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Determinants of Short-Run IPO Performance

Evidence from Swedish IPOs

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Abstract

This thesis examines how pre-IPO deal-level characteristics influence short-term market performance for Swedish IPOs from 2001 to 2024. Specifically, it analyzes the effects of free float, the ratio of secondary shares to primary shares, and price revisions on market-adjusted returns over one, ten, and 252 trading days post-listing. The study finds a significant negative relationship between free float and initial returns, aligning with agency and information asymmetry theories. The ratio of secondary to primary shares does not significantly impact short-term IPO performance. However, price revisions show a positive relationship with initial returns, indicating that stronger investor demand leads to greater underpricing. These findings contribute to IPO literature and offer practical insights for market participants in Sweden.

Keywords: *Agency Theory, Free Float, Information Asymmetry, Initial Public Offerings (IPO), Price Revision, Secondary vs Primary Shares, Short-Run Underpricing, Swedish Stock Market*

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1 Introduction

Initial Public Offering, IPO, is when a private company decides to go public and sell a part of its shares to other investors. IPO pricing has long been a focal point in finance and has attracted extensive research across many markets. Companies routinely set their IPO offer price below the price that shares begin trading on public markets, creating underpricing and volatility in the early trading days. Engelen et al. (2020) conducted a meta-analysis of 123 empirical studies found that traditional explanations focusing on the firms age, leverage, or industry account for only part of the observed underpricing and capital raised. Engelen et al. (2020) further highlight that the presence and timing of stakeholders such as venture capitalists, underwriters, auditors, and retained owners shape both the extent of initial underpricing and the proceeds raised. They also show that initial underpricing is a costly signal of firm quality, enhancing long-term performance and increasing risk. This thesis builds on these insights by exploring how pre-IPO characteristics influence initial returns for Swedish IPOs when firms go from private ownership to public markets. Historically, the initial days of trading for newly listed companies have been characterized by substantial volatility, often delivering notable first-day returns (Loughran & Ritter, 2004).

During the company's market debut, a company often sees dramatic price swings that can reward investors within hours or weeks. Central to this dynamic are two decisions, setting the offer price and determining the proportion of shares available to the public. A substantial free float introduces additional shares into the market, increasing liquidity and attracting traders. Similarly, the ratio of newly issued shares to those sold by insiders conveys signals about the company's confidence in its growth path. This thesis seeks to investigate how these strategic decisions around the ratio between primary and secondary shares influence the trajectory of a newly listed firm from its first trade through the early months of trading.

The IPO process involves several steps with specialized actors. Initially, the issuing company prepares financial statements and compiles a registration document. Once that filing is declared approved, a preliminary prospectus is released to potential investors. Management and the lead underwriter conduct a marketing campaign known as the roadshow, during which the business model, growth strategy, and financial outlook are presented to institutional

investors in major financial centers (Bodie et al., 2021).

During the roadshow, investors submit non-binding offers at specified price levels, forming the demand book that leads to the book-building process. Underwriters summarises the bids which will guide both the offer price and the allocation of shares (Bodie et al., 2021). The final offer price and share distributions are fixed at a formal pricing meeting. Using all of the summarized bids, during an open pricing method a filing range is created with the offer price, most often, ending up in this range, the percentage change between the midpoint of the filing range and the final offer price is also known as the price revision. Underwriting agreements often include an overallotment option permitting the issuance of up to fifteen percent additional shares to support aftermarket stability. Using this option is typically followed by a short stabilization period and a 90 to 180 day lock-up for insiders. Once the roadshow is finished, issuers typically sell between twenty and forty percent of their outstanding equity for funding expansion, repay debt, or provide liquidity for existing shareholders (Logue, 1992).

This thesis focuses on how pre-IPO decisions influence initial investor reactions. In particular, it investigates how the proportion of equity sold to public investors, the composition of primary and secondary shares, and adjustments to the offer price during the book-building process relate to short-term IPO performance. These characteristics are analyzed to explore whether they help explain variations in excess returns following the listing.

