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Guarantee Commitments in Swedish Rights Issues: Determinants, Pricing and Interest Rate Shocks

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Abstract:

This thesis examines guarantee commitments and fee levels in the Swedish rights issue market, focusing on how macroeconomic conditions and sector characteristics influence guarantee usage and pricing. Using a manually collected dataset of 1,277 rights issues from 2006 to 2025, the study employs a Logistic regression to model the likelihood of obtaining an underwriting guarantee, and a Beta regression to analyze the determinants of guarantee fees. A Heckman selection model is used to address potential sample selection bias. To capture dynamic macroeconomic effects, a Structural Vector Autoregression (SVAR) is applied to assess the impact of interest rate shocks on issuance activity, guarantee usage, and fee levels. The results indicate that guarantees are more likely in uncertain macro-environments, for smaller or very large offerings, and in certain sectors. In contrast, strong support from existing shareholders reduces the need for external guarantees. Guarantee fee levels are mostly affected by deal-specific characteristics but remain relatively stable to macroeconomic factors. The SVAR analysis reveals that interest rate shocks lead to a rise in rights issue activity and greater use of guarantees, but do not significantly affect guarantee fees.

Keywords: Rights Issues, Guarantee Commitments, Guarantee Fees, Underwriting, Adverse Selection, Information Asymmetry, Interest Rate Shocks

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1 Introduction

Rights offerings allow firms to raise capital by giving existing shareholders the opportunity to buy new shares at a discounted price. To reduce the risk of under-subscription, companies often secure guarantee commitments, where a third party commits to purchasing any unsubscribed shares in exchange for a fee. Understanding when and why firms incur these additional costs provides important insights into financing behavior and the functioning of equity markets.

Previous research has extensively studied the economic rationale behind flotation method choices, information asymmetry, and the structure of rights issues. Classic adverse-selection models, such as those proposed by Myers and Majluf (1984), suggest that equity issuance can signal negative private information, leading to undervaluation. Underwriters or guarantors may thus serve as certifiers of firm quality, mitigating investor concerns and supporting the success of the offering.

Smith (1977) coined the term 'rights issue paradox' to explain why firms frequently prefer costly underwritten rights issues, despite the availability of cheaper uninsured alternatives. Further empirical studies, including Eckbo and Masulis (1992), document that underwriting became nearly universal in rights offerings in the United States during the 1980s, despite higher direct costs. In Sweden, Cronqvist and Nilsson (2005) find that firms with strong insider ownership are less likely to rely on underwriters, supporting the view that insider commitments can substitute for external certification.

Prior research has also shown that underwriters in Sweden tend to earn relatively high excess returns compared to their counterparts in other Scandinavian markets. Janbu and Mørk (2012) document that underwriters in Swedish rights issues capture on average 76% of the underwriting fee as excess return, with average mispricing reaching approximately 3.6%. This highlights the potential costs borne by issuing firms and the importance of understanding underwriting dynamics in the Swedish market.

While extensive literature addresses firm-level characteristics influencing underwriting decisions, there is comparatively limited empirical evidence on how macroeconomic conditions and sector-specific factors affect the use of underwriting guarantees and the pricing of guarantee fees. This thesis aims to fill these gaps by investigating how issue-specific characteristics, macroeconomic variables, and sector traits influence underwriting behavior in Swedish rights issues. The perspective of sector traits brings new attention to sector-specific differences, recognizing that firms across industries face varying risks, financing needs and differ in financing behavior. By focusing on the Swedish market, where underwriting is commonly provided by private investors or insiders through standby commitments rather than by investment banks, the thesis offers insights into a structure that differs markedly from those typically studied. Moreover, it is, to the best of our knowledge, the first to apply a Structural Vector Autoregression (SVAR) model to examine the dynamic effects of monetary policy shocks on equity issuance and underwriting behavior. These contributions are supported by a new, manually collected dataset of 1,277 Swedish rights issues from 2006 to 2025, providing a broad and detailed empirical foundation.

This thesis addresses three main research questions:

i. What factors determine the use of underwriting guarantees in Sweden?

ii. Conditional on underwriting being used, what factors determine the guarantee fee for Swedish guaranteed rights issues?

iii. What is the impact of interest rate shocks on firms' rights issue activity and underwriting decisions in Sweden?

The results suggest that firms are more likely to use underwriting guarantees when facing higher uncertainty, particularly in sectors such as Healthcare and during periods of weak market sentiment. Moreover, strong insider support reduces the need for external guarantees. The findings also indicate that very small or very large offerings are more likely to involve guarantees, reflecting a U-shaped pattern.

Fees follow a similar trend, with higher costs for the smallest and largest issues. A greater portion of insider commitments tends to reduce the fee, which suggests that strong initial backing lowers the risk for guarantors. In general, fees stay within a narrow range. This may indicate that pricing is sticky or influenced by informal coordination. Fees are somewhat affected by changes in market sentiment but do not respond strongly. The SVAR analysis shows that unexpected interest rate increases lead to a short-term rise in the number of rights issues and the amount of capital raised. There is also a lasting increase in the share of issues that use guarantees. However, average fees remain stable. These results support the idea that guarantees are used as a tool when uncertainty grows.

The remainder of the thesis is organized as follows. Section 2 reviews the existing literature on rights issues, underwriting, and macro-financing cycles. Section 3 describes the data and empirical methodology. Section 4 presents the results of the analysis. Finally, Section 5 concludes by summarizing the main findings and suggesting directions for future research.

2 Literature Review and Background

2.1 Guarantee Fees and Underwriting in Rights Issues

Underwriting in a rights issue refers to a guarantee provided by a financial intermediary or investor to purchase any shares not taken up by existing shareholders during the offering (Corporate Finance Institute, 2023). In a rights issue, current shareholders are granted the first right to subscribe to new shares, usually offered at a discount to the market price, in proportion to their existing holdings. An underwriter provides assurance that any shares not subscribed by shareholders will be acquired by the underwriter, up to the amount specified in the underwriting agreement (Corporate Finance Institute, 2023). This arrangement effectively offers support to the offering process.

To compensate for the service, underwriters charge a fee or commission, often calculated as a percentage of the guaranteed amount. This fee serves as a premium for the risk they assume (Smith, 1977). Underwriting is often described as a form of insurance because it transfers the risk of an unsuccessful share issue from the company to the underwriter. In return for taking on this risk, the underwriter receives a fee, enhancing the firm's ability to secure necessary financing.

Beyond taking on financial risk, underwriters also help reduce information asymmetry between the firm and investors. Booth and Smith (1986) propose that underwriters play a role in certifying the issuer's credibility, as their involvement signals confidence in the firm's financial health and prospects. This confidence is based on the underwriter's own due diligence, and it sends a positive signal to the market. Investors may be more likely to participate in the issue when they know a reputable underwriter is willing to commit its name and capital. As argued by Eckbo and Masulis (1992), this signal is credible because underwriters face reputational and financial costs if they support low-quality offerings. The concept of information asymmetry will be explored in greater depth in the following sections.

Underwriting agreements in equity financing typically take one of two forms: *standby commitments* or *firm commitments*, with the choice often depending on market practice and geography. In standby underwriting, which is common in Europe and Sweden, the underwriter agrees to purchase any shares that are not subscribed by existing shareholders up to the specified amount. In a firm commitment underwriting, primarily used in the United States, the underwriter purchases the entire issue upfront and then resells the shares to investors (Eckbo and Masulis, 1992).

If a company chooses not to use underwriting guarantees, the rights issue is referred to as an uninsured rights issue. In such cases the firm relies entirely on existing shareholders to subscribe to the new shares. While this approach avoids underwriting fees and is therefore cheaper in principle, it also introduces substantial risk. If shareholders do not fully subscribe the company may fail to raise the required capital. For this reason uninsured rights issues are often impractical for firms that require funding certainty. Overall, the structure of underwriting in rights offerings is intended to balance cost and risk. The company pays a fee and typically offers the shares at a discount [1] in exchange for a guaranteed outcome, which is often considered worthwhile when the success of the capital raise is a priority.

[1] A discount in this context means that the new shares are offered to existing shareholders and guarantors at a lower price than the current market price. This encourages participation and increases the likelihood that the full amount of capital will be raised.

2.2 The Right Issue Paradox and Flotation Method Choice

The "rights issue paradox" was first identified by Smith (1977). He observed that although non-underwritten rights offerings represent the lowest-cost method of issuing equity by avoiding underwriting fees and commissions, firms often prefer costlier flotation methods, such as underwritten or public cash offers[2]. In other words, firms often bypass a seemingly cheaper financing method in favor of costlier alternatives. This creates a paradox when viewed strictly from a cost-minimisation perspective. Smith noted that in the United States, fully underwritten offers became widespread despite the fact that uninsured rights issues would have incurred lower direct costs due to the absence of fees.

Subsequent research has confirmed this phenomenon in multiple markets and has sought to explain it through factors such as information asymmetry, shareholder structure, and considerations beyond direct issuance costs. Eckbo and Masulis (1992), in a widely cited study, examined the equity flotation method choices of firms in the United States and confirmed that uninsured rights issues had largely disappeared by the early 1980s, despite their cost advantage. They found that companies overwhelmingly relied on standby or fully underwritten offers. Although standby agreements typically involve lower direct costs than fully bought deals, both remain more expensive than uninsured rights. The persistence of this paradox suggests that factors beyond immediate financial cost, such as ensuring the success of the issue and managing investor perception, play a central role in determining the flotation method.

One important determinant is the expected shareholder take-up. If a company expects that its existing shareholders will subscribe to most of the new shares at a high rate, an uninsured rights issue can succeed without underwriters. However, if expected take-up is low or uncertain, the firm is more likely to underwrite the issue in order to guarantee proceeds. Hansen and Pinkerton (1982) demonstrated empirically that firms choosing direct offers[3] typically have high ownership concentration, often involving one or several large committed shareholders. This concentrated ownership increases the likelihood of sufficient shareholder take-up, reducing the need for underwriting and making uninsured rights issues a viable and cost-effective alternative.

Empirical evidence supports these ideas. Bøhren et al. (1997), in a study of the Oslo Stock Exchange, found that the probability of a rights offering being underwritten through a standby commitment was higher when expected shareholder subscription was low. In other words, firms tend to resort to underwriting when they anticipate limited participation among shareholders. This helps explain the rights issue paradox. Firms are willing to accept the higher costs of underwriting when they are concerned about the success of an uninsured offer.

The choice of flotation method is also influenced by how the market reacts to the announcement of the equity issue. Interestingly, evidence shows that the stock market often responds more favorably to rights issues that are uninsured compared to underwritten offerings. This is presumably because the use of an underwriter, along with the associated deeper discount or fees, may signal higher issuance costs or potential problems. Bøhren et al. (1997) reported that uninsured rights offerings were met with a smaller negative market reaction at the time of announcement compared to standby-underwritten rights issues. In other words, investors appeared to prefer uninsured offerings, interpreting them as a sign of confidence. When a firm is willing to issue rights without a safety net, investors may view it as having strong shareholder support or facing less asymmetric information.

[2] In a public cash offer, new shares are sold directly to the market without giving priority to existing shareholders.

[3] Non-underwritten equity issues offered directly to existing stockholders are also known as direct offerings according to Hansen and Pinkerton (1982).

Despite the potential negative signal associated with guarantee commitments, underwriting became increasingly common in the United Kingdom after 1986. Slovin et al. (2000) document a major shift in flotation methods following regulatory changes that allowed firms to bypass traditional rights issues and instead raise capital through underwritten offerings to outside investors.[4] Although underwritten rights issues were already widespread before 1986, the introduction of this alternative made underwriting more flexible and more attractive to issuing firms, contributing to its broader adoption.

Slovin et al. (2000) argue that companies increasingly preferred underwritten flotation methods because they could avoid setting a steep discount on an uninsured rights issue. At the same time, they could send a positive signal to the market by involving an underwriter who was fully committed to the offering. The underwriter's involvement served as a form of certification of the issue's quality. This view aligns with the certification theory presented by Booth and Smith (1986), where the presence of a credible underwriter boosts investor confidence and helps justify the higher direct costs associated with underwriting.

In summary, the rights issue paradox can be explained by recognizing that flotation method choice is not driven by cost considerations alone. When choosing how to structure a rights issue, companies weigh the lower upfront costs of uninsured offerings against the added security that underwriting can provide. The decision is shaped by factors like information asymmetry, shareholder support levels, investor sentiment, and the perceived need to guarantee the success of the capital raise. The signaling role of underwriting is nuanced according to the literature. It can reassure investors through certification by a credible third party, but it may also raise concerns about insider uncertainty or weak shareholder support. Taken together, what appears to be an irrational preference for higher-cost methods could in fact be explained as a response to information asymmetry and financing risk, where the indirect costs of failure or negative market reactions can outweigh the direct savings from avoiding underwriting fees, as further detailed below.

2.3 Information Asymmetry, Adverse Selection and the Decision to Underwrite

While the previous section emphasized how flotation method choice balances cost, certainty, and investor confidence, a deeper understanding requires unpacking the role of information asymmetry and adverse selection in more detail. Myers and Majluf (1984) adverse selection model in equity financing suggests that managers with superior information are reluctant to issue equity when they believe the firm is undervalued, as doing so dilutes existing shareholders. Conversely, managers are more eager to issue equity if they know the stock is overvalued. Rational outside investors anticipate this behavior and therefore tend to view any unexpected equity issue with skepticism, often interpreting it as a signal that the stock might be overpriced according to insiders' information. This dynamic leads to the well-documented phenomenon of stock price declines upon announcement of equity offerings. The severity of this adverse selection discount depends on how uncertain investors are about the firm's value and motives for issuing equity.

Rights issues offer a partial solution to this problem. On one hand, a rights issue can help mitigate adverse selection by giving first priority to existing shareholders, many of whom may be insiders or long-term investors. If these shareholders exercise their rights, it sends a strong signal of confidence. Informed insiders are unlikely to invest more if they believe

[4] Often referred to as "placings" in the UK, these are similar to US-style firm commitment offerings in which an underwriter purchases shares from the issuing firm at a fixed price and often resells them to institutional investors.

the shares are overpriced. Rights offerings can therefore encourage insiders to reveal private information through their participation. This aligns with the signaling model of Brealey et al. (1977), which posits that insiders retaining or increasing their stake in the firm is a signal of high firm quality. Thus, a rights issue that is backed by management and large shareholders conveys confidence to the market and can substantially reduce the adverse selection discount. Empirical evidence supports this effect. For example, Eckbo and Masulis (1992) show that in the US, the few rights issues that weren't underwritten usually had strong pre-commitments from existing shareholders. Without that kind of backing, an uninsured issue simply wasn't credible.

