative impact on the cost of underwriting, while the coefficient for the number of underwriters, although it is infinitely small, has a positive impact on the cost. Finally, we see that the economic indicator is insignificant, and that the coefficient value in fact is smaller than its standard error, indicating that the coefficient is not separated from zero.

In line with what was presented in the OLS model regarding panel data structure, we have also conducted the above estimation using cross sectional fixed effects. Unfortunately, the Heckman selection model is not compatible with cross section fixed effects, so the results, which are provided in appendix 14, may suffer from selection bias, however in line with the results from the White's (1980) test we apply robust standard errors in this estimation. The overall results from the fixed effects model show that the coefficient estimates become smaller and less significant, which may be a consequence of fixed effects halving the sample size and thereby ignoring a majority of the variation that contributes to the results in the output presented in table 9 above.

6.3.2 Analysis

The coefficient of the constant shows a positive value at a 1 per cent significance level, thereby indicating that there is a fixed cost associated with engaging underwriters in an equity issuance, and furthermore, the number of underwriters is positive and equally significant. This suggests that the cost of underwriting is increasing in the involved parties. We argue that this is a result of riskier firms, that have higher risk of offer failure, incur higher costs of underwriting and have improved access to underwriting when the underwritten amount is borne by many underwriters. This is supported by the idea that financial advisors charge extra for risky firms issuing units, as found in our model estimating direct floatation costs. As a final note regarding this variable, we realize that the coefficient value is infinitely small relative the variables standard deviation being approximately 1, while at the same time noting that the direction is negative and therefore concluding that a qualitative survey to financial advisors could help explain the phenomenon.

Gross proceeds is negative and significant at the 1 per cent level, suggesting that the cost of underwriting is aligned with our initial expectations, namely that there are economies of scale in the services provided by underwriters, as well as larger firms having to pay less for underwriting. If higher gross proceeds are associated with larger firms of higher liquidity in the stock, then the underwriter would effectively take on less risk in this dimension, perhaps serving as an explanation to its remuneration.

The coefficient for subscription precommitments, arguably the most accurate measure of expected takeup, is negative and significant. This is completely aligned with our expectations and suggests that the standby underwriters are considering risk of offer failure before providing their insurance services. However, the observed effect can also be explained by the issuing firm's behaviour. If assuming that the firm aims to maximize its proceeds from the issuance, they should have an incentive to first gain as much precommitments as possible before engaging in contracts with underwriters. Therefore, these firms have lower risk of offer failure, which accordingly leads to lower costs of underwriting in addition to requiring less insurance.

The *ETI* coefficient is positive, yet negligible in its intensity, but insignificant. Therefore, no analysis is conducted for the outcome.

The multivariate framework for explaining the cost of underwriting, as a measure of underwriting cost relative to gross proceeds, serve to further explain the dynamics of standby underwriting in equity offerings. The increasing probability in using underwriting with higher subscription precommitments, as found in the logit model, can be explained by the decreasing cost of underwriting with subscription precommitments. We believe that the opportunity cost for insuring an equity issue decreases with subscription precommitments, that is, offerings with already large precommitments incur less costs to fully insure an offering than do firms with less precommitments.