Building on this examination of pre-IPO choices, this study contributes to the IPO literature. First, it augments the limited research on the Swedish IPO market by offering a comprehensive analysis of the impact of pre-IPO characteristics on short-term excess returns, extending the theoretical framework of owner incentives (Habib & Ljungqvist, 2001). Second, it reexamines established theories of information asymmetry, signaling, and agency within a contemporary Swedish setting, building on documented regime shifts during the dot-com bubble (Ljungqvist & Wilhelm, 2003) and on evidence of evolving issuer objectives over time (Loughran & Ritter, 2004). Third, the study disentangles their roles in shaping early aftermarket returns by isolating three deal-level variables: free float, primary-to-secondary share ratio, and price revisions. Prior research has shown how the fraction of shares sold influences underpricing

levels (Habib & Ljungqvist, 2001) and how sequential price adjustments drive initial returns (Ljungqvist et al., 2006). Finally, the findings guide issuers and underwriters by clarifying how ownership structures and pricing strategies affect short-term performance.

The remainder of the thesis is organized as follows. Section 2 presents the literature review and outlines previous findings on free float, share composition, and price revision. Section 3 introduces the theoretical framework, including information asymmetry, signaling, and agency theory. Section 4 describes the data, variable definitions, and empirical strategy. Section 5 reports and discusses the main results, including regression outputs, robustness checks, and interpretation. Section 6 concludes with a summary of key findings, practical implications, and suggestions for future research.

2 Literature Review

This section begins with a review of previous research, which is used to develop and motivate the study's hypotheses. Based on these hypotheses, relevant theoretical frameworks are then presented to explain the expected relationships.

2.1 Free Float

The proportion of equity offered to public investors at the time of an IPO, referred to as the free float, has been studied in relation to initial underpricing. Several contributions in the literature argue that free float influences short-term returns through its impact on insider ownership and incentive alignment. Empirical findings consistently show that lower free float is associated with greater underpricing, suggesting that ownership structure is an important factor that influences initial returns.

Habib and Ljungqvist (2001), analyzing 1,376 U.S. IPOs from 1991 to 1995, find that IPOs with a higher free float tend to exhibit lower underpricing. Their model predicts that when insiders sell a larger portion of their holdings, they are more exposed to the financial consequences of underpricing, often referred to as wealth losses or money left on the table. To mitigate these losses, they have stronger incentives to invest in promotional activities, such as

hiring reputable underwriters or conducting roadshows, which can reduce underpricing. Their empirical findings support this prediction, showing a negative relationship between insider selling and the degree of underpricing. Ljungqvist and Wilhelm (2003), studying 2,178 U.S. IPOs during the dot-com bubble from 1996 to 2000, report a similar pattern. They show that underpricing is significantly lower when insiders sell more shares in the offering. This finding supports the view that greater insider selling strengthens incentives to monitor the pricing process, thereby limiting the extent of underpricing. Bradley and Jordan (2002), using a sample of 3,325 U.S. IPOs between 1990 and 1999, find that firms with greater insider retention, captured by a higher overhang ratio[1], exhibit greater underpricing. Compared to Habib and Ljungqvist (2001) and Ljungqvist and Wilhelm (2003), Bradley and Jordan use a different measure of ownership structure, focusing on the overhang ratio rather than insider ownership percentages. Furthermore, their sample spans both hot and cold IPO markets across the 1990s, unlike Ljungqvist and Wilhelm (2003), who focus specifically on the dot-com bubble period.

Other studies highlight how the relationship between ownership retention and underpricing may depend on institutional context. Teti and Montefusco (2022), analyzing 128 Italian IPOs, find that greater board and institutional ownership, implying a smaller free float[2], is associated with significantly higher first-day returns. These findings suggest that ownership retention can lead to greater underpricing, particularly in markets characterized by concentrated ownership structures. Similarly, in the UK, Brennan and Franks (1997) analyze 69 IPOs and show that firms often use underpricing strategically to generate oversubscription and limit large share allocations. This helps to ensure dispersed outside ownership and preserve insider control. Their findings indicate that directors typically retain large stakes and sell only modest amounts at the IPO, suggesting that underpricing may be used as a substitute for formal control mechanisms. The UK IPO environment during their sample period lacked widespread use of dual-class shares, potentially increasing the reliance on underpricing as a tool to maintain control compared to other markets.