On the other hand, when those who know the firm best are unwilling or unable to participate in a rights issue, it sends a negative signal. A lack of insider commitment suggests that even informed shareholders do not find the offer attractive, raising concerns about adverse selection. This weakens investor confidence and increases the likelihood that the issue will fail or require a deep discount to succeed. In such situations, underwriting can help restore confidence by partially compensating for the absence of insider support. Although a guarantee cannot fully address doubts about firm quality, the underwriter's involvement, as discussed earlier, carries a certifying function (Booth and Smith, 1986). By risking both reputation and capital, the underwriter signals that the offer price is not severely misvalued and thereby mitigates the negative implications of low insider participation.

These dynamics highlight that information asymmetry between corporate insiders and outside investors is a central factor in the decision to underwrite. Rights issues and underwriting guarantees serve as complementary tools for managing adverse selection. Rights offerings leverage insider information through participation signals, while underwriting provides an external certifier and ensures proceeds. The optimal balance between these mechanisms depends on the firm's specific context, including ownership structure, insider credibility, and the severity of information asymmetry.

Cronqvist and Nilsson (2005) show that in Sweden, firms facing greater asymmetric information are more likely to involve an underwriter when raising equity through rights issues. When information asymmetry is extreme, firms may bypass rights offerings altogether and opt for private placements to a few informed investors. These findings imply that when insider signals are insufficient to reassure the market, underwriters are brought in to enhance credibility. Conversely, firms with strong and credible insider support can raise capital through rights issues with little or no underwriting, thereby saving on fees.

This trade-off underlies much of the observed behavior in equity financing. A rights issue with substantial insider participation or an underwriting guarantee can reduce investor concerns that would otherwise raise issuance costs or jeopardize the offering. Ultimately, the decision to underwrite is influenced by adverse selection considerations. Firms weigh whether the benefit of signaling certainty to investors through an underwriting guarantee justifies the cost, given the surrounding information environment.

2.4 Macroeconomic Factors and Underwriting Decisions

Beyond firm-specific factors, broader macroeconomic conditions and market environments may also influence seasoned equity offerings and the use of underwriting. Several studies suggest that equity issuance activity tends to follow cyclical patterns. For example, during bullish market periods and economic expansions, companies appear more inclined to issue equity and investors more receptive, while in bearish markets or recessions, issuance activity often slows

significantly (Choe et al., 1993). This cyclical pattern has been linked to fluctuations in adverse selection costs over the business cycle.

Choe et al. (1993) argue that adverse selection problems are milder during expansionary phases of the business cycle, both theoretically and empirically. In upturns, even firms with weaker fundamentals tend to perform better, reducing investor concerns about firm quality. The high issuance volume and prevailing optimism also lower perceived risk, resulting in less negative stock price reactions to SEO announcements and a lower equity issuance cost. Consequently, during favorable market conditions, firms may choose uninsured or lightly underwritten rights issues. By contrast, during downturns, firms often face deeper adverse selection concerns, necessitate greater issuance discounts, higher underwriting fees, or even choose to postpone equity issuance altogether.

Bayless and Chaplinsky (1996) later introduced the concept of "windows of opportunity" in seasoned equity offerings. They identify hot markets, characterized by high aggregate issuance volume and milder negative price reactions, as periods when firms can issue equity at lower informational costs. In contrast, cold markets show more severe announcement effects and reduced issuance activity.

The volatility of the market is another macro factor that affects underwriting, with volatility acting as a proxy for uncertainty. In turbulent markets, underwriters face a greater risk that the market price will drop below the subscription price during the offering period, potentially resulting in losses on any shares they are required to take up. As a result, during periods of high market volatility, it could be expected that underwriters tend to charge more for their services. Armitage (2000) observed that underwriters in the UK did not explicitly charge higher percentage fees for more volatile stocks on an individual basis. However, at a macro level, fewer voluntary equity offerings were made during volatile periods, suggesting an implicit increase in the cost of issuance. Bøhren et al. (1997) also found that greater market volatility was linked to a lower likelihood of firms pursuing uninsured rights issues, implying a preference for underwriting to reduce risk in uncertain market conditions.

Moreover, interest rates and the cost of debt tend to influence firms' equity issuance decisions. When rates are low and credit is readily accessible, firms tend to favor debt which is often cheaper and does not dilute ownership (Graham and Harvey, 2001). However, as interest rates rise or leverage constraints tighten, equity becomes a more attractive option despite its higher issuance costs (Choe et al., 1993).

While the general relationship between interest rates and financing choices is well established, academic studies directly linking interest rates to SEO costs are relatively limited. However, some relationships can be inferred. When interest rates rise and debt becomes expensive, equity may be the only viable funding option. Firms that would otherwise delay issuing equity may be forced to proceed, even at suboptimal times, resulting in higher costs through fees and discounts. In contrast, when rates are low, many firms prefer debt over equity, reducing the supply of equity issues. Underwriters in such periods may lower fees to attract business, or only high-quality issuers enter the market and negotiate lower costs. Overall, both the business and credit cycles shape the bargaining dynamics between issuers and underwriters.

In conclusion, the business cycle, market volatility, and interest rates each influence the timing, structure, and cost of seasoned equity offerings. In expansions, equity issuance becomes more frequent and firms may rely on lighter underwriting due to reduced adverse selection. In volatile or recessionary environments, underwriters face higher risk, leading to deeper discounts, more

conservative terms, or delayed issuance. When debt becomes less attractive or less available due to rising interest rates, firms may turn to equity despite higher issuance costs, often accepting deeper discounts or more expensive underwriting terms.

2.5 Background to Thesis

In Sweden, seasoned equity is almost never issued via US-style firm-commitment underwriting. Instead, companies raise new capital almost exclusively through rights offerings subscribed by existing shareholders, usually backed by standby underwriting guarantees. This pattern mirrors other Nordic markets. For example, Bøhren et al. (1997) report that on the Oslo Stock Exchange almost all seasoned issues are rights offerings with standby underwriters rather than unsubscribed rights. In short, Scandinavian firms favor the standby model over firm-commitment underwriting.

Another defining feature of the Swedish market is its concentrated ownership structure. In contrast to markets like the United Kingdom or the United States, ownership in Sweden is often concentrated in one or a few dominant shareholders (Norges Bank Investment Management, 2015). Such concentrated ownership may influence both the structure of equity offerings and the need for standby underwriting, especially in relation to control considerations and shareholder participation.

Empirical evidence also suggests that underwriting fees in the Scandinavian market often exceed what is justified by the actual risk borne by the underwriters. Janbu and Mørk (2012) studied 101 underwritten rights issues in Sweden, Norway, and Denmark from 2002 to 2010, finding that underwriters earn substantial excess returns averaging 2.72 percent, equivalent to 76 percent of the underwriting fee relative to the assumed risk. In particular, this mispricing appears most pronounced in Sweden, where the average excess return was 3.63 percent. These findings raise important questions about whether observed fees in Sweden reflect genuine risk or other underlying incentives.

The Swedish regulatory environment further strengthens the case for using Sweden as an empirical setting, offering an unusually high level of transparency in underwriting arrangements. Issuers are required to disclose detailed information, including the identity of guarantors and the exact terms of compensation (Europeiska Unionen, 2017). This level of disclosure stands in contrast to many international markets, where underwriting agreements are far less visible. The resulting transparency provides a strong empirical setting to investigate the relationship between underwriter characteristics, fee structures, and underlying motives.

Beyond firm-specific structures and regulatory transparency, broader macroeconomic conditions and sector-specific characteristics are likely to influence underwriting behavior. While some studies have examined the structure of Swedish equity offerings, the effects of external economic factors and industry-specific risk remain largely unexplored. Building on this gap, this thesis examines the determinants of underwriting and the pricing of guarantee fees in Swedish rights issues. The analysis focuses on issue-specific characteristics, complemented by macroeconomic indicators such as the Economic Tendency Indicator and short-term interest rate shocks. By combining firm-level issuance data with broader market variables, the thesis aims to contribute to a deeper understanding of underwriting behavior within the Swedish equity issuance landscape.

3 Method

3.1 Data

3.1.1 Data Collection

The dataset for this thesis is based on prospectuses approved by the Swedish Financial Supervisory Authority (Finansinspektionen). Under prospectus regulations applicable in Sweden, a prospectus must be prepared in two main situations: (1) when tradable securities are offered to the public, in accordance with Article 3.1 of the Prospectus Regulation (EU) 2017/1129, and (2) when such securities are admitted to trading on a regulated market, as set out in Article 3.3 of the same regulation (Finansinspektionen, 2022). We therefore gain access to a robust set of documents whenever companies raise capital through rights issues on Swedish markets. We focus exclusively on equity offerings by publicly traded companies where new shares are issued to the public. This excludes listings without a new capital raise, as well as offerings of bonds, convertible instruments, or shares distributed only to specific groups (like employees). These exclusions ensure our sample focuses on transactions where companies could, in principle, involve external parties to guarantee a rights issue.

We manually reviewed each prospectus, noting any references to pre-commitments, guarantee commitments and guarantee compensation. We also gathered information on the amount of capital raised from the prospectus. Because prospectus formats and levels of detail can vary across firms, every document required a careful examination of both textual sections and accompanying financial tables. To enrich our data with macro-level insights, we supplemented the prospectus information with interest rates from Sveriges Riksbank (as of 24 March 2025), the Economic Tendency Indicator (ETI) from Konjunkturinstitutet and Inflation from Statistikmyndigheten SCB, all retrieved on the same date. Our sector classifications are primarily derived from Yahoo Finance. In instances where companies were no longer listed or had reorganized significantly, we consulted archived articles, investor relations pages, and other historical sources to confirm the most accurate industry at the time of each rights issue.

3.1.2 Data Reliability and Limitations

Even though all prospectuses are formally reviewed and approved by the Swedish Financial Supervisory Authority (FSA), the authority does not verify that all information is accurate or complete. Our analysis is therefore based on the assumption that companies follow the disclosure rules honestly. Moreover, manual data collection always carries a risk of human error. Given the significant variation in the format and level of detail across prospectuses, the human factor represents a potential limitation that is acknowledged in the analysis.

As previously noted, some companies in our sample were no longer listed or had undergone significant restructuring, which meant that sector information on Yahoo was no longer available. In these cases, we relied on other sources to assess which sector classification appeared most appropriate at the time of the rights issue. While this method allowed us to fill in missing data, the resulting classifications are based on informed judgment and may not perfectly reflect the original business context.

Finally, we only have access to the publication date of the prospectus and therefore cannot determine the exact date each company made decisions regarding the equity issuance[5]. As a

[5]This may include decisions about whether to conduct a rights issue, the size of the issue, the flotation method, and other relevant terms of the equity offering.

result, our macroeconomic data are matched to the timing of the first published prospectus for each rights issue, rather than the actual decision date. Despite these limitations, we believe our dataset is strong enough to analyze what factors influence the use of guarantee commitments and the size of guarantee fees in Swedish rights issues.

To assess the reliability of our dataset, we compared our dataset with existing studies on Swedish equity offerings. Our dataset comprises 1,277 rights issues over the period 2006–2025, averaging approximately 67 issues per year. This figure aligns with the findings of Regnér and Tedroff (2017), who analyzed 703 public offerings between late 2006 and early 2017, averaging about 64 issues per year. The consistency between these datasets suggests that our data collection process has captured a comprehensive and representative sample of the Swedish market.

3.1.3 Variables

The first dependent variable is *Underwritten*, which is a binary indicator equal to one if the rights issue included an underwriting guarantee. If no such guarantee was in place, the variable takes the value zero. The second dependent variable is *GuaranteeFee*, which reflects the compensation paid to guarantors. It is measured as the underwriting fee in SEK million divided by the amount guaranteed. By definition, this variable is constructed as a continuous variable between 0 and 1. In practice, min value is given by 0.0 and max by 0.2 (20%), see further in descriptive statistics.

One of the independent variables is the size of the rights issue, measured as the gross proceeds raised in SEK million. As observed in both our data and in Eckbo and Masulis (1992), issue size is right-skewed and exhibits non-linear effects. According to Eckbo and Masulis (1992), costs tend to decline with larger offerings due to economies of scale, but the rate of decline diminishes as size increases. The paper also highlights issue size as a central factor in the choice of flotation method and the use of underwriting guarantees. To capture potential non-linearities and economies of scale, we include both *IssueSize* and its squared term $IssueSize^2$ in the models. Although logarithmic transformations are commonly used to reduce skewness, our attempts to use *log(IssueSize)* and $log(IssueSize)^2$ introduced multicollinearity and reduced interpretability. Centering the log-transformed terms as suggested by Kutner et al. (2005) mitigated some of the collinearity but further obscured the economic meaning of the coefficients. We therefore retain the original scale variables, acknowledging the skewness as a limitation while prioritizing interpretability. In the Heckman model, where polynomial terms are not feasible, we retain only *log(IssueSize)* to reduce skewness and the influence of extreme values.

We include *Pre-Commitments* to capture the percentage of the rights issue pre-subscribed by existing shareholders, providing a direct measure of shareholder support. Unlike ownership concentration, emphasized in studies such as Eckbo and Masulis (1992) and Ginglinger and Hamon (2012), pre-commitments reflect actual, observable behavior rather than assumed willingness to support. Although prior literature suggests that concentrated ownership reduces the need for underwriting, this does not necessarily hold in the Swedish context. Large shareholders in Sweden may act as guarantors, which could be driven by the opportunity to receive compensation rather than to reduce risk. This creates a potential agency conflict, where high insider ownership may increase the likelihood of underwriting. For this reason, we rely on reported pre-commitments in prospectuses, which offer a clearer and more relevant measure of actual shareholder support. As shown in the decision model (3.2.1), we include a squared term to allow for a potential non-linear relationship with the use of a guarantee. We expect *Pre-Commitments* to be negatively related to both the use of underwriting and the level of guarantee fees, since higher upfront support reduces the perceived risk of a failed offering.