7 Conclusion

This thesis extends on the existing literature on determinants of underwriting and the rights issue paradox. Our research focuses on explaining the aforementioned issues by using data extracted from all equity offerings prospectuses in Sweden during 2006-2017 while also observing the prevailing economic sentiment during the time of the equity offering. Firstly, we use a logistic model to estimate the determinants of underwriting. Our findings are generally aligned with existing theories, but also exhibit important differences. We find that high quality firms use underwriting as a signalling mechanism, which is aligned with Heinkel and Schwartz (1986) theories. As a result, it is illogical to call Swedish underwriters in issues on the primary exchange certification providers, but should rather be viewed as insider investors signalling firm quality through their implied willingness to invest. However, since issuing units is also increasing the probability of underwriting, Booth and Smith's (1986) theory of certification cannot be disregarded for firms of this character. Nonetheless, we believe that issuers of units use standby underwriting for its benefit from insurance purposes rather than effect from certification or signalling. Moreover, our study finds a negative relationship between issuing uninsured rights and higher expected takeup, which is in contradiction to prevailing theories and findings (Eckbo and Masulis, 1992; Bohren et al, 1997; and Ginglinger et al, 2013). Our explanation for this outcome is bilateral. On the one hand, we believe that firms governed by shareholders possessing risk aversion will improve the probability of success of the offering by using both subscription precommitments and standby underwriting. On the other hand, large subscription precommitments may indicate concentrated ownership, which could result in higher levels of underwriting based on an existing agency problem between different shareholders. Secondly, we find in our model for direct cost of floatation that standby agreements are statistically significant in explaining increased costs. The results are largely consistent with existing literature on international settings for domestic equity markets (Eckbo and Masulis, 1992; Bohren et al, 1997; Ginglinger et al, 2013) and suggest that a rights issue paradox could be prevalent on the Swedish equity market too. The result calls for further research to investigate the indirect costs of floatation in order to completely determine if firms are acting in divergence to wealth-maximizing decision making in equity offerings. Thirdly, we estimate the cost of underwriting and find that there exists economies of scale among underwriters and that the cost of underwriting increases with additional underwriters. The cost of underwriting decreases with subscription precommitments, suggesting that the initial results from the standby decision are further explained by underwriting becoming more economically attainable as subscription precommitments increase. Future studies could include firm specific variables symbolising firm specific risk as well as improved measures of shareholder takeup, as well as seek to estimate the implied status of underwriters as investors. Furthermore, qualitative studies, surveying decision makers in equity offerings, could shed some light on the decision of floatation method and the implied role of underwriters as providers of signalling and certification. In addition, particular focus could be brought to agency problems between shareholders, as this would widen the theoretical scope from managers and shareholders.

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9 Appendix

A.1: Transformation of equation

Transforming a linear equation that can be estimated with ordinary least squares to an equation that can be estimated using the logistic method

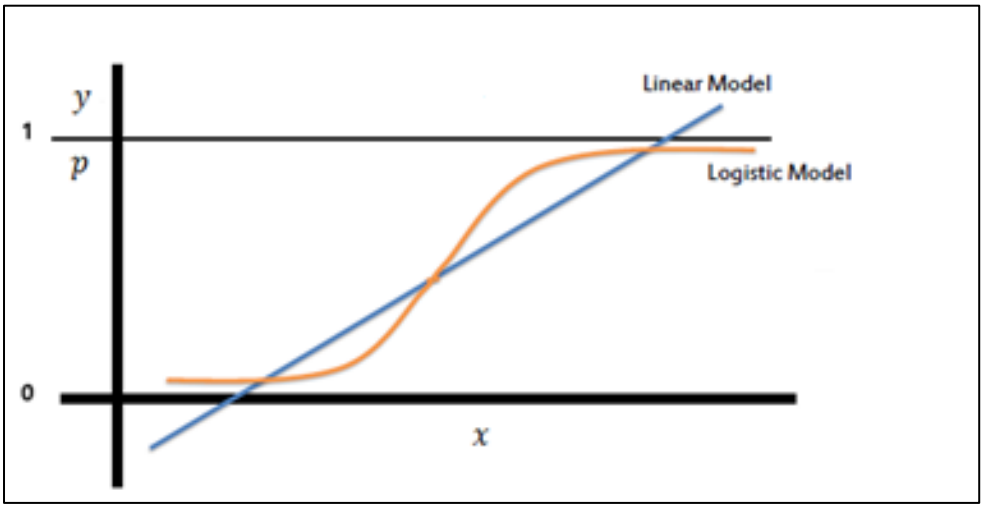
$$y = \beta_o + \beta_1 x_1 + \cdots + \beta_k x_k \quad (1)$$

$$\frac{p}{(1-p)} = \exp(\beta_o + \beta_1 x_1 + \cdots + \beta_k x_k) \quad (2)$$

$$\ln\left(\frac{p}{1-p}\right) = \beta_o + \beta_1 x_1 + \cdots + \beta_k x_k \quad (3)$$

$$p = \frac{1}{1+e^{-(\beta_o+\beta_1 x_1+\cdots+\beta_k x_k)}} \quad (4)$$

Illustrating the difference between the dependent variable in a linear and logistic regression



A.2: Augmented Dickey Fuller test

Null Hypothesis: ETI has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, max. lag=19)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-24.49365	0.0000
Test critical values:	1% level	-3.439437	
	5% level	-2.865441	
	10% level	-2.568904	

*MacKinnon (1996) one-sided p-values.