[1]Bradley and Jordan (2002) calculate the overhang ratio as the number of pre-IPO shares retained (including all share classes) divided by the total number of shares filed for the IPO (both primary and secondary).

[2]Teti and Montefusco (2022) define board and institutional ownership as shares retained by insiders and long-term investors at the time of the IPO. Higher levels of such ownership indicate that a smaller proportion of shares was offered to public investors, thereby implying a lower free float.

In summary, prior research consistently finds that lower free float is associated with higher initial returns. While some studies highlight the role of insider incentives and wealth losses as a driving mechanism (Habib & Ljungqvist, 2001; Ljungqvist & Wilhelm, 2003), others emphasize control-related motives and ownership dispersion strategies (Brennan & Franks, 1997; Bradley & Jordan, 2002; Teti & Montefusco, 2022). Taken together, the literature suggests that ownership structure plays an important role in shaping IPO pricing outcomes. Based on this literature, the following hypothesis is proposed:

H1: A lower proportion of equity offered at IPO increases market-adjusted returns.

2.2 Share-composition (Secondary vs Primary shares)

IPO shares consist of primary shares, which are newly issued equity providing capital to the firm, and secondary shares, which are existing shares sold by insiders (Berk and DeMarzo, 2024). The composition of these shares has been studied in terms of IPO pricing and short-term performance, and empirical evidence regarding how secondary share sales influence initial underpricing and investor returns remains mixed.

In addition to free float, Habib and Ljungqvist (2001) also examine how the composition of shares sold at the IPO relates to underpricing. Their empirical results indicate that underpricing declines with the level of insider selling, captured by the participation ratio, while the effect of issuing new (primary) shares is less consistent. They suggest that when insiders sell secondary shares, they have stronger incentives to minimize underpricing because they bear the direct cost of pricing the shares below market value. In contrast, when new shares are issued, part of the cost is absorbed by the firm, which can weaken these incentives. However, their analysis is limited to U.S. IPOs in the early 1990s, potentially restricting the applicability of their conclusions under different market structures or regulatory conditions.

In their empirical analysis, Ljungqvist and Wilhelm (2003) also differentiate between secondary and primary share sales. They find that underpricing is significantly lower when insiders sell a larger portion of secondary shares, measured by the participation ratio. The dilution factor, which captures the extent of new share issuance, is also negatively associated with underpricing. While the effect is somewhat weaker, the result suggests that both the

level and type of shares sold at the IPO can influence pricing outcomes.

In contrast, Loughran and Ritter (2004), despite identifying fewer secondary sales during the dot-com bubble, observe an increase in CEO dollar ownership[3], finding no significant relationship between secondary share presence and underpricing. However, their study's concentration on U.S. listings during specific market periods, notably the dot-com bubble, limits its applicability to other contexts. Loughran and Ritter (2004) sample ends in 2003, so they do not cover later market disruptions such as the 2008 global financial crisis. Re-examining secondary share sales using more recent IPO data could help determine whether the original results hold. Brau et al., (2007) similarly find that secondary share sales, whether conducted by insiders or other shareholders, do not significantly impact first-day returns. Nevertheless, their study does reveal that insider sales correlate with weaker long-term performance, hinting at potential opportunistic behavior. However, like Loughran and Ritter (2004), their conclusions are based solely on IPOs up to 2001 and could not incorporate major events such as the 2008 financial crisis. Thus, re-testing the effects of secondary share sales in recent IPO contexts and Swedish markets could provide important insights and validate their findings' continued relevance.

Further developing this discussion, Chua and Nasser (2016) examine motivations behind insider secondary share sales. Using a sample of 1,603 U.S. IPOs from 1997 to 2010, they demonstrate that secondary sales driven by liquidity needs correspond with lower underpricing. Their study indicates that the relationship between secondary share sales and short-term returns depends significantly on underlying insider motives. However, as their analysis is limited to U.S. IPOs over this period, the generalizability of their findings to other market contexts remains uncertain. Moreover, while they construct a composite liquidity factor to capture insider motives, this approach makes it difficult to assess whether different types of motivations, such as genuine liquidity needs versus opportunistic behavior, affect underpricing in distinct ways.