We also include the variable *GuaranteeCommitments* that measures the proportion of the issue that was covered by external guarantors. It takes positive values only for underwritten deals and is therefore closely related to the binary *Underwritten* variable. For this reason, we do not use it when modeling the underwriting decision. Instead, it is included in fee regressions to assess whether the extent of guarantee coverage influences the size of the fee. A larger underwritten share shifts more risk to guarantors, but it may also reduce the percentage fee due to economies of scale, making the expected net effect ambiguous or even negative.

To reflect the broader financial environment, we include two macro-level variables. The first is Δ*InterestRate*, which measures the change in the Swedish short-term policy rate. By focusing on the change in the repo rate, the variable captures shifts in monetary policy that can affect both the cost and availability of external capital. Sudden increases in interest rates may indicate tighter credit conditions and heightened risk aversion in financial markets. This can make it more difficult for firms to attract investors without additional security, which in turn increases the appeal of underwriting. We also expect this increased demand to be reflected in higher underwriting fees, as guarantors price in greater risk and lower investor appetite.

The second macro variable is the Economic Tendency Indicator, denoted *ETI*. It reflects aggregated economic sentiment based on survey responses from Swedish businesses and households. Higher values signal stronger confidence in the economy, while lower values indicate pessimism or uncertainty. This measure is inspired by earlier attempts in the literature to capture market-wide risk, including both idiosyncratic and systematic components (Eckbo and Masulis, 1992; Bøhren et al., 1997). Although previous studies have sometimes found limited significance for market risk in probit models, we believe that ETI captures meaningful variation in the Swedish market, where investor sentiment likely influences both the use of guarantees and their pricing. A negative coefficient on *ETI* would suggest that firms tend to rely less on underwriting guarantees when general economic confidence is high, consistent with the idea that guarantees are used to mitigate the risk of offer failure during uncertain times.

To capture differences between industries, we include sector fixed effects. The sectors in our dataset include Healthcare, Technology, Industrial, Consumer Goods, Real Estate, Financial Services, Communication Services, Utilities, and Basic Materials, with Industrials used as the baseline category in regressions. Firms in different sectors often face different levels of business risk and have varying access to financing. This means that both the decision to use a guarantee and the fee paid for that guarantee may vary across industries. For instance, companies in the Technology sector may be more likely to use guarantees due to the uncertainty in their operations, while firms in the utility sector may rarely need guarantees because of their more stable cash flows. This approach is supported by Bustos et al. (2022), who show that firms with tighter financial constraints are more likely to engage in risk management practices, such as buying insurance. Their findings suggest that companies with more limited financing options tend to invest in ways to reduce their exposure to risk. Including sector effects in our model helps control for these types of industry-specific differences, allowing for a more accurate analysis of what drives the use of guarantees and the fees paid in Swedish rights issues.

Finally, we include year fixed effects in selected regressions to capture unobserved annual variation in market conditions. While these controls help account for time-specific effects, they may also absorb variation otherwise explained by variables such as interest rates or ETI. Therefore, we introduce them cautiously and evaluate their impact on model fit.

We use the SVAR framework to analyze four equity issuance variables and capture their responses to interest rate shocks. These include: (1) *logNo*, the logarithm of the number of rights

issues per month, representing overall issuance activity, (2) *logSum*, the logarithm of the average capital raise per issue in a given month, (3) *Prop*, the proportion of rights issues in a month that involved underwriting guarantees, indicating the relative prevalence of guarantee use, and (4) *Fee*, the average guarantee fee among underwritten rights issues in a given month, expressed as a percentage of the guaranteed amount. All four variables are constructed as monthly averages or aggregates based on our manually collected event-based dataset spanning 2006 to 2025.

We include *Inflation*, defined as the monthly percentage change in the consumer price index, as an endogenous variable in the SVAR model to better capture macroeconomic conditions and strengthen the identification of interest rate shocks. In inflation-targeting regimes such as Sweden's, policy rates are typically set in response to expected inflation. It is therefore important to account for inflation dynamics when analyzing monetary policy (Svensson, 1997). This inclusion helps distinguish the real effects of interest rate changes from movements in nominal variables and provides a more accurate representation of the environment in which firms make financing decisions. It also aligns with standard SVAR practice and allows us to capture relevant macro-financial feedbacks that affect firms' equity issuance decisions. See further explanation of variable ordering and structural identification in section 3.2.4.

3.1.4 Descriptive Statistics

Variable	N	Zero-values (%)	Mean	SD	Median	Min	Max	Skew
Issue Size (MSEK)	1,277	NA	328.0	1,098.0	59.8	1.2	15,100.0	8.51
log(Issue Size)	1,277	NA	4.40	1.46	4.11	0.79	9.62	0.77
Pre-Commitments (%)	1,277	26.0%	28.0	25.0	25.0	0.0	100.0	0.55
GuaranteeCommitments (%)	1,277	39.6%	36.0	34.0	37.0	0.0	100.0	0.25
Guarantee Fee (%)	1,277	44.7%	4.00	4.00	3.00	0.00	20.00	0.51
ΔInterest Rate (%)	1,277	64.3%	-0.01	0.26	0.00	-1.75	1.00	-2.14
Economic Tendency Indicator	1,277	NA	102.0	10.6	103.0	60.9	122.0	-1.13

Table 1: Summary Statistics of Event-Based Dataset

Table 1 reports summary statistics for the 1,277 rights issues in our event-based dataset. The issue size is skewed with a mean of 328 MSEK, a median of 59.8 MSEK and a standard deviation of 1,098. The maximum issue size is 15,100 MSEK and minimum is 1.2 MSEK. Existing shareholder pre-commitments cover on average 28.0% of each issue with a median of 25.0%, while guarantee commitments cover around 36.0% with a median of 37.0%.

The average fee in the dataset is 4.0% with a median of 3.0%. Most periods exhibit no change in interest rates with 64.3% of observations showing zero change and a mean close to zero at minus 0.01 which is expected. Finally, the Economic Tendency Indicator averages 102 with a median of 103, slightly above the neutral level of 100. The range spans from 60.9 to 122.0 and the variable is negatively skewed at minus 1.13, indicating that most months reflect moderate optimism with a few periods of very weak sentiment.

26.0% of observations report zero pre-commitments and 39.6% have no guarantee coverage. In line with this, 44.7% of issues do not involve a guarantee fee. The 5.1 percentage points[6] difference between guarantee use and fee is primarily due to existing shareholders supporting the financing by providing guarantees free of charge.

[6]Percentage points is further denoted as pp

Sector	Number of Issues
Healthcare	354
Technology	294
Industrials	218
Consumer Goods	115
Real Estate	99
Basic Materials	79
Communication Services	50
Financial Services	49
Utilities	19
Total	**1,277**

Table 2: Number of Rights Issues by Sector

Table 2 shows the sectoral breakdown for all 1,277 issues. The sample covers a broad set of industries, but a few sectors dominate. The largest sector represented in the dataset is *Healthcare*, which accounts for 354 rights issues, followed by *Technology* with 294 issues and *Industrials* with 218. Together, these three sectors represent nearly 70 percent of the entire sample. This likely reflects the higher capital needs and more frequent equity issuance patterns of growth-oriented or R&D-intensive companies.

Other sectors include *Consumer Goods* (115 issues), *Real Estate* (99), *Basic Materials* (79), *Communication Services* (50), *Financial Services* (49), and *Utilities* (19). The relatively small number of rights issues in Utilities and Financials may reflect the more stable cash flows or alternative financing structures commonly used in those industries.

Variable	N	Mean	SD	Median	Min	Max	Skew
Number of Issues	219	5.86	4.88	4.00	0.00	26.00	1.59
log(Number of Issues)	219	1.70	0.69	1.61	0.00	3.30	-0.20
Average Issue Size (MSEK)	219	331.00	548.00	161.00	1.00	4,621.00	4.55
log(Average Issue Size)	219	2.13	0.69	2.21	0.00	3.66	-1.06
Average Guarantee Fee (%)	219	7.00	3.00	7.00	0.00	14.00	-0.72
Proportion of Underwritten Issues (%)	219	56.00	29.00	53.00	0.00	100.00	-0.17
ΔInterest Rate (%)	219	0.01	0.30	0.00	-1.75	1.00	-1.70
Inflation Rate (%)	219	0.18	0.49	0.20	-1.40	2.10	0.13

Table 3: Summary Statistics of Monthly Dataset

Table 3 presents the 219 monthly observations used in the SVAR analysis. On average, there are 5.9 issues per month, with a median of 4 and a range from 0 to 26, showing a positively skewed distribution (1.59). The average issue size per month is 331.0 MSEK, with a median of 161.0 and a maximum of 4,621.0 MSEK, resulting in a skewness of 4.55. On average, 7% of the guaranteed amount are charged as a guarantee fee, and around 56% of issues in a given month are are at least partly guaranteed. Interest-rate changes average close to zero (mean 0.01, median 0), which reflects the many periods without policy shifts, and the distribution is negatively skewed (–1.70). Inflation rates are more stable, averaging 0.18% per month with a median of 0.20 and only mild skewness (0.13).

3.2 Empirical Models

3.2.1 Logit Model

We first estimate a Logit model to examine the determinants of firms' decisions to include guarantee commitments in their rights issues. The model is specified below:

$$\begin{aligned}\text{logit}\big[P(\text{Underwritten}_i = 1)\big] = \alpha &+ \beta_1 \cdot \Delta\text{InterestRate}_i + \beta_2 \cdot \text{IssueSize}_i + \beta_3 \cdot \text{IssueSize}_i^2 \\ &+ \beta_4 \cdot \text{Pre-Commitments}_i + \beta_5 \cdot \text{Pre-Commitments}_i^2 \\ &+ \beta_6 \cdot \text{ETI}_i + \beta_7 \cdot \text{Sector}_i + \beta_8 \cdot \text{Year}_i \end{aligned} \tag{1}$$

In this formulation, the dependent variable is the *log-odds*:

$$\log\left(\frac{P(\text{Underwritten}_i = 1)}{1 - P(\text{Underwritten}_i = 1)}\right)$$

The Logistic model is a transformed version of the linear model. It is based on the cumulative logistic probability distribution, which ensures that the predicted values remain within the 0 to 1 interval and are consistent with the binary nature of the outcome (Hosmer et al., 2013). This approach avoids the pitfalls of the linear probability OLS model and provides a sound framework for inference on binary outcomes. We chose a Logistic (Logit) model over a probit model for convenience of interpreting coefficients in odds-ratio terms, where the results are expected to be very similar given the large sample size (Greene, 2012).

To ensure the validity of the model, several assumptions underlying the Logistic regression must be considered (Hosmer et al., 2013). The first key assumption is correct model specification, meaning that no important variables are omitted and no irrelevant ones are included. We argue that the specification fulfills this requirement, as each included variable is motivated in Section 3.1.3 based on theoretical reasoning and empirical findings from earlier studies.

Moreover, we tested the Logit model's linearity assumption using the Box–Tidwell procedure, which involves interacting each continuous predictor with its natural logarithm (Box and Tidwell, 1962). This revealed significant non-linearity in *IssueSize* and *Pre-Commitments* (see Appendix A.1). To address this, we included squared terms for these variables in the model. Alternative specifications omitting $IssueSize^2$ and $Pre\text{-}Commitments^2$ resulted in a significantly poorer fit, and the squared terms themselves were highly significant, confirming their necessity. We also incorporated year fixed effects, which improved model fit as measured by a lower AIC. While these fixed effects absorbed much of the variation previously captured by macroeconomic variables, their inclusion serves as a robustness check confirming the stability of our main results.

Thirdly, the model assumes no or only limited multicollinearity among the independent variables. To examine this, a VIF (Variance Inflation Factor) test was performed, and the results are presented in Appendix A.2. All VIFs were low (well below 5), with the highest being around 3.0 for pre-commitments and its squared term. This is expected since the squared term is mathematically correlated with the linear term but not high enough to pose estimation problems. Additionally, we looked at pairwise correlation through a correlation matrix, see Appendix A.3. None of the continuous variables exhibit sufficiently high correlation to raise concerns. The largest correlation was between *ETI* and $\Delta InterestRate$ around 0.43. This moderate positive correlation may reflect that central banks tend to raise interest rates during periods of strong economic sentiment to prevent overheating and inflation. Given that all pairwise correlations are well below commonly used thresholds (e.g., 0.8), multicollinearity does not appear to be a concern, and the assumption can be considered fulfilled (Shrestha, 2020).

Another important assumption is the independence of observations, which means that the outcome for one observation should not influence, or be correlated with, the outcome of another. This assumption is generally considered to hold in our case, as there is no structural dependence between individual observations.

A final concern relates to the time-dependent nature of *InterestRate* and *ETI*. Although stationarity is not a strict requirement in logistic models, non-stationary regressors can lead to spurious results and unreliable inference. To address this, the augmented Dickey-Fuller (ADF) test was conducted to assess the stationarity of each series (Greene, 2012). The results, shown in Appendix A.4, indicate that *InterestRate* is non-stationary. To correct for this, the variable was first-differenced, resulting in a stationary series, and thus Δ*InterestRate* is used in the final model. In contrast, *ETI* was found to be stationary (p = 0.015) and required no transformation.

3.2.2 Beta Model

Secondly, we employ a Beta model to assess the fee paid to guarantors. Since the fee is a rate given by a percentage of the guarantee commitment, it's bounded between 0 and 1. Beta regression, as proposed by Ferrari and Cribari-Neto (2004), is designed for dependent variables that are constrained to the interval (0,1). The model is applied to the subset of rights issues that have non-zero underwriting fees.

The model has two components: (1) a *mean submodel*, capturing the expected fee, and (2) a *precision submodel*, which accounts for heteroskedasticity in the conditional variance.