A.3: Detecting potential multicollinearity in logistic model

Bivariate correlation between regressors in logistic model (excluding binary regressors)

Correlation Probability	ETI	SPRE
ETI	1.000000 n/a	
SPRE	-0.050610 0.1801	1.000000 n/a

VIF: logit model (estimated as part of a OLS model)

Variable	Coefficient variance	Centered VIF
C	0.030123	NA
SPRE	0.004998	1.022542
PRIMEX	0.001578	1.059297
UNITS	0.004490	1.032037
LCKUP	0.001589	1.048724
ETI	2.83E-06	1.029314

A.4: Goodness of fit test for logistic model

Expectation-Prediction Evaluation for Binary Specification
Equation: LOG
Success cut-off: C = 0.5

	Estimated Equation			Constant Probability		
	Dep=0	Dep=1	Total	Dep=0	Dep=1	Total
P(Dep=1)<=C	107	63	170	0	0	0
P(Dep=1)>C	189	344	533	296	407	703
Total	296	407	703	296	407	703
Correct	107	344	451	0	407	407
% Correct	36.15	84.52	64.15	0.00	100.00	57.89
% Incorrect	63.85	15.48	35.85	100.00	0.00	42.11
Total Gain*	36.15	-15.48	6.26			
Percent Gain**	36.15	NA	14.86			

	Estimated Equation			Constant Probability		
	Dep=0	Dep=1	Total	Dep=0	Dep=1	Total
E(# of Dep=0)	137.54	158.46	296.00	124.63	171.37	296.00
E(# of Dep=1)	158.46	248.54	407.00	171.37	235.63	407.00
Total	296.00	407.00	703.00	296.00	407.00	703.00
Correct	137.54	248.54	386.07	124.63	235.63	360.26
% Correct	46.46	61.07	54.92	42.11	57.89	51.25
% Incorrect	53.54	38.93	45.08	57.89	42.11	48.75
Total Gain*	4.36	3.17	3.67			
Percent Gain**	7.53	7.53	7.53			

*Change in "% Correct" from default (constant probability) specification
**Percent of incorrect (default) prediction corrected by equation

A.5: Heteroscedasticity detection

This table reports results derived from White's test which was conducted on the estimation where the direct cost of floatation was measured. The insignificant F-statistic indicates that we cannot reject the null hypothesis of homoscedasticity.

F-statistic	1.152530	Prob. F(18,498)	0.2975
Obs*R-squared	20.67573	Prob. Chi-Square(18)	0.2961
Scaled explained SS	48.83073	Prob. Chi-Square(18)	0.0001

A.6: Detecting multicollinearity in the model Direct cost of floatation

Bivariate correlations between regressors in model direct cost of floatation (excluding binary regressors)

Sample/ included observations: 517/517

Correlation Probability	SPRE	ETI	PRO
SPRE	1.000000 n/a		
ETI	-0.021546 0.6250	1.000000 n/a	
PRO	0.182434 0.0000	-0.022755 0.6057	1.000000 n/a

Variance inflation factors for variables in the estimation regarding direct cost of floatation. All 517 observations are included.

Variable	Coefficient variance	Centered VIF
C	0.000680	NA
SPRE	5.02E-05	1.037157
UNITS	3.86E-05	1.039210
STAND	1.41E-05	1.009055
ETI	2.14E-08	1.006803
PRO	1.41E-06	1.066928

Auxiliary regressions

(1/5)

Dependent Variable: SPRE
Method: Least Squares
Sample/ included observations: 517/517
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.210317	0.158328	-1.328361	0.1847
UNITS	-0.035683	0.037393	-0.954273	0.3404
STAND	0.014852	0.027644	0.537254	0.5913
ETI	-0.000429	0.000902	-0.475405	0.6347
PRO	0.028624	0.007308	3.917079	0.0001