[3]CEO dollar ownership is calculated as the number of shares held by the CEO multiplied by the offer price. Despite lower percentage ownership during the dot-com bubble, Loughran and Ritter (2004) show that rising valuations led to substantially higher dollar values of CEO holdings, which may have preserved or even strengthened incentives to avoid underpricing.

In conclusion, the literature provides varied findings regarding the relationship between secondary share sales and IPO underpricing. Some studies highlight that higher secondary share sales reduce underpricing due to more substantial insider incentives (Habib & Ljungqvist 2001), while others report no significant relationship or emphasize underlying motivations and context (Loughran & Ritter 2004; Brau et al., 2007). These discrepancies highlight the complexity involved in isolating the direct effect of share composition on IPO pricing. Despite such inconsistencies, existing studies emphasize the importance of considering share composition at IPO due to its potential implications for insider incentives and investor outcomes. Based on the reviewed literature, particularly Habib and Ljungqvist (2001) and Ljungqvist and Wilhelm (2003), the following hypothesis is proposed:

H2: A higher proportion of secondary shares relative to primary shares at the IPO lowers market-adjusted returns.

2.3 Price Revision

Price revision is the percentage change between the midpoint of the initial filing range and the final offer price (Ljungqvist & Wilhelm, 2003). Positive price revisions typically indicate stronger investor demand than anticipated during the book-building process (Ljungqvist & Wilhelm, 2003). This relationship is consistent with information asymmetry theory, whereby stronger investor demand leads to positive price revisions and is associated with greater underpricing and higher first-day returns (Benveniste & Spindt, 1989; Ljungqvist & Wilhelm, 2003). Investors who disclose positive private information are often rewarded with larger share allocations, although underwriters typically adjust the offer price only partially, allowing investors to realize significant first-day returns (Benveniste & Spindt, 1989; Biais et al., 2002).

Benveniste and Spindt (1989) present an auction-based theoretical model predicting that underwriters partially incorporate positive investor information into IPO prices to incentivize truthful information revelation. However, Benveniste and Spindt (1989) present a static, single-period model where investors provide binary signals of either good or bad information. While influential, their framework does not capture the dynamic, multi-round structure of

modern book-building processes[4].

Empirical support for Benveniste and Spindt (1989) predictions is provided by Hanley (1993), who analyzed 1,430 U.S. firm commitment IPOs from 1983 to 1987. Hanley finds that IPOs priced above their filing range exhibit average first-day returns of approximately 21 percent, nearly double the returns for IPOs priced within the initial range. Conversely, IPOs with downward price revisions exhibit minimal underpricing. However, Hanley's (1993) deliberate exclusion of unit offerings and bank stocks restricts the generalizability of findings to other issuance types or more heavily regulated sectors.

Ljungqvist and Wilhelm (2003) extend these findings to the U.S. dot-com bubble period, showing that underwriters fully incorporate negative information but only partially adjust offer prices upward. Their results establish upward revisions as strong predictors of initial returns, controlling for endogeneity[5]. Complementary evidence from Benveniste, Ljungqvist, Wilhelm, and Yu (2003), using a comprehensive sample of 6,181 U.S. IPOs between 1985 and 2000, supports the concept that IPO pricing revisions are not isolated decisions but are influenced by contemporaneous market activities. They find issuers consider peer IPO pricing and performance when revising offer terms, emphasizing significant information spillovers within IPO waves.