Let $y_i = \text{GuaranteeFee}_i$. The dependent variable is assumed to follow a Beta distribution:

$$y_i \sim \text{Beta}(\mu_i\phi_i, (1-\mu_i)\phi_i)$$

where $\mu_i \in (0,1)$ is the conditional mean, and $\phi_i > 0$ is the precision parameter. The logit link is used for the conditional mean:

$$\begin{aligned}\text{logit}(\mu_i) = \alpha &+ \beta_1 \cdot \Delta\text{InterestRate}_i + \beta_2 \cdot \text{IssueSize}_i + \beta_3 \cdot \text{IssueSize}_i^2 \\ &+ \beta_4 \cdot \text{Pre-Commitments}_i + \beta_5 \cdot \text{GuaranteeCommitments}_i \\ &+ \beta_6 \cdot \text{ETI}_i + \beta_7 \cdot \text{Sector}_i + \beta_8 \cdot \text{Year}_i \end{aligned} \tag{2}$$

To allow the conditional variance to vary across observations, the precision parameter ϕ_i is modeled as:

$$\log(\phi_i) = \gamma_0 + \gamma_1 \cdot \Delta\text{InterestRate}_i + \gamma_2 \cdot \text{ETI}_i \tag{3}$$

The Beta regression is specified similarly to the Logit model. The variable *GuaranteeCommitments* is included to assess whether guarantee coverage affects the size of the fee (see further explanation in Section 3.1.3). A further modification is the exclusion of the squared pre-commitments term. Based on the Box-Tidwell transformation results, pre-commitments enters the guarantee-fee equation linearly in this setting, unlike the non-linear effect observed in the Logit model of the underwriting decision. In contrast, *IssueSize* still exhibits a non-linear relationship (see Appendix A.10).

The precision submodel includes Δ*InterestRate* and *ETI*, based on the hypothesis that during periods of economic uncertainty or tighter financial conditions, variation in fees across offerings may increase due to differences in risk perception and negotiation outcomes. Other variables lacked strong theoretical support and were statistically insignificant in tests, while also reducing the model's pseudo R^2. This specification improves model fit while focusing on the most plausible sources of heteroskedasticity.

The model's first assumption is that the dependent variable follows a Beta distribution. This is supported by visual inspection of the histogram, which approximately follows a Beta distribution (see Appendix A.5). Furthermore, it is important to select the appropriate link function, such as logit or probit. When re-estimating the model using a probit link, the pseudo R^2 decreases, indicating a lower proportion of explained variation. The logit link is therefore preferred, as it not only provides better model fit but also enables a more intuitive interpretation of the coefficients in terms of log-odds.

Moreover, we examined the model's goodness-of-fit by analyzing the Pearson residuals from the Beta regression. As shown in Appendix A.6, the residuals are largely symmetrically distributed around zero with no apparent systematic patterns, indicating that the model captures the underlying structure of the data reasonably well. While a few observations exhibit larger residuals, suggesting potential outliers, the overall distribution supports the adequacy of the Beta regression specification.

Although the standard Beta regression model initially appeared well specified, a plot of Pearson residuals against fitted values revealed heteroskedasticity (see Appendix A.7), violating the assumption of constant variance. As previously introduced, we addressed this issue by incorporating a precision sub-model, allowing the dispersion of guarantee fees to vary with the macroeconomic variables. The residual-versus-fitted plot for the Beta regression with a precision sub-model (see Appendix A.8) shows a tighter, homoscedastic pattern, highlighting the model's improved specification. Furthermore, the significance of both *ETI* and Δ*InterestRate* in the precision model confirms that the assumption of homoskedasticity did not hold in the original specification and that the refined model offers a more accurate, robust representation of the data.

Thereafter, we tested for multicollinearity using a Variance Inflation Factor (VIF) test, the results of which are presented in Appendix A.9[7]. The test indicated no severe multicollinearity, and the assumption is therefore considered satisfied.

3.2.3 Heckman Selection Model

To further increase the robustness of our analysis, we also employ the sample selection procedure developed by Heckman (1979), which addresses potential selection bias by incorporating information from a first-stage logistic model. The first stage estimates the probability that a firm chooses to use an underwriter. Conditional on this selection, the second stage estimates the cost of underwriting. The empirical model is presented below:

$$\begin{aligned}
\text{Selection (Probit):} \quad \text{Underwritten}_i^* &= \gamma_0 + \gamma_1 \cdot \Delta\text{InterestRate}_i + \gamma_2 \cdot \log(\text{IssueSize}_i) \\
&\quad + \gamma_3 \cdot \text{Pre-Commitments}_i + \gamma_4 \cdot \text{ETI}_i + \gamma_5 \cdot \text{Sector}_i \\
&\quad + u_i \\
\text{Underwritten}_i &= \begin{cases} 1 & \text{if Underwritten}_i^* > 0 \\ 0 & \text{otherwise} \end{cases}
\end{aligned} \tag{4}$$

where $u_i \sim \mathcal{N}(0,1)$ is a normally distributed error term.

$$\begin{aligned}
\text{Outcome (Guarantee Fee):} \quad \text{GuaranteeFee}_i &= \beta_0 + \beta_1 \cdot \log(\text{IssueSize}_i) \\
&\quad + \beta_2 \cdot \text{Pre-Commitments}_i + \beta_3 \cdot \text{ETI}_i \\
&\quad + \beta_4 \cdot \text{Sector}_i + \rho \cdot \lambda_i + \epsilon_i
\end{aligned} \tag{5}$$

[7] See interpretation of previous VIF test in section 3.2.1.

where $\epsilon_i \sim \mathcal{N}(0, \sigma^2)$ and $\lambda_i = \frac{\phi(z_i'\gamma)}{\Phi(z_i'\gamma)}$ is the inverse Mills ratio, constructed from the first-stage Probit model. Here, $\phi(\cdot)$ and $\Phi(\cdot)$ denote the standard normal density and cumulative distribution functions, respectively. The parameter $\rho = \text{Corr}(u_i, \epsilon_i)$ captures the correlation between the error terms in the selection and outcome equations. By including it in the outcome equation, we adjust for the non-random nature of the sample, allowing us to obtain consistent estimates of the guarantee fee. The significance of the estimated correlation between the error terms in the selection and outcome equations ($\rho = -0.495$) confirms the presence of selection bias and supports the use of the Heckman model.

In the Heckman model, convergence issues prevented the use of a more flexible polynomial specification in the full-information maximum likelihood estimation. We therefore use a linear specification for *Pre-Commitments*, as it best captures the relationship in the fee equation. For *IssueSize*, we apply a logarithmic transformation to improve model fit, enhance interpretability, and reduce skewness, though this may not fully capture the underlying relationship. For both variables, we consider the earlier models to better represent the true functional form.

The selection equation is specified as a probit model to align with the distributional assumptions of the Heckman selection framework. While a logit link was used in previous parts of the analysis, the full-information maximum likelihood (ML) estimation of the Heckman model requires the errors in the selection and outcome equations to follow a joint normal distribution. This assumption only holds if the selection equation is estimated using a probit specification. Although logit and probit links tend to produce similar marginal effects, using probit here ensures correct model specification.

To assess the validity of the joint normality assumption, we examined the residuals from the outcome equation using a QQ-plot, see Appendix A.11. The residuals align closely with the theoretical normal distribution, with only minor deviations in the tails, which supports the appropriateness of the maximum likelihood approach.

Finally, the Heckman model also relies on an exclusion restriction, which requires at least one variable to affect the selection equation but not the outcome. To meet the identification requirements, the change in interest rate *(ΔInterestRate)* is included in the selection model, as it is expected to influence the binary choice of using underwriting but not the fee itself, as supported by the results from the Logistic- and Beta model. To test this assumption, each model was estimated separately (see Appendix A.12). The results confirm that the interest rate significantly affects the selection decision but has no significant effect on the guarantee fee, supporting the validity of the exclusion restriction.

3.2.4 SVAR Analysis

To complement the cross-sectional models, we employ a Structural Vector Autoregression (SVAR) model to investigate the dynamic impact of interest rate shocks on equity issuance outcomes. This approach allows us to trace impulse response functions that illustrate how an unexpected change in interest rates propagates to equity market activity over time.

Unlike traditional single-equation models, which often treat macroeconomic variables as exogenous and fail to account for feedback effects, the VAR framework treats all variables as endogenous. The SVAR builds on this by using economic theory to separate true shocks from simple correlations, making it possible to identify a dynamic macroeconomic shock and understand its causal effects on equity issuance activity (Lütkepohl, 2005). This methodology is widely adopted in the monetary policy literature to examine how exogenous policy shocks

influence real and financial variables over time (Lütkepohl and Netšunajev, 2014; Jang, 2021). In our context, the SVAR allows us to isolate an unexpected interest rate hike and observe its multi-period impact on our chosen outcome variables of interest, including the number of rights issues, underwriting fees, average capital raised per issue, and the proportion of issues underwritten.

We estimate a series of three-variable SVAR models using monthly data, where the endogenous variable vector is defined as:

$$\mathbf{y}_t = \begin{bmatrix} i_t \\ \pi_t \\ x_t \end{bmatrix}$$

with i_t denoting the $\Delta InterestRate$, π_t the *Inflation*, and x_t the equity market outcome of interest. The outcome variable x_t is specified in four separate models as $\log(no_t)$, fee_t, $\log(IssueSize_t)$, and $prop_t$, each representing a distinct equity issuance variable. All variables are treated as endogenous, and no exogenous regressors or deterministic trends are included. We estimate the SVAR without exogenous controls to focus on the direct dynamics between interest rates, inflation, and equity issuance variables. While omitting external factors may exclude some influences, this lean specification avoids overfitting and preserves degrees of freedom given the sample size and lag length [8].

The reduced-form VAR(p) is written as:

$$\mathbf{y}_t = c + A_1 \mathbf{y}_{t-1} + A_2 \mathbf{y}_{t-2} + \cdots + A_p \mathbf{y}_{t-p} + \boldsymbol{\varepsilon}_t, \tag{5}$$

where c is a vector of intercepts, A_j are 3×3 coefficient matrices up to lag p, and the vector of residuals $\boldsymbol{\varepsilon}_t$ represents the unexpected movements of each variable after accounting for past values. These residuals can be contemporaneously correlated, and this joint variation is summarized by their variance-covariance matrix Σ.

Lag length p was selected using the Akaike Information Criterion (AIC) in line with Ozcicek and McMillin (1999). The result indicated $p = 6$ for the model with $\log(IssueSize)$ and $p = 7$ for the other three outcome variables. To ensure consistency across specifications, we also estimated the $\log(IssueSize)$ model with $p = 7$ and found the results to be robust. Therefore, we set $p = 7$ for all models to maintain a uniform lag structure and facilitate comparability.

To interpret the system in structural terms, we reformulate the VAR into its structural representation. The structural model is written:

$$B_0 \mathbf{y}_t \;=\; c + B_1 \mathbf{y}_{t-1} + B_2 \mathbf{y}_{t-2} + \cdots + B_p \mathbf{y}_{t-p} + \mathbf{u}_t, \tag{6}$$

where B_0 is the 3×3 matrix that captures the contemporaneous links among the variables, and $\mathbf{u}_t = [u_t^i,\, u_t^\pi,\, u_t^x]'$ is the vector of structural shocks. These shocks are assumed to be mutually uncorrelated, so the off-diagonal elements of their covariance matrix $E(\mathbf{u}_t \mathbf{u}_t') = D$ are zero.

Because the matrix B_0 contains the current values of the endogenous variables on both sides of the equation, the system exhibits simultaneity. To eliminate this, we premultiply by B_0^{-1} to

[8] The SVAR is estimated using monthly data from November 2006 to January 2025, resulting in 219 observations. With three endogenous variables and seven lags, each equation includes 21 lagged regressors and a constant, totaling 22 parameters. As noted by Lütkepohl (2005), excessive parameterization in VAR models can impair small-sample inference and distort impulse response analysis. Given our lag structure and limited sample size, a simple specification is preferred.

express the system in its reduced form. This yields:

$$\mathbf{y}_t \;=\; c^* + C_1\,\mathbf{y}_{t-1} + \cdots + C_p\,\mathbf{y}_{t-p} + \boldsymbol{\varepsilon}_t, \qquad c^* = B_0^{-1}c,\; C_j = B_0^{-1}B_j,\; \boldsymbol{\varepsilon}_t = B_0^{-1}\mathbf{u}_t.$$

The reduced-form residuals $\boldsymbol{\varepsilon}_t$ inherit their covariance from the structural shocks:

$$\Sigma \;=\; E[\boldsymbol{\varepsilon}_t\boldsymbol{\varepsilon}_t'] \;=\; B_0^{-1}D\big(B_0^{-1}\big)'.$$

Normalising $D = I$ assumes that each structural shock has unit variance and is uncorrelated with the others. This simplifies the reduced-form covariance matrix to $\Sigma = PP'$, where $P = B_0^{-1}$. To recover the structural shocks and compute impulse-response functions, we must impose enough restrictions to identify the system.

In our 3×3 case, the matrix B_0 contains k^2 unknown contemporaneous coefficients, while the data provides only $\frac{k(k+1)}{2}$ distinct elements of the reduced-form covariance matrix $\Sigma = E[\boldsymbol{\varepsilon}_t\boldsymbol{\varepsilon}_t']$. Hence, we must impose:

$$\underbrace{k^2}_{\text{unknowns}} \;-\; \underbrace{\tfrac{k(k+1)}{2}}_{\text{observed moments}} \;=\; \tfrac{k(k-1)}{2}$$

restrictions to achieve identification. A common and computationally convenient way to do this is to assume a recursive ordering of the variables, which corresponds to applying a Cholesky decomposition to Σ. In our setting, we adopt the ordering $(i_t \to \pi_t \to x_t)$ which imposes the following contemporaneous structure: A shock to the interest rate i_t affects all variables immediately. A shock to inflation π_t affects inflation and the equity variable but does not affect interest rates contemporaneously. A shock to the equity variable x_t affects only itself on impact.

These assumptions imply the following lower-triangular structure for the impact matrix:

$$P = \begin{pmatrix} p_{11} & 0 & 0 \\ p_{21} & p_{22} & 0 \\ p_{31} & p_{32} & p_{33} \end{pmatrix}$$

The triangularity condition imposes $\frac{k(k-1)}{2} = 3$ zero restrictions, matching the number required for $k = 3$.