R-squared	0.035826	Mean dependent var	0.266952
Adjusted R-squared	0.028293	S.D. dependent var	0.244638
S.E. of regression	0.241153	Akaike info criterion	0.002852
Sum squared resid	29.77520	Schwarz criterion	0.043936
Log likelihood	4.262657	Hannan-Quinn criter.	0.018950
F-statistic	4.756113	Durbin-Watson stat	1.966244
Prob(F-statistic)	0.000894	Wald F-statistic	5.220411
Prob(Wald F-statistic)	0.000397		

(2/5)

Dependent Variable: UNITS
Method: Least Squares
Sample/ included observations: 517/517
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.805087	0.176704	4.556136	0.0000
STAND	0.035257	0.025056	1.407154	0.1600
ETI	-0.001814	0.001136	-1.597010	0.1109
PRO	-0.030857	0.006228	-4.954703	0.0000
SPRE	-0.046422	0.049131	-0.944862	0.3452

R-squared	0.037731	Mean dependent var	0.085106
Adjusted R-squared	0.030213	S.D. dependent var	0.279310
S.E. of regression	0.275058	Akaike info criterion	0.265958
Sum squared resid	38.73647	Schwarz criterion	0.307042
Log likelihood	-63.75014	Hannan-Quinn criter.	0.282056
F-statistic	5.018868	Durbin-Watson stat	2.099043
Prob(F-statistic)	0.000565	Wald F-statistic	7.187293
Prob(Wald F-statistic)	0.000012		

(3/5)

Dependent Variable: STAND
Method: Least Squares
Sample/ included observations: 517/517
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.252367	0.331726	0.760769	0.4471
ETI	0.000188	0.001764	0.106368	0.9153
PRO	0.023049	0.014241	1.618498	0.1062
SPRE	0.053047	0.100318	0.528785	0.5972
UNITS	0.096796	0.067393	1.436302	0.1515

R-squared	0.008974	Mean dependent var	0.705996
Adjusted R-squared	0.001231	S.D. dependent var	0.456035
S.E. of regression	0.455754	Akaike info criterion	1.275897
Sum squared resid	106.3484	Schwarz criterion	1.316981
Log likelihood	-324.8195	Hannan-Quinn criter.	1.291995
F-statistic	1.159020	Durbin-Watson stat	1.876086
Prob(F-statistic)	0.328072	Wald F-statistic	1.089162
Prob(Wald F-statistic)	0.361117		

(4/5)

Dependent Variable: ETI
Method: Least Squares
Sample/ included observations: 517/517
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	104.2662	7.539173	13.82992	0.0000
PRO	-0.253531	0.410962	-0.616921	0.5376
SPRE	-1.005301	2.112395	-0.475906	0.6343
UNITS	-3.268687	2.002989	-1.631905	0.1033
STAND	0.123128	1.158198	0.106310	0.9154

R-squared	0.006757	Mean dependent var	99.26809
Adjusted R-squared	-0.001003	S.D. dependent var	11.66885
S.E. of regression	11.67470	Akaike info criterion	7.762349
Sum squared resid	69784.89	Schwarz criterion	7.803433
Log likelihood	-2001.567	Hannan-Quinn criter.	7.778447
F-statistic	0.870737	Durbin-Watson stat	1.872395
Prob(F-statistic)	0.481243	Wald F-statistic	0.747922
Prob(Wald F-statistic)	0.559701		

(5/5)

Dependent Variable: PRO
Method: Least Squares
Sample/ included observations: 517/517
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17.92086	0.635939	28.18018	0.0000
SPRE	1.019860	0.259570	3.929035	0.0001
UNITS	-0.845074	0.136780	-6.178350	0.0000
STAND	0.229926	0.143894	1.597891	0.1107
ETI	-0.003854	0.006333	-0.608609	0.5431

R-squared	0.062729	Mean dependent var	17.90093
Adjusted R-squared	0.055407	S.D. dependent var	1.481063
S.E. of regression	1.439448	Akaike info criterion	3.576020
Sum squared resid	1060.869	Schwarz criterion	3.617104
Log likelihood	-919.4012	Hannan-Quinn criter.	3.592118
F-statistic	8.566764	Durbin-Watson stat	0.131700
Prob(F-statistic)	0.000001	Wald F-statistic	15.45036
Prob(Wald F-statistic)	0.000000		