Loughran and McDonald (2013) analyze 1,887 completed U.S. IPOs from 1997 to 2010. They find that upward revisions in the offer price, measured relative to the midpoint of the initial price range, are strongly associated with higher first-day returns. This relationship is partly explained by the tone of the S-1 filings, which are the initial registration documents submitted to the SEC during the IPO process, as filings with more uncertain or negative language tend to coincide with larger price adjustments and greater underpricing. These results suggest that initial tone provides information about ex ante uncertainty, which influences both pricing decisions and aftermarket performance. Weber, Willenborg, Wu, and Yang (2024) examine

[4]Modern book-building processes involve iterative rounds where underwriters solicit and update information from investors before setting the final offer price (Biais, Bossaerts, & Rochet, 2002)

[5]In this context, "controlling for endogeneity" refers to the use of a two-stage least squares (2SLS) model, where predicted values for underwriter reputation and price revisions are used as instruments in the final underpricing regressions to account for potential simultaneity between offer price adjustments and initial returns (Ljungqvist & Wilhelm, 2003).

1,554 U.S. IPOs from 2002 to 2020 and find that upward revisions to the offer price strongly predict first-day returns. They interpret these revisions as reflecting institutional investor demand revealed during the book-building process.

Liu, Lu, Sherman, and Zhang (2023), studying 5,623 U.S. IPOs between 1995 and 2020, provide additional insights by highlighting the role of investor attention in driving IPO outcomes. They find that greater pre-IPO media coverage, as a proxy for investor attention, is positively associated with stronger upward price revisions and higher first-day returns. Their results suggest that behavioral factors, such as investor attention, amplify traditional information-based mechanisms, such as the role of price revisions and partial adjustment to information in explaining IPO underpricing (Benveniste & Spindt, 1989; Hanley, 1993; Ljungqvist & Wilhelm, 2003; Benveniste et al., 2003).

Overall, existing research highlights price revision as an important indicator of investor demand and IPO underpricing, although methodological limitations and contrasting findings highlight the complexity of clearly establishing this relationship. Given these insights, it is hypothesized that:

H3: A larger positive price revision pre-IPO increases market-adjusted returns.

3 Theory

3.1 Information Asymmetry Theory

Information asymmetry theory explains how differences in access to information between insiders and outside investors affect pricing decisions. Akerlof (1970) introduced the concept through the "market for lemons," where sellers have more information than buyers, leading to adverse selection. In the IPO context, Rock (1986) argues that uninformed investors face a "winner's curse" because informed investors avoid overpriced offerings. As a result, uninformed investors are more likely to receive full allocations in overvalued IPOs and fewer shares in undervalued ones. To compensate for this disadvantage, issuers may underprice IPOs to attract uninformed investors, resulting in positive first-day returns.

Benveniste and Spindt (1989) expand this logic by showing how underwriters collect information from informed investors during the bookbuilding process. To reward these investors for revealing valuable signals, underwriters often only partially adjust the offer price in response to strong demand. This mechanism, known as partial adjustment, implies that higher investor demand is not fully incorporated into the offer price, leading to higher first-day returns once the stock begins trading. Hanley (1993) confirms this empirically, finding that IPOs with upward price revisions exhibit greater underpricing. Ljungqvist and Wilhelm (2003) also observe a similar pattern during the dot-com bubble, noting that underwriters incorporated negative information fully but adjusted prices only partially in response to positive signals.

If Hypothesis 3 holds, which predicts that a larger positive price revision pre-IPO leads to a higher short-term return, it can be explained by this theory. The demand revealed during book building is not fully reflected in the offer price, resulting in a larger price jump once the stock begins trading.

Other studies suggest that pricing decisions during bookbuilding may also be shaped by market-level signals and interfirm dynamics. Biais et al. (2002) extend the traditional model to a dynamic setting, showing how information is revealed iteratively over multiple rounds of investor interaction. Benveniste et al. (2003) provide evidence of information spillovers, demonstrating that issuers adjust offer prices based not only on internal demand but also on the pricing and performance of recent peer IPOs. These findings indicate that price revisions reflect both firm-specific and broader market information.

If Hypothesis 1 holds, which predicts that a lower proportion of equity offered at IPO increases short-term excess returns, it can also be explained by information asymmetry theory. When insiders retain more shares, fewer signals are available for outside investors to assess firm quality, leading to greater uncertainty. To compensate for this uncertainty and attract demand, issuers may set a lower offer price, resulting in greater underpricing. This mechanism is particularly relevant in settings where ownership concentration or disclosure limitations restrict the flow of information prior to the offering. This mechanism is especially relevant in markets with concentrated ownership and limited pre-IPO transparency, as firms may use underpricing to compensate for investor uncertainty or to increase the number of outside

shareholders (Teti & Montefusco, 2022; Brennan & Franks, 1997).