Our ordering is motivated by the idea that monetary policy is forward-looking, responding to expected future inflation rather than to current inflation figures. Christiano et al. (2005) find that "after an expansionary monetary policy shock [...] inflation responds in a hump shape fashion peaking after about two years." This delayed response supports our assumption that interest rates can affect inflation contemporaneously, but not vice versa. While it could be assumed that inflation contemporaneously affects interest rates, doing so would prevent us from isolating the impact of monetary policy shocks which is our main focus. We also tested ordering inflation before the interest rate, and the results remained largely robust, suggesting that the findings are not overly sensitive to this assumption.

Before estimating the SVAR, we check for unit roots using Augmented Dickey-Fuller (ADF) tests. The interest rate series appears to be non-stationary, see Appenix A.13. To ensure valid inference, we difference the interest rate. This transformation implies that impulse responses show the effect of shocks on the change in the interest rate to the outcome variable. While this reduces interpretability, it avoids spurious regressions and ensures model validity (Lütkepohl, 2005). We also take the logarithm of issue size and number of issues to reduce skewness, stabilize variance, and allow for interpretation of estimated effects in percentage terms.

While most variables pass the Augmented Dickey-Fuller (ADF) test at lag 7, others, especially Inflation, do not clearly reject the unit root hypothesis. However, this does not invalidate the model, as the overall system can remain dynamically stable even if some individual series are non-stationary (Kilian and Lütkepohl, 2017). Testing the eigenvalues of the companion matrix confirms that all estimated SVAR models satisfy the stability condition, with maximum eigenvalue well below one (Kilian and Lütkepohl, 2017), see Appendix A.14. Hence, we proceed with the models as specified.

After identification, we focus on the impulse response functions (IRFs) to an interest rate shock. An exogenous, unanticipated increase in the interest rate at time t is represented by a one-standard-deviation structural shock to u_t^i (approximately 0.3 pp[9]). This allows us to trace its dynamic effects on inflation π_t, the equity variable x_t, and their future values. Uncertainty in IRFs is assessed using a residual bootstrap with 500 replications. We construct 80% confidence intervals using the 10th and 90th percentiles of the bootstrapped responses. This level balances informativeness and statistical caution, particularly in small-sample settings. For instance, Herrera and Pesavento (2009) report both 68% and 95% intervals in a quarterly VAR covering 1959–2006, and note the importance of reducing the number of parameters when subsampling. Similarly, Matsumoto (2011) employs 60% and 80% intervals in the context of global liquidity shocks. Following a similar logic as Sims and Zha (1999), who warns that excessively wide confidence bands can obscure meaningful inference in small samples, we argue that 80% intervals are appropriate given our sample of 219 monthly observations and high lag order.

[9]Standard deviation of $\Delta InterestRate$ is 0.2989.

4 Results

4.1 Overall Empirical Findings

The empirical analysis reveals clear patterns in how and when Swedish firms use guarantee commitments in rights issues and what drives the pricing of those guarantees. In general, companies facing greater uncertainty or weaker shareholder backing are more likely to employ underwriting, consistent with asymmetric information and adverse selection theories (Brealey et al., 1977; Myers and Majluf, 1984; Eckbo and Masulis, 1992). In contrast, firms with strong insider participation often avoid paying for guarantees, effectively signaling confidence in their offering's success.

Our results indicate that firms exhibit non-linear behavior in their decision to secure guarantee commitments. The likelihood of using guarantees is concave in shareholder pre-commitments, meaning firms are most likely to seek guarantees when internal support is present but not sufficient. In contrast, the relationship with issue size is convex, as very small or very large offerings are more likely to involve guarantees. Underwriting fees also show a convex relationship with issue size. Larger issues tend to benefit from economies of scale and thus lower percentage fees, but this effect reverses beyond a certain threshold, possibly due to increased complexity or risk.

Firms in high-uncertainty sectors such as Healthcare show a significantly higher reliance on underwriting, while firms in asset-heavy, stable sectors like Real Estate more often forgo guarantees or secure them at lower cost. These patterns are consistent with the predictions of signaling and adverse selection theory that firms facing greater information asymmetry or investor skepticism are more likely to signal quality through costly guarantees, whereas firms with tangible assets and predictable cash flows face less investor uncertainty.

While macroeconomic factors do not significantly affect the level of guarantee fees, weakened macroeconomic conditions appear to increase uncertainty around fee outcomes. The SVAR analysis further reveals that interest rate shocks lead to an uptick in numbers of rights issues and a higher proportion of guaranteed offerings. This supports the view that rising rates reduce the attractiveness of debt financing, pushing more firms toward equity issuance, as suggested by Choe et al. (1993). Additionally, the amount of capital raised increase after an interest rate shock. This suggests that the firms seeking equity financing during these periods may be larger, given their larger capital needs.

4.2 Determinants of Guarantee Usage - Logit Model

Firstly, we analyze the likelihood of using a *guarantee commitment* with a Logistic regression model, see Table 4. Including year fixed effects improved fit but absorbed most variation from *ETI* and partly from $\Delta InterestRate$, reducing their interpretability. Since macro effects are a focus, the main results are based on the model without year effects, with the year-fixed version included in Appendix B.1 as a robustness check.

While logistic regression coefficients describe the effect of a variable on the log-odds of the outcome, such estimates are not directly interpretable in terms of actual probabilities. To provide more intuitive insight into the economic significance of our results, we compute marginal effects at the mean (MEM). These represent the change in the predicted probability of underwriting associated with a one-unit change in an explanatory variable, holding all other variables at their sample means.[10][11]

Variable	**Estimate**	**Std. Error**	**Sign.**
(Intercept)	1.959	0.703	***
IssueSize	-5.9e-04	1.5e-04	***
IssueSize^2	7.2e-08	2.0e-08	***
Pre-Commitments	7.955	0.790	***
Pre-Commitments^2	-11.580	1.146	***
ΔInterestRate	0.922	0.281	***
ETI	-0.025	0.007	***
Sector Fixed Effects			
Basic Materials	0.632	0.285	**
Communication Services	1.843	0.439	***
Consumer Cyclical	-0.047	0.246	
Financial Services	-0.502	0.362	
Healthcare	0.657	0.187	***
Real Estate	-0.640	0.282	**
Technology	0.369	0.194	*
Utilities	-0.204	0.510	

Notes: *** p<0.01, ** p<0.05, * p<0.10. Residual deviance: 1524.2 (AIC: 1554.2)

Table 4: Logistic Regression: Model without Year Fixed Effects

The Logit model confirms a non-linear, U-shaped relationship between *IssueSize* and the likelihood of using a guarantee. The negative coefficient on the linear term and the positive coefficient on the squared term (both $p < 0.01$) suggest that medium-sized issues are least likely to involve guarantees, whereas both small and large issues show a higher probability of being guaranteed. Smaller issues, likely conducted by smaller firms, may face higher perceived risk. Very large deals exceed what insiders can absorb without external support. To put it in perspective, a rights issue of SEK 4,000 million[12] is 17.0 pp less likely to be guaranteed than one of SEK 1,000 million, and 14.9 pp less likely than one of SEK 7,000 million. Firms seem to avoid the cost of guarantees when the issue is manageable but turn to them when scale introduces risk.

A second finding is the inverted U-shaped relationship for *Pre-Commitments*, which does not fully align with the results of Eckbo and Masulis (1992). While they document a monotonic decrease in the likelihood of using a guarantee as pre-commitments increase, we instead find that *Pre-Commitments* is positively associated with guarantee usage up to approximately 30%[13], beyond which additional commitments reduce the probability. Interpreting the results suggests

[10] See sample means in Table 1.

[11] All subsequent economic interpretations in the Logit model assume that all other variables are held at their mean, corresponding to a baseline probability of using a guarantee of 63%. Reported marginal effects should therefore be interpreted as changes in probability relative to this mean baseline unless otherwise stated.

[12] The minimum point occurs at an issue size of SEK 4,098 million.

[13] The maximum occurs at a pre-commitment level of 34.3%.

that increasing insider commitment from 0% to 30% raises the likelihood of a guarantee by 32.3 pp, but increasing it from 30% to 60% reduces it by 18.1 pp. We argue that two primary factors explain this pattern: (1) low to moderate levels, insider pre-commitments may signal some confidence from insiders but also draw attention to the lack of stronger support. As a result, firms may be more likely to add a guarantee to strengthen credibility and offset the negative signal from limited insider backing. (2) high levels of pre-commitment can act as a substitute for guarantees, in line with the mechanism proposed by Eckbo and Masulis (1992).

Moreover, macroeconomic conditions significantly influence guarantee decisions. A higher *ETI* is associated with a lower probability of using a guarantee. A one-point increase in *ETI* reduces the likelihood by approximately 0.58 pp. Conversely, a standard 25 basis point interest rate hike increases the probability of guarantee usage by 5.2 pp. These effects are both statistically and economically meaningful, supporting the argument by Choe et al. (1993). Adverse selection problems tend to be milder during expansionary phases of the business cycle when perceived risk is lower, which implies reduced demand for guarantees. In contrast, tighter monetary policy increases uncertainty and lowers investor risk appetite, leading firms to secure guarantee commitments. These results confirm that shifts in sentiment and policy affect how firms and investors perceive placement risk.

Finally, we find sectoral differences in the use of guarantees. Firms in the Healthcare, Communication Services, and Basic Materials sectors are significantly more likely to use guarantees[14]. Healthcare companies are 13.7 pp more likely to secure a guarantee. This likely reflects: (1) higher uncertainty and information asymmetries in biotech and research-intensive firms, and (2) the critical need for full funding to proceed with operations. In Healthcare, failing to raise the full amount might stop the entire project. For instance, a company completing a Phase 1 clinical trial might depend on guaranteed capital to advance to Phase 2, which could determine its survival. Investors may be hesitant to participate without knowing the full amount will be raised, which makes guarantee commitments an important tool for gaining their support. In these contexts, guarantees help reduce information asymmetries and signal confidence to the market in line with Myers and Majluf (1984), while ensuring continued operational funding.

Communication Services companies, including those in telecom and media, exhibit one of the strongest effects, suggesting that they almost always rely on guarantees. In both Communication Services and Basic Materials, firms may depend on the success of the issue to finance large-scale investments, for example in infrastructure. Although agency problems and adverse selection may play a role, the frequent use of guarantees in these sectors appears to be primarily driven by the need for funding certainty and the risks associated with under-subscription.

Real Estate firms were 15.7% less likely to use guarantee commitments. Many Swedish property companies have strong anchor shareholders, often families or institutional investors, and typically hold tangible assets that reduce perceived risk.[15] These firms tend to rely more on shareholder support than on underwriters, consistent with the findings of Cronqvist and Nilsson (2005). Their findings shows that control-oriented owners, particularly families, often choose equity issue methods that preserve control and limit external involvement.

In summary, the Logit model indicates that guarantee commitments are not randomly assigned but systematically linked to firm-specific risk and contextual factors. They are more prevalent in situations characterized by heightened uncertainty, such as very small or large offerings, in

[14] Relative to Industrials, the reference category in the sector fixed effects.

[15] See for example L E Lundbergföretagen AB (family ownership), Atrium Ljungberg (family ownership), and Vasakronan (institutionally owned by Swedish national pension funds).

certain sectors, and periods of weak market sentiment. In contrast, firms operating in more stable environments often raise capital without external guarantees. Stronger firms avoid guarantees to signal confidence, while riskier firms accept the additional cost to secure funding. The results support key predictions from signaling and adverse selection theories (Myers and Majluf, 1984; Bøhren et al., 1997). Overall, the findings suggest that guarantee commitments reflect firm risk, issue-specific structure, and the broader investment climate, rather than being a standard or administrative feature of equity offerings.

4.3 Pricing of Guarantee Fees - Beta Model

We now turn to the *pricing* of guarantee commitments, modeled using a beta regression framework (see Table 5). As in the Logit specification, adding year fixed effects improves model fit by capturing time-specific variation. However, this also absorbs explanatory power from *ETI*, which limits the ability to interpret macroeconomic effects. To maintain consistency with the structure of the previous model, we present the specification without year fixed effects. The version including year dummies is reported in Appendix B.2 as a robustness check.

Given the use of a logit link function, interpretation of the Beta regression coefficients parallels that of the Logit model. To enable intuitive interpretation and maintain consistency with the previous section, we report marginal effects at the mean (MEM). These reflect the expected change in the guarantee fee associated with a one-unit change in a given variable, evaluated at the sample means of all other covariates[16].

[16] All subsequent economic interpretations in the Beta model assume that all other variables are held at their mean, corresponding to a baseline guarantee fee of 7.2%

Variable	Estimate	Std. Error	Sign.
(Intercept)	-1.626	0.211	***
IssueSize	-7.3e-04	5.8e-05	***
$IssueSize^2$	4.7e-08	4.3e-09	***
Pre-Commitments	-0.698	0.105	***
GuaranteeCommitments	-0.335	0.100	***
ΔInterestRate	-0.008	0.065	
ETI	-0.003	0.002	*
Sector Fixed Effects			
Basic Materials	0.084	0.067	
Communication Services	-0.030	0.073	
Consumer Goods	-0.284	0.071	***
Financial Services	-0.369	0.128	***
Healthcare	-0.022	0.048	
Real Estate	-0.214	0.102	**
Technology	0.012	0.049	
Utilities	0.189	0.129	
Precision Model (Phi)			
(Intercept)	2.362	0.556	***
ΔInterestRate	-0.855	0.217	***
ETI	0.020	0.005	***

Notes: *** p<0.01, ** p<0.05, * p<0.10. Pseudo R^2: 0.346. Log-likelihood: 1552.

Table 5: Beta Regression: Model without Year Fixed Effects

We find a statistically significant non-linear relationship between *IssueSize* and guarantee fees. Fees initially decline as issue size increases, which is consistent with economies of scale and stronger bargaining power. However, beyond a certain threshold, fees begin to rise again. For example, increasing the offering size from SEK 100 million to SEK 300 million reduces the guarantee fee by approximately 1 pp. The turning point occurs around SEK 7.8 billion, a level exceeded by only six offerings in our sample. Increasing the issue size from SEK 7.8 billion to SEK 12 billion raises the fee by 0.8 pp[17]. This suggests that while larger issues benefit from lower relative fees due to fixed-cost effects[18] and negotiation leverage, very large offerings may result in higher fees because underwriters face greater absolute risk exposure.

[17] In practice, such large offerings are rare, suggesting this is primarily a diminishing effect.