A.7: Detecting multicollinearity in the model Cost of underwriting

Variance inflation factors for the response equations variables in the Heckman selection model

Variable	Coefficient Variance	Centered VIF
C	0.001776	NA
SPRE	0.000165	1.021790
PRO	2.82E-06	1.013937
ETI	8.66E-08	1.010762
UWRITERS	2.86E-06	1.012296

Bivariate correlations: cost of underwriting

Covariance Analysis: Ordinary
Sample/included observations: 407/407

Correlation Probability	SPRE	PRO	ETI	UWRITERS
SPRE	1.000000 n/a			
PRO	0.105431 0.0335	1.000000 n/a		
ETI	-0.037017 0.4564	-0.123454 0.0127	1.000000 n/a	
UWRITERS	-0.178366 0.0003	-0.070616 0.1550	0.018223 0.7140	1.000000 n/a

Auxiliary regressions

(1/4)

Dependent Variable: SPRE
Method: Least Squares
Sample: 1 407
Included observations: 407
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.178427	0.185121	0.963838	0.3357
PRO	0.012426	0.007176	1.731563	0.0841
ETI	-0.000612	0.000975	-0.627671	0.5306
UWRITERS	-0.038143	0.011077	-3.443365	0.0006

R-squared	0.046128	Mean dependent var	0.276296
Adjusted R-squared	0.039027	S.D. dependent var	0.214031
S.E. of regression	0.209813	Akaike info criterion	-0.275423
Sum squared resid	17.74063	Schwarz criterion	-0.236024
Log likelihood	60.04849	Hannan-Quinn criter.	-0.259831
F-statistic	6.496141	Durbin-Watson stat	2.048611
Prob(F-statistic)	0.000266	Wald F-statistic	6.460807
Prob(Wald F-statistic)	0.000279		

(2/4)

Dependent Variable: PRO
Method: Least Squares
Sample/ included observations: 407/407
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	19.54089	0.816426	23.93467	0.0000
ETI	-0.015613	0.007998	-1.951981	0.0516
UWRITERS	-0.126206	0.067391	-1.872738	0.0618
SPRE	0.541390	0.307909	1.758279	0.0795

R-squared	0.033959	Mean dependent var	17.92116
Adjusted R-squared	0.026767	S.D. dependent var	1.403813
S.E. of regression	1.384897	Akaike info criterion	3.498908
Sum squared resid	772.9299	Schwarz criterion	3.538307
Log likelihood	-708.0278	Hannan-Quinn criter.	3.514500
F-statistic	4.722136	Durbin-Watson stat	1.650872
Prob(F-statistic)	0.002988	Wald F-statistic	3.640711
Prob(Wald F-statistic)	0.012917		

(3/4)

Dependent Variable: ETI
Method: Least Squares
Sample/ included observations: 407/407
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	118.6464	8.690323	13.65270	0.0000
UWRITERS	-0.467442	0.532016	-0.878623	0.3801
SPRE	-1.675845	2.667374	-0.628275	0.5302
PRO	-0.980894	0.475492	-2.062902	0.0398

R-squared	0.017704	Mean dependent var	99.82387
Adjusted R-squared	0.010392	S.D. dependent var	11.03464
S.E. of regression	10.97715	Akaike info criterion	7.639288
Sum squared resid	48560.63	Schwarz criterion	7.678687
Log likelihood	-1550.595	Hannan-Quinn criter.	7.654880
F-statistic	2.421154	Durbin-Watson stat	0.036042
Prob(F-statistic)	0.065564	Wald F-statistic	1.651867
Prob(Wald F-statistic)	0.176884		

(4/4)

Dependent Variable: UWRITERS
Method: Least Squares
Sample/ included observations: 407/407
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.573735	0.846826	4.220151	0.0000
SPRE	-0.913271	0.260024	-3.512256	0.0005
PRO	-0.069358	0.036200	-1.915958	0.0561
ETI	-0.004089	0.004669	-0.875766	0.3817

R-squared	0.047348	Mean dependent var	1.670253
Adjusted R-squared	0.040256	S.D. dependent var	1.047970
S.E. of regression	1.026660	Akaike info criterion	2.900278
Sum squared resid	424.7742	Schwarz criterion	2.939676
Log likelihood	-586.2065	Hannan-Quinn criter.	2.915869
F-statistic	6.676502	Durbin-Watson stat	1.925416
Prob(F-statistic)	0.000208	Wald F-statistic	5.871803
Prob(Wald F-statistic)	0.000624		

A.8: White's test applied on the model for Cost of underwriting

This table shows the results from the White's test which has been conducted on the model where we estimate the cost of underwriting. The null hypothesis of the White's test implies homoscedasticity, and therefore a rejected null hypothesis, as in this case, implies heteroscedasticity if assuming a 95% confidence level.