[18] By fixed-cost effects, we refer to the presence of upfront costs that do not scale with volume. Once these are covered, the marginal cost of underwriting additional volume is low, making discounts on larger mandates economically rational.

As expected, higher shareholder *Pre-Commitments* is strongly associated with lower guarantee fees. A guaranteed rights issue with 50 percent insider commitments is expected to have a guarantee fee approximately 2.4 pp lower than an otherwise similar issue with no insider backing. These effects are consistent with signaling theory, as outlined by Brealey et al. (1977) and Myers and Majluf (1984), where insider participation signals firm quality and helps alleviate concerns about overvaluation. They also align with certification theory (Booth and Smith, 1986), which suggests that credible third parties or insider signals can reduce information asymmetries and strengthen investor confidence. These findings indicate that *Pre-Commitments* not only reduce the likelihood of using guarantees, as shown in our Logit model, but also improve the pricing of guarantees when used. In a well-functioning market, this relationship behaves as expected. When demand for guarantees is lower, fees tend to be lower as well.

Moreover, we find a significant negative relationship between *GuaranteeCommitment* and the guarantee fee. To put this in perspective, if *GuaranteeCommitment* increases from 20% to 80%, the guarantee fee decreases by 1.4 pp. While this may seem counterintuitive, as higher risk exposure should imply higher fees, it might be explained by volume discounts and fixed-cost effects.

Macroeconomic variables had a limited influence on average guarantee fees in the Beta regression model. A higher ETI was associated with slightly lower fees, which aligns with the theoretical expectation that underwriters accept lower compensation in optimistic markets when risk premiums are reduced. However, this relationship was only weakly significant. The lack of stronger statistical significance suggests that the effect is weaker than anticipated in our sample. Changes in the interest rate also showed no meaningful association with fee levels. These results indicate that guarantee fees are primarily shaped by deal-specific factors rather than broader macroeconomic conditions. This finding is in line with Armitage (2000), who found no clear link between macroeconomic volatility and underwriting fees in the UK. In contrast, Choe et al. (1993) argue that adverse selection costs vary over the business cycle and should be reflected in fee adjustments as macro conditions change. The greater similarity between the Swedish and UK equity markets, both in structure and institutional context, may help explain why our results align more closely with Armitage (2000) than with Choe et al. (1993).

Macroeconomic variables had limited influence on mean fees but played a stronger role in explaining fee dispersion in the precision model. Higher interest rates were associated with greater fee variability, while stronger sentiment reduced it, indicating that macro conditions influence the dispersion of guarantee fees. These results support two potential mechanisms: (1) uncertain environments heighten risk sensitivity and may lead underwriters to engage in greater price discrimination across firms, rewarding low-risk issuers with lower fees while penalizing riskier ones. And (2), macroeconomic conditions may influence which firms choose to issue equity. As interest rates rise and debt becomes more expensive, equity financing becomes relatively more attractive, drawing in a broader and more varied set of firms. This increases adverse selection and leads to a more heterogeneous issuer pool, which causes underwriters to differentiate more in pricing and contributes to greater fee dispersion. This selection effect aligns with Baker and Wurgler (2002), who show that issuance activity varies over the cycle with firm quality and leverage.

Turning to the sector-specific results, the data revealed only modest variation in guarantee fees, suggesting perceived differences in risk and placement difficulty. The only statistically significant differences were found in the Financial Services, Consumer Goods, and Real Estate

sectors, which paid approximately 2.1 pp, 1.6 pp and 1.3 pp less[19], respectively. These patterns indicate that underwriters viewed issuers in these sectors as easier to place or less risky.

None of the sectors in our sample paid significantly higher guarantee fees than the baseline. Even in Technology and Healthcare, where higher fees might be expected due to valuation uncertainty or greater risk involved, no premium was observed. This limited variation in fees across sectors relative to the decision-model, suggests a standardized and potentially oligopolistic pricing structure in the underwriting market. This pattern resembles the clustering of IPO fees around seven percent in the United States, where tacit coordination among underwriters has been suggested as a possible explanation (Chen and Ritter, 2000). Our findings point to similar pricing inertia. Underwriters may offer selective discounts to secure deals but rarely charge more than an implicit norm.

In summary, the results largely reflect those from the usage regression. Riskier rights issues are more likely to include guarantees and tend to incur higher fees. Fees are higher when deals are smaller and lack insider support, and lower when offerings are larger and well-backed. These patterns support the view that underwriters price risk, consistent with findings from previous European studies. However, sector-level fee differences were negligible, which was contrary to expectations given varying risk profiles. This suggests that underwriters may apply standardized pricing across industries, possibly due to a concentrated underwriting market. Macroeconomic variables had little effect on average fees but did influence fee dispersion, indicating some sensitivity to broader conditions. Taken together, the model fits the data well, though some variation in fees remains unexplained. This may reflect company-specific factors such as recent news, negotiation dynamics, or other unobserved differences in underwriter pricing practices.

4.4 Accounting for Selection Bias - Heckman Selection Model

As previously discussed in Section 3.2.3, a key concern when analyzing underwriting fees is selection bias. We only observe a fee when a company chooses to use a guarantee commitment. If this decision is correlated with unobservable factors that also influence the fee, such as limited transparency or urgency of funding, the Beta regression may yield biased estimates. To address this issue, we apply a Heckman two-stage selection model (Heckman, 1979). The main results from the Heckman model are presented in Table 6.[20]

[19] Compared to the baseline category, Industrials.

[20] Due to the model's inability to capture non-linear effects, the variables *log(IssueSize)* and *Pre-commitments* appear insignificant and may bias other estimates. As a result, we limit the economic interpretation of this section. The primary objective is to assess whether the model supports our earlier findings after correcting for selection bias.

Variable	Estimate	Std. Error	Sign.
Selection Equation			
(Intercept)	1.6486	0.4199	***
log(IssueSize)	-0.0219	0.0262	
Pre-Commitments	0.0760	0.1443	
ΔInterestRate	0.6163	0.1515	***
ETI	-0.0161	0.0038	***
Sector Fixed Effects			
Basic Materials	0.4183	0.1679	**
Communication Services	1.0375	0.2286	***
Consumer Goods	0.0669	0.1462	
Financial Services	-0.2522	0.2049	
Healthcare	0.4383	0.1096	***
Real Estate	-0.5012	0.1636	***
Technology	0.2819	0.1143	**
Utilities	-0.1164	0.3017	
Outcome Equation			
(Intercept)	0.1710	0.0116	***
log(IssueSize)	-0.0115	0.0008	***
Pre-Commitments	-0.0281	0.0049	***
ETI	-0.0002	0.0001	**
Sector Fixed Effects			
Basic Materials	0.0019	0.0049	
Communication Services	-0.0097	0.0059	*
Consumer Goods	-0.0181	0.0045	***
Financial Services	-0.0194	0.0069	***
Healthcare	-0.0040	0.0036	
Real Estate	-0.0033	0.0061	
Technology	-0.0033	0.0036	
Utilities	0.0187	0.0098	*
Error Terms			
sigma	0.0281	0.0019	***
rho	-0.4946	0.1796	***

Notes: *** p<0.01, ** p<0.05, * p<0.10, . p<0.10. Log-likelihood: 745.5. 1277 observations (571 censored, 706 observed).

Table 6: Heckman Selection Model

The estimated rho is -0.49 and highly significant, indicating a strong negative relationship between the unobserved factors in the decision to underwrite and the underwriting fee. The significant estimate of rho confirms the presence of selection bias, validating the use of the Heckman model and allowing for interpretation corrected for this bias.

The first-stage probit results support the main findings from the earlier Logit model. Market sentiment (*ETI*) had a strong negative effect, while Δ*InterestRate* had a strong positive effect on the likelihood of using a guarantee. Sectoral variation is also evident, with firms in Technology, Healthcare, and Communication Services being more likely to use guarantees, while firms in Real Estate are less likely. Neither log-transformed issue size nor insider commitments were significant, which aligns with previous indications of a U-shaped relationship that linear speci-

fications cannot fully capture. Overall, the results reinforce that guarantees are more frequently used under conditions of heightened uncertainty, consistent with the findings from the Logit model.

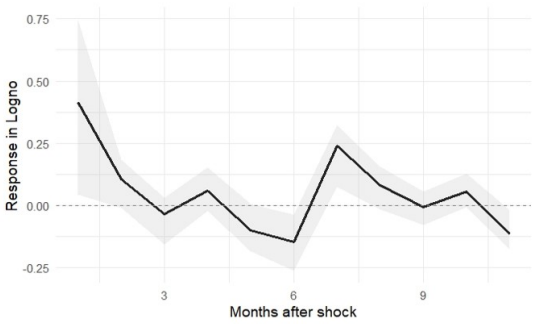
The second-stage outcome equation of the Heckman model is consistent with the results from the Beta regression. Log(*IssueSize*) remained a strong negative predictor of the guarantee fee, and insider commitments continued to reduce fees significantly. Firms in the Consumer Goods and Financial Services sectors paid lower fees, with estimated reductions of 1.8 to 1.9 pp respectively. No sector paid significantly higher fees than the Industrial baseline at the 5 percent level, reinforcing the pattern of a largely uniform pricing structure. Moreover, ETI exhibited a statistically significant negative effect, although the magnitude was relatively modest. This aligns with the generally weak coefficients observed for macroeconomic variables in the Beta model. A 10-point increase in ETI lowered guarantee fees by approximately 0.20 pp in both the Heckman and Beta model.

In summary, the Heckman selection model is in line with our previous findings after accounting for selection bias. Key relationships such as the effects of issue size, insider commitments, and market sentiment on guarantee fees remain statistically significant after correction. In addition to confirming these observed effects, the model also reveals significant unobserved influences on both selection and pricing. While firms under greater uncertainty may be more likely to rely on guarantees, the negative rho suggests that unobserved factors increasing the likelihood of guarantee use are associated with lower unobserved components of the fee. This may reflect bargaining power, pricing heterogeneity, or omitted firm characteristics. By accounting for these hidden influences, the Heckman model improves the reliability of the estimated effects and provides a robustness check on the prior results.

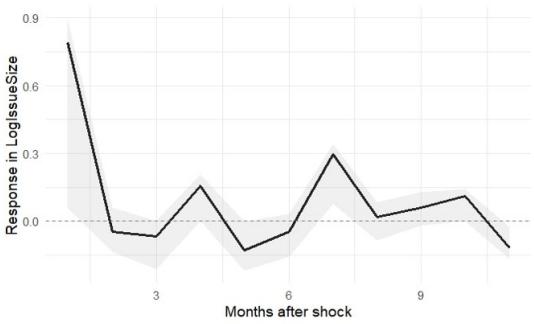
4.5 SVAR Analysis of Interest Rate Shocks

Finally, we estimate four structural VAR models to examine how unanticipated changes in interest rates affect firms' equity financing behavior. The interest rate shock is defined as a one-standard-deviation exogenous increase in the change of the interest rate[21]. We focus on interpreting the impulse response functions (IRFs), cumulative IRFs, and forecast error variance decompositions (FEVDs) for each model. Figures 1a–1d present the IRFs with confidence bands, while Appendix B.3 shows the corresponding FEVDs and cumulative responses.

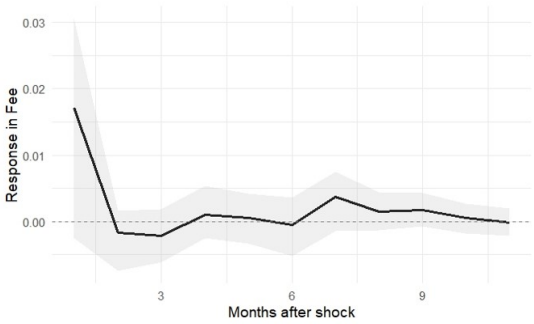
[21] Approximately an increase of 0.3 pp, see Table 3.



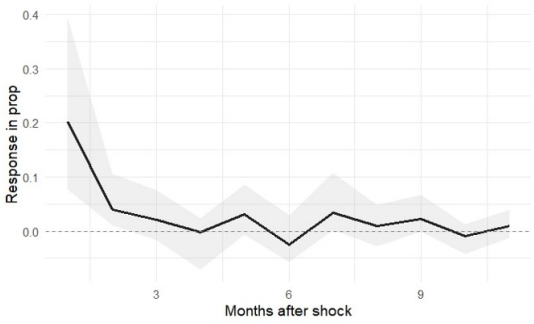
(a) Log Number of Issues



(b) Log of Issue Size



(c) Guarantee Fees



(d) Proportion of Underwritten Issues

Figure 1: SVAR Analysis: IRF Plots

The SVAR results show a sharp rise in equity issuance following an unexpected interest rate hike. Both the number of offerings and the average amount of capital raised increase significantly on impact, but these effects are short-lived and fade within a few months. With regard to the cumulative responses, both variables exhibit persistently positive trajectories, with statistically significant effects in the initial months that fade to insignificance thereafter. Interest rate shocks explain roughly 25 percent of the variation in the number of issues at horizon 1. For average capital raised the explanatory power is even stronger at around 56 percent, suggesting that issuance volumes respond more strongly than frequency to monetary tightening. The immediate response shows a 38 percent increase in the number of issues and a roughly 120 percent increase in the average capital raised.

The increase in issuance may be explained by a combination of three underlying mechanisms: (1), as borrowing becomes more expensive, firms may substitute away from debt and toward equity financing. This behavior is consistent with the substitution view of capital structure. Graham and Harvey (2001) find that rising interest rates discourage debt usage and increase the relative attractiveness of equity, despite its higher issuance costs. (2), the increase may reflect a shift in the composition of firms accessing equity markets. Firms entering during periods of tightening monetary policy may be larger and thus have larger capital needs, lower exposure to adverse selection, and greater flexibility to respond to changes in financing conditions. Baker and Wurgler (2002) show that firms differ in when they seek equity financing, suggesting that shifts in market valuations and credit conditions can influence which firms choose to issue equity. And (3), a broader set of firms may choose to raise more capital per issue as a precautionary response to tightening monetary conditions.

While Choe et al. (1993) argue that firms prefer to issue equity in strong markets to minimize adverse selection, our findings suggest that firms issue reactively in response to tightening financing conditions. In such cases, maintaining access to capital may outweigh concerns about timing.

The SVAR results also show a clear increase in the proportion of underwritten issues following an unexpected interest rate hike. The share of rights issues involving underwriting increases by approximately 20 pp on impact, with the effect being statistically significant at the 80 percent confidence level. This immediate shift suggests that firms rely more heavily on underwriting when financial conditions tighten, in line with our Logit results. The cumulative response remains persistently elevated, indicating a lasting change in issuance behavior.

Interest rate shocks explain approximately 40 percent of the variation in the proportion of underwritten issues at horizon 1, pointing to a strong macroeconomic influence on firms' choice of issuance structure. This behavior aligns with theories of adverse selection and signaling. Myers and Majluf (1984) argue that when firms face valuation uncertainty, they prefer financing methods that reduce investor skepticism. Underwriting helps mitigate placement risk and signals confidence to the market. Similarly, Eckbo and Masulis (1992) find that guarantees can offset weak expected demand and improve issue success. Our SVAR results support this view. In an environment of rising uncertainty, firms increasingly turn to underwriting both as insurance and as a quality signal.

In contrast to the clear shifts in issuance volume and structure, the SVAR results show no meaningful change in average guarantee fees following an interest rate shock. Although the point estimate shows a modest uptick on impact, the effect is statistically insignificant and fades quickly over the remainder of the estimation period. Interest rate shocks explain only about 23 percent of the variation in fees at horizon 1, reinforcing the view that pricing is sticky and only weakly responsive to macroeconomic conditions, consistent with our Beta regression results.

One explanation is that fee structures reflect strategic behavior in concentrated markets, as discussed in section 4.3. Chen and Ritter (2000) document fee clustering in concentrated underwriting markets, while Ciobanu (2011) argues that muted price responses could be a symptom of limited competition in oligopolistic markets. In the Swedish underwriting market, where a small number of intermediaries dominate, fees may be anchored by convention, long-term relationships, or reputational concerns. This could also help explain the findings of Janbu and Mørk (2012), who show that Swedish underwriters earn high excess returns relative to the risk they bear. The combination of market concentration and already elevated fee levels may help explain why guarantee pricing remains stable despite changing financial conditions.

A second explanation involves changes in the types of firms accessing equity markets. This interpretation follows a similar logic as argument (2) for the increase in issuance volume, where monetary tightening leads to a shift in the composition of issuing firms (Baker and Wurgler, 2002). Firms that choose to raise capital in these conditions may be relatively larger, perceived as less risky and secure lower guarantee fees. Although some firms still face high fees, the average remains stable due to offsetting effects within the issuer pool. This interpretation may also help explain the Beta model's strong predictive performance despite an overall flat fee response. Taken together, the cross-sectional and SVAR evidence suggest that guarantee fees are shaped more by deal-specific risk than by temporary changes in the macroeconomic environment.

In summary, the SVAR results complement our earlier findings and offer a dynamic view of how interest rate shocks affect equity issuance. Both the number of offerings and the average

issue size increase on impact, though these effects are short-lived. Likewise, the proportion of guaranteed issues increases and remains elevated over time, reflecting heightened demand for underwriting as uncertainty rises. This supports our Logit and Heckman results, which show that firms are more likely to use guarantees when financial conditions tighten. Meanwhile, guarantee fees exhibit no significant response, consistent with our Beta regression findings and the discussion of sticky pricing. Overall, the SVAR confirms that firms respond to monetary tightening by issuing more equity and relying more heavily on guarantees, while guarantee fees remain stable.

5 Conclusion

This study has examined the determinants of underwriting usage and guarantee fees in Swedish rights issues. Using a manually collected dataset covering the period from 2006 to 2025, we combined cross-sectional regression analysis with a structural VAR model to assess both issue-specific drivers and macroeconomic influences. We find that: (1) firms turn to guarantees during macroeconomic stress, but fees remain stable, (2) fees are driven by deal structure, not macro conditions, and (3) interest rate shocks raise issuance volume temporarily and guarantee usage more persistently.

Firstly, we find that Swedish firms are more likely to secure underwriting guarantees in periods of heightened uncertainty. Guarantees are especially common in smaller offerings and when insider pre-commitments are limited. We also find that the likelihood of using a guarantee increases following interest rate hikes and decreases when market sentiment improves, suggesting that macroeconomic stress increases the demand for external risk-sharing. Guarantee usage is also higher in the Healthcare, Communication Services, Basic Materials, and Technology sectors, while Real Estate firms tend to use underwriting less.

Secondly, guarantee fees are primarily shaped by issue size, insider participation, and the share of the offering covered by guarantees. We observe a U-shaped relationship with issue size, where fees are higher for both very small and very large offerings. Stronger pre-commitments from existing shareholders are associated with lower fees, and fees also decline when a larger portion of the issue is underwritten. Macroeconomic variables do not significantly affect the average fee, but do influence its variability. These results are robust to potential selection bias, as confirmed by a Heckman model.

Finally, the SVAR analysis shows that an interest rate shock has a positive and statistically significant impact on both the number of rights issues and the average capital raised. However, these effects are limited to the first period after the shock. Meanwhile, the proportion of underwritten issues increases significantly at the time of the shock and remains elevated throughout the forecast horizon, indicating a more durable shift in issuance structure. Guarantee fees show no significant response, suggesting that pricing is unresponsive to changing macroeconomic conditions. The model explains a moderate share of the variation in issuance activity, with the strongest explanatory power for the proportion of underwritten issues, followed by average capital raised and then the number of offerings. Explanatory power for guarantee fees is limited, consistent with the observed price stability. Together, these findings contribute both to the existing literature and to real-world settings.

For the literature, this thesis extends prior research by demonstrating that underwriting decisions are influenced not only by firm- and issue-specific factors, but also by macroeconomic shocks. The results also point to meaningful sectoral differences. Firms in industries such as Healthcare are more likely to use guarantees but do not pay systematically higher fees. While earlier studies primarily focused on ownership structure and information asymmetry, this thesis shows that industry context is also an important factor in equity financing decisions.

In practical terms, the results suggest that neither operating in a high-risk sector nor facing rising interest rates justifies higher underwriting fees, which supports more informed and strategic negotiations for issuing firms. For underwriters, the findings provide a benchmark for market-based risk pricing and highlight strategic opportunities to engage clients ahead of anticipated interest rate hikes, when demand for guarantees tends to increase. For policymakers, the limited fee responsiveness suggests weak competitive pressure in underwriting markets,

highlighting the need to assess competition and pricing practices in underwriting markets.

While the findings provide a clearer understanding of underwriting behavior and its implications, certain limitations should be kept in mind. First, our data are drawn from prospectuses, allowing key firm-specific or macroeconomic variables to shift between the time of the underwriting decision and the filing date. Second, although our study provides detailed insights into the Swedish market, contextual differences may limit the generalizability of our findings to other settings. Third, we rely on broad sector classifications, which may overlook important differences in firm risk and financing behavior within each sector. In addition, the SVAR analysis does not capture sector-specific dynamics because the sample size is insufficient for reliable estimation at that level. Finally, the lack of access to detailed contractual terms, internal strategic considerations, and other unobserved factors limits our ability to fully explain the usage and pricing of guarantee commitments.

These gaps also present opportunities for future research on guarantee commitments in rights issues. One direction is to examine whether the patterns observed here hold across other markets, such as in the Nordic region or broader European context. Another is to explore long-term outcomes such as post-issue performance or financial distress, in order to assess whether guarantees primarily reduce risk or also function as strategic signals. Interviews with CFOs, underwriters, or guarantors could complement this by providing deeper insight into how fees are set, how negotiations unfold, and how relationships or time pressure influence the process. Although this thesis introduces macroeconomic and sectoral factors, these aspects remain underexplored in the context of guarantee commitments. Further work could test the effects of different types of shocks, apply more detailed firm-level data, and group firms by risk level or development stage rather than broad sector categories. Together, these approaches could clarify the mechanisms behind guarantee use and pricing, and strengthen our understanding of their role in equity financing.

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A Appendix: Method

A.1 Linearity Assumption - Logit Model

The linearity assumption of the Logit model was tested using the Box-Tidwell approach.

Variable	Estimate	Std. Error	p-value
ΔInterestRate $\cdot$ log(ΔInterestRate)	0.353	0.855	0.680
IssueSize $\cdot$ log(IssueSize)	0.000479	0.000102	<0.001
ETI $\cdot$ log(ETI)	-0.144	0.077	0.060
Pre-Commitments $\cdot$ log(Pre-Commitments)	-7.525	0.616	<0.001

Table 7: Box-Tidwell test results for linearity in the Logit model

A.2 VIF Test - Logit Model

Variance Inflation Factor (VIF) values for the variables included in the Logit model:

Variable	GVIF	Df	GVIF$^{1/(2\cdot Df)}$
ΔInterestRate	2.373	1	1.540
IssueSize	4.141	1	2.035
IssueSize^2	4.096	1	2.024
Pre-Commitments	10.263	1	3.204
Pre-Commitments^2	10.070	1	3.173
ETI	4.593	1	2.143
Sector	1.340	8	1.018
YEAR	8.822	19	1.059

Table 8: VIF values for the Logit model

A.3 Correlation Matrix

Pairwise Pearson correlation matrix for the continuous explanatory variables:

	ΔInterestRate	IssueSize	Pre-Commitments	ETI
ΔInterestRate	1.000	-0.032	-0.011	0.433
IssueSize	-0.032	1.000	0.065	-0.141
Pre-Commitments	-0.011	0.065	1.000	0.033
ETI	0.433	-0.141	0.033	1.000

Table 9: Correlation matrix for explanatory variables in the Logit model

A.4 ADF Test for Stationarity - Logit Model

Results from the Augmented Dickey-Fuller (ADF) test for stationarity of `InterestRate` and `ETI`:

Variable	Dickey-Fuller Statistic	Lag Order	p-value
`InterestRate`	-1.403	10	0.831
Δ`InterestRate`	-3.455	6	0.048
`ETI`	-3.8959	6	0.015

Table 10: ADF test results for stationarity of InterestRate and ETI, based on optimal lag lengths

A.5 Distribution of Guarantee Fee

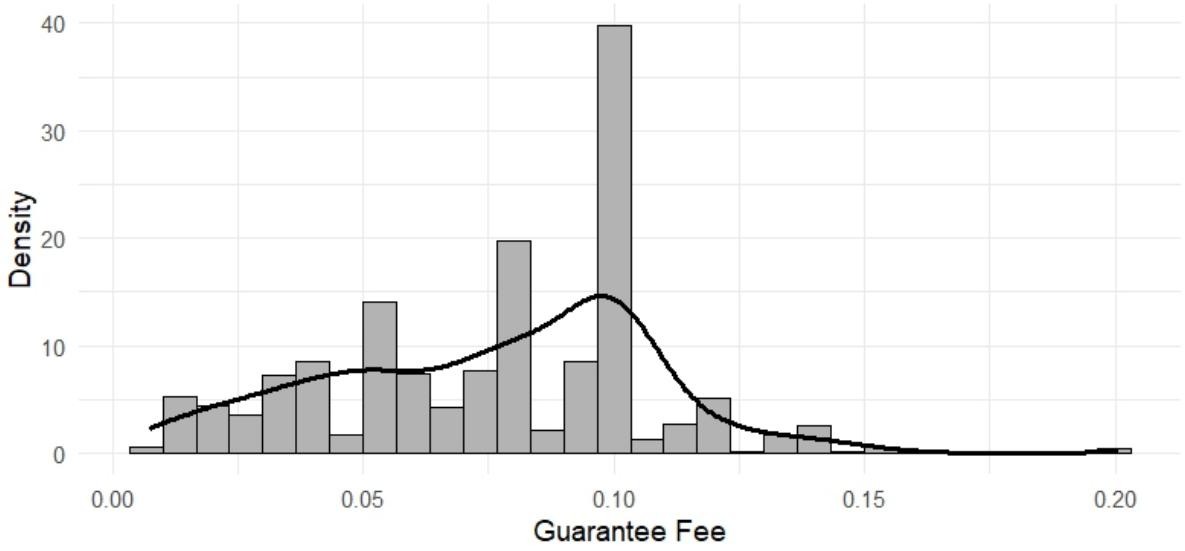


Figure 2: Distribution of Guarantee Fee

A.6 Pearson Residuals

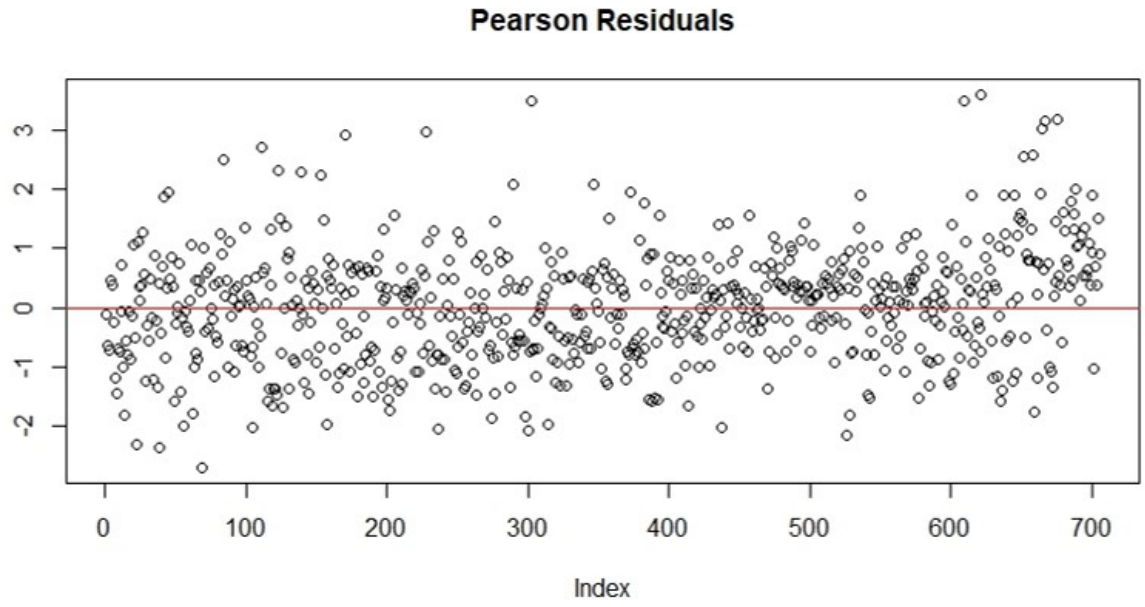


Figure 3: Pearson Residuals

A.7 Residuals Vs. Fitted Values

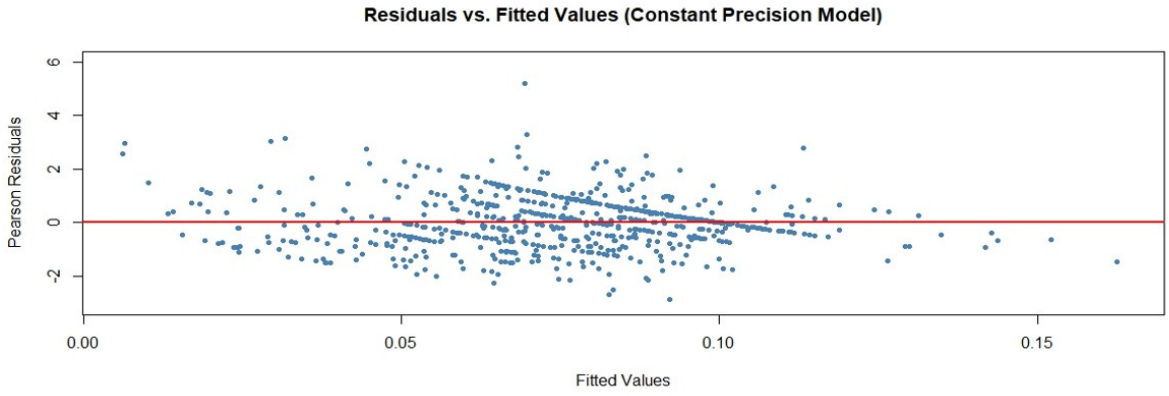


Figure 4: Residuals vs. Fitted Values

A.8 Residuals Vs. Fitted Values (Precision Model)