F-statistic	2.598984	Prob. F(14,392)	0.0013
Obs*R-squared	34.56933	Prob. Chi-Square(14)	0.0017
Scaled explained SS	51.54365	Prob. Chi-Square(14)	0.0000

A.9 : Output table from logistic regression

Dependent Variable: STAND
Method: ML - Binary Logit (Newton-Raphson / Marquardt steps)
Date: 07/27/17 Time: 10:35
Sample: 1 703
Included observations: 703
Convergence achieved after 3 iterations
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.505285	0.785422	1.916530	0.0553
SPRE	0.960266	0.320256	2.998431	0.0027
PRIMEX	0.460042	0.178439	2.578144	0.0099
UNITS	0.576725	0.311224	1.853085	0.0639
LCKUP	-1.002745	0.176411	-5.684130	0.0000
ETI	-0.012831	0.007595	-1.689369	0.0911

McFadden R-squared	0.055170	Mean dependent var	0.578947
S.D. dependent var	0.494080	S.E. of regression	0.476306
Akaike info criterion	1.303228	Sum squared resid	158.1266
Schwarz criterion	1.342107	Log likelihood	-452.0846
Hannan-Quinn criter.	1.318254	Deviance	904.1692
Restr. deviance	956.9651	Restr. log likelihood	-478.4825
LR statistic	52.79590	Avg. log likelihood	-0.643079
Prob(LR statistic)	0.000000		
Obs with Dep=0	296	Total obs	703
Obs with Dep=1	407		

A.10: Steps involved in calculating marginal effects

$$\bar{z} = \alpha + \beta_1\bar{x}_1 + \beta_2\bar{x}_2 + \beta_3\bar{x}_3 + \beta_4\bar{x}_4 + \beta_5\bar{x}_5 + \beta_6\bar{x}_6 \quad (1)$$

$$F(\bar{z}) = \frac{1}{1+\exp(-\bar{z})} \quad (2)$$

$$marginal\ effect_k^{logit} = \beta_i F(z)(1 - F(z)), \text{ where } i \in \{1, \dots, 6\} \quad (3)$$

A.11: Output table for estimation Direct cost of floatation

Dependent Variable: Direct cost of floatation
Method: Least Squares
Sample: 1 517
Included observations: 517

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.383917	0.026068	14.72724	0.0000
SPRE	-0.039891	0.007089	-5.627441	0.0000
UNITS	0.011578	0.006215	1.862981	0.0630
STAND	0.049601	0.003751	13.22403	0.0000
ETI	-0.000315	0.000146	-2.150395	0.0320
PRO	-0.016114	0.001188	-13.56924	0.0000

R-squared	0.452708	Mean dependent var	0.089552
Adjusted R-squared	0.447353	S.D. dependent var	0.052032
S.E. of regression	0.038680	Akaike info criterion	-3.655433
Sum squared resid	0.764542	Schwarz criterion	-3.606133
Log likelihood	950.9294	Hannan-Quinn criter.	-3.636115
F-statistic	84.53765	Durbin-Watson stat	2.020200
Prob(F-statistic)	0.000000		

A.12: Estimation of Direct cost of floatation with cross-section fixed effects

Dependent Variable: Direct cost of floatation
Method: Panel Least Squares (with cross-section fixed effects)
Sample: 1 517
Periods included: 10
Cross-sections included: 280
Total panel (unbalanced) observations: 517

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.444831	0.063765	6.976103	0.0000
SPRE	-0.024896	0.010338	-2.408129	0.0168
UNITS	0.009897	0.007427	1.332531	0.1840
STAND	0.044012	0.005347	8.231422	0.0000
ETI	-9.92E-05	0.000170	-0.585225	0.5590
PRO	-0.020708	0.003620	-5.721188	0.0000

R-squared	0.838342	Mean dependent var	0.089552
Adjusted R-squared	0.640451	S.D. dependent var	0.052032
S.E. of regression	0.031199	Akaike info criterion	-3.795630
Sum squared resid	0.225829	Schwarz criterion	-1.453866
Log likelihood	1266.170	Hannan-Quinn criter.	-2.878042
F-statistic	4.236375	Durbin-Watson stat	3.948274
Prob(F-statistic)	0.000000		

A.13: Estimation output Cost of underwriting

Results from Heckman's two step correction model. Note that the coefficients in the selection equation (i.e. the model estimated using the logit method) differ slightly from the coefficients presented above, due to differing estimation methods. The analysis of the logit results are based on the output in appendix 6.

Two-Step Heckman Selection
Sample/ included observations: 703/703
Selection Variable: Underwriter (0/1)
Coefficient covariance computed using two-step Heckman method

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Response Equation – Cost of underwriting				
C	0.128295	0.042144	3.044175	0.0024
SPRE	-0.027849	0.012835	-2.169835	0.0304
PRO	-0.006997	0.001680	-4.164336	0.0000
ETI	0.000135	0.000294	0.459783	0.6458
UWRITERS	0.013283	0.001692	7.851102	0.0000
Selection Equation - Underwritten				
C	0.929467	0.472817	1.965806	0.0497
SPRE	0.550726	0.187466	2.937738	0.0034
PRIMEX	0.277759	0.108512	2.559696	0.0107
UNITS	0.352014	0.186437	1.888113	0.0594
LCKUP	-0.614179	0.107484	-5.714156	0.0000
ETI	-0.007828	0.004586	-1.706906	0.0883

Mean dependent var	0.062491	S.D. dependent var	0.041267
S.E. of regression	0.036089	Akaike info criterion	2.407580
Sum squared resid	0.898692	Schwarz criterion	2.478859
Log likelihood	-835.2644	Hannan-Quinn criter.	2.435128

Output table for model where cost of underwriting is estimated using robust standard errors

Dependent Variable: Cost of underwriting
Method: Least Squares
Sample/ included observations: 407/407
White heteroskedasticity-consistent standard errors & covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.133588	0.025960	5.145892	0.0000
SPRE	-0.036559	0.008575	-4.263435	0.0000
PRO	-0.007074	0.001073	-6.590718	0.0000
ETI	0.000422	0.000127	3.335480	0.0009
UWRITERS	0.014142	0.001692	8.357293	0.0000

R-squared	0.296546	Mean dependent var	0.062491
Adjusted R-squared	0.289546	S.D. dependent var	0.041267
S.E. of regression	0.034783	Akaike info criterion	-3.867172
Sum squared resid	0.486360	Schwarz criterion	-3.817924
Log likelihood	791.9695	Hannan-Quinn criter.	-3.847682
F-statistic	42.36643	Durbin-Watson stat	1.181469
Prob(F-statistic)	0.000000	Wald F-statistic	47.85688
Prob(Wald F-statistic)	0.000000		

A.14: Estimating cost of underwriting using fixed effects

Dependent Variable: Cost of underwriting
Method: Panel Least Squares (with cross-section fixed effects)
Sample: 1 407
Periods included: 9
Cross-sections included: 243
Total panel (unbalanced) observations: 407
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.093822	0.095362	-0.983850	0.3267
SPRE	-0.023049	0.009956	-2.315168	0.0219
PRO	0.007442	0.005479	1.358285	0.1763
ETI	0.000225	7.71E-05	2.925199	0.0039
UWRITERS	0.004070	0.004107	0.991189	0.3231

R-squared	0.802641	Mean dependent var	0.062491
Adjusted R-squared	0.499202	S.D. dependent var	0.041267
S.E. of regression	0.029203	Akaike info criterion	-3.948962
Sum squared resid	0.136452	Schwarz criterion	-1.516095
Log likelihood	1050.614	Hannan-Quinn criter.	-2.986175
F-statistic	2.645145	Durbin-Watson stat	3.937112
Prob(F-statistic)	0.000000		