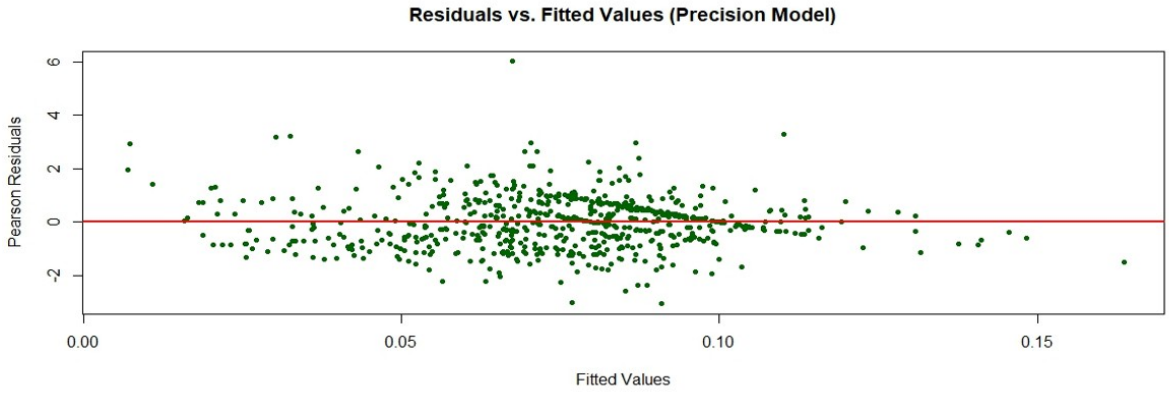


Figure 5: Residuals vs. Fitted Values (Precision Model)

A.9 VIF Test - Beta Model

Variance Inflation Factor (VIF) values for the variables included in the Beta model:

Variable	GVIF	Df	$\text{GVIF}^{1/(2\cdot\text{Df})}$
ΔInterestRate	2.211	1	1.487
IssueSize	8.191	1	2.862
IssueSize^2	7.968	1	2.823
Pre-Commitments	2.415	1	1.554
GuaranteeCommitments	2.368	1	1.539
ETI	3.965	1	1.991
Sector	1.715	8	1.034
Year	9.951	19	1.062

Table 11: VIF values for the mean equation in the Beta regression

A.10 Linearity Assumption - Beta Model

The linearity assumption of the Beta model was tested using the Box-Tidwell approach.

Variable	Estimate	Std. Error	p-value
ΔInterestRate · log(ΔInterestRate)	-1.331	1.232	0.280
IssueSize · log(IssueSize)	0.001	0.000	<0.001
Pre-Commitments · log(Pre-Commitments)	-0.717	0.610	0.239
GuaranteeCommitments · log(GuaranteeCommitments)	-0.375	0.872	0.667
ETI · log(ETI)	-0.150	0.103	0.147

Table 12: Box-Tidwell test results for linearity in the Beta model

A.11 Q-Q Plot - Heckman Model

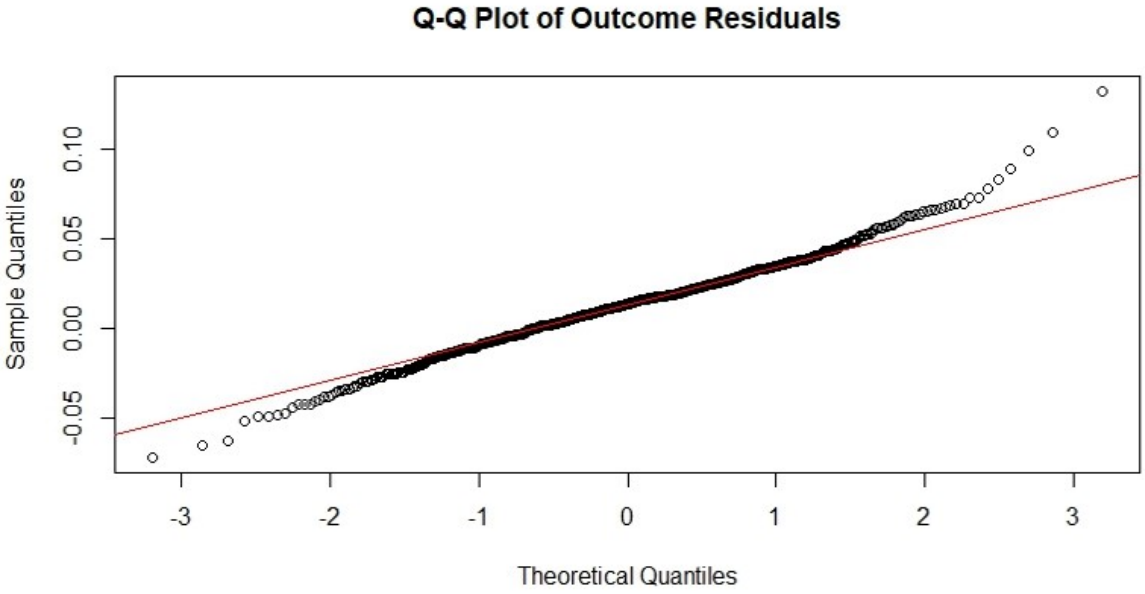


Figure 6: Q-Q Plot

A.12 Exclusion Restriction - Heckman Model

Model	Estimate for ΔInterestRate	Std. Error	p-value
Selection equation	0.978	0.264	<0.001
Outcome equation	0.0043	0.0041	0.295

Table 13: Exclusion restriction check for ΔInterestRate in the Heckman selection model

A.13 ADF Test for Stationarity - SVAR Model

Variable	ADF Statistic	Lag Order	p-value
InterestRate	-2.6602	7	0.299
ΔInterestRate	-3.7259	7	0.0236
Prop	-4.0259	7	< 0.01
log(No)	-3.6177	7	0.0326
log(IssueSize)	-4.6761	7	< 0.01
Inflation	-2.8575	7	0.2161
Fee	-3.7363	7	0.0231

Table 14: Augmented Dickey-Fuller (ADF) Test Results with Lag Length 7

A.14 Maximum Eigenvalue - SVAR Model

Model (Dependent Variable)	Max Eigenvalue Modulus
`log(No)`	0.9500
`Fee`	0.9008
`log(IssueSize)`	0.9475
`Prop`	0.8984

Table 15: Maximum Eigenvalue Modulus for Each SVAR Model

B Appendix: Results

B.1 Logistic Regression with Year Fixed Effects

Variable	Estimate	Std. Error	Sign.
(Intercept)	0.504	1.513	
IssueSize	-6.247e-04	1.608e-04	***
$IssueSize^2$	7.610e-08	2.119e-08	***
Pre-Commitments	7.791	0.821	***
$Pre\text{-}Commitments^2$	-11.570	1.180	***
ΔInterestRate	0.867	0.387	**
ETI	-0.0178	0.0129	
Sector Fixed Effects			
Basic Materials	0.693	0.293	**
Communication Services	1.970	0.447	***
Consumer Cyclical	-0.034	0.253	
Financial Services	-0.370	0.372	
Healthcare	0.605	0.193	***
Real Estate	-0.767	0.293	***
Technology	0.395	0.199	**
Utilities	-0.295	0.523	
Year Fixed Effects			
2007	0.307	0.617	
2008	0.598	0.663	
2009	0.683	0.694	
2010	0.830	0.610	
2011	0.564	0.622	
2012	0.618	0.646	
2013	1.075	0.667	
2014	1.316	0.640	**
2015	0.531	0.627	
2016	0.536	0.614	
2017	0.728	0.602	
2018	1.467	0.615	**
2019	1.266	0.631	**
2020	1.699	0.784	**
2021	-0.216	0.685	
2022	1.339	0.717	*
2023	0.939	0.743	
2024	1.367	0.699	*
2025	13.500	373.900	

Notes: *** p<0.01, ** p<0.05, * p<0.10. Residual deviance: 1481.1 (AIC: 1549.1)

Table 16: Logistic Regression: Model with Year Fixed Effects

B.2 Beta Regression with Year Fixed Effects

Variable	Estimate	Std. Error	Sign.
(Intercept)	-1.961	0.387	***
IssueSize	-8.327e-04	5.920e-05	***
$IssueSize^2$	5.366e-08	4.383e-09	***
Pre-Commitments	-0.584	0.102	***
GuaranteeCommitments	-0.204	0.099	**
ΔInterestRate	-0.051	0.078	
ETI	-0.0016	0.0031	
Sector Fixed Effects			
Basic Materials	0.157	0.065	**
Communication Services	0.043	0.072	
Consumer Goods	-0.248	0.069	***
Financial Services	-0.319	0.123	***
Healthcare	-0.029	0.046	
Real Estate	-0.289	0.102	***
Technology	0.020	0.048	
Utilities	0.148	0.125	
Year Fixed Effects			
2007	-0.171	0.168	
2008	-0.066	0.176	
2009	-0.030	0.181	
2010	-0.019	0.162	
2011	-0.092	0.166	
2012	-0.011	0.171	
2013	-0.062	0.173	
2014	-0.089	0.167	
2015	-0.014	0.167	
2016	0.002	0.164	
2017	0.051	0.160	
2018	0.119	0.159	
2019	0.092	0.163	
2020	0.042	0.194	
2021	0.154	0.186	
2022	0.214	0.181	
2023	0.328	0.190	*
2024	0.403	0.172	**
2025	0.502	0.274	*
Precision Model (Phi)			
(Intercept)	2.465	0.556	***
ΔInterestRate	-0.800	0.218	***
ETI	0.020	0.005	***

Notes: *** p<0.01, ** p<0.05, * p<0.10, . p<0.1. Pseudo R^2: 0.375. Log-likelihood: 1586.

Table 17: Beta Regression: Model with Year Fixed Effects

B.3 SVAR Analysis: FEVD and Cumulative IRF

H	IR	INF	Logno
1	0.265	0.003	0.732
2	0.273	0.013	0.714
3	0.270	0.014	0.716
4	0.273	0.015	0.712
10	0.313	0.078	0.608

(a) Log Number of Issues

H	IR	INF	Logsum
1	0.559	0.001	0.440
2	0.560	0.001	0.439
3	0.557	0.005	0.439
4	0.563	0.004	0.433
10	0.567	0.052	0.380

(b) Log of Issue Size

H	IR	INF	Fee
1	0.233	0.028	0.739
2	0.226	0.033	0.741
3	0.228	0.034	0.737
4	0.228	0.040	0.732
10	0.226	0.065	0.709

(c) Guarantee Fees

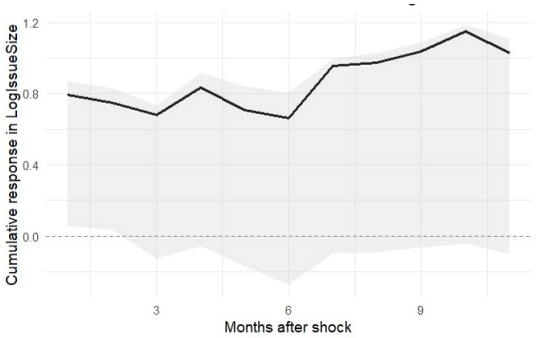
H	IR	INF	Prop
1	0.337	0.007	0.656
2	0.338	0.014	0.648
3	0.333	0.015	0.652
4	0.330	0.022	0.648
10	0.327	0.035	0.637

(d) Proportion of Underwritten Issues

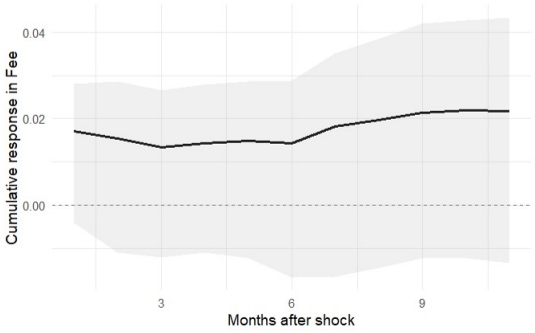
Table 18: Forecast Error Variance Decomposition (FEVD)



(a) Log Number of Issues



(b) Log of Issue Size



(c) Guarantee Fees



(d) Proportion of Underwritten Issues

Figure 7: SVAR Analysis: Cumulative IRF Plots