3.2 Agency Theory

Agency theory focuses on conflicts of interest between managers or insiders (agents) and outside shareholders (principals). Jensen and Meckling (1976) argue that when insiders own more of the company, their incentives are better aligned with those of outside investors. In IPOs, this alignment affects how offer prices are negotiated.

If Hypothesis 1 holds, agency theory offers a possible rationale. When insiders sell a larger portion of their shares in the IPO, they become more exposed to the financial consequences of underpricing, often referred to as money left on the table. Habib and Ljungqvist (2001) formalize this idea by showing that higher insider selling increases the incentive to invest in activities that reduce underpricing, such as selecting reputable underwriters or conducting investor roadshows. By contrast, when insiders retain a larger stake, by contrast, they are less financially affected by a lower offer price and may have weaker incentives to ensure accurate pricing. From this perspective, the lower free float may be associated with higher underpricing due to a weaker alignment between the interests of insiders and outside investors.

If Hypothesis 2 holds, which predicts that a higher proportion of secondary shares leads to lower short-term excess returns, agency theory may help explain the mechanism through insider incentives. When insiders sell their shares in the IPO, they directly bear the cost of underpricing. To protect their wealth, they may have stronger incentives to set a higher offer price or reduce underpricing through strategic actions, such as selecting reputable underwriters or engaging in costly promotions. This mechanism is formalized by Habib and Ljungqvist (2001), who show that the cost of underpricing increases with the number of secondary shares sold, encouraging selling insiders to act in ways that minimize this loss.

3.3 Signaling Theory

Signaling theory explains how insiders with better information can send signals to outside investors about the quality of the firm. Originally developed by Spence (1973) and later applied to financial markets by Leland and Pyle (1977), the theory suggests that when insiders

retain a large portion of shares at the IPO, they communicate confidence in the firm's future prospects. This can reassure investors and reduce the degree of underpricing needed to attract demand. Allen and Faulhaber (1989) further argue that high-quality firms may even underprice deliberately to separate themselves from lower-quality firms that cannot afford to do the same.

If Hypothesis 2 holds, signaling theory is particularly relevant, as it relates to how investors interpret insider sales at the IPO. A high proportion of secondary shares, those sold by insiders, can be interpreted as a lack of long-term commitment. This negative signal may lead investors to demand a lower offer price, resulting in more underpricing and higher first-day returns. However, if insider sales are instead viewed as driven by liquidity needs, this effect may not occur. Chua and Nasser (2016) find that underpricing tends to be lower when investors interpret insider selling as unrelated to firm quality. Habib and Ljungqvist (2001) also point out that selling insiders have incentives to minimize underpricing, often by selecting reputable underwriters or engaging in costly promotional activities.

4 Data and Methodology

This section describes the dataset, variable construction, and empirical strategy for analyzing short-run IPO performance in Sweden from 2001 to 2024. It outlines the sources of return and firm-level data, defines the market-adjusted return measure, and introduces the key explanatory and control variables. The section specifies three regression models designed to test the main hypotheses.

4.1 Sample Selection

The dataset combines two primary sources, historical stock prices and company-specific pre-IPO data. The historical stock prices are obtained from the Swedish House of Finance, while detailed IPO information is from Svenska Handelsbanken. The data from Handelsbanken includes all domestic IPOs. It provides comprehensive insights into pricing mechanisms, underwriter identity, ownership composition, and firm-level characteristics.

Table 1: Sample Selection Process

Step	Observations Remaining	Observations Dropped
Initial sample of IPOs	606	–
After dropping IPOs with missing pre-IPO data	575	31
After removing IPOs with missing stock prices	565	10
Final Sample	**565**	**Total dropped: 41**

The sample includes IPOs listed on all major Swedish exchanges such as Nasdaq Stockholm, First North Stockholm, Nordic Growth Market, and Spotlight Stock Market. The data in this paper consists of 144,061 firm-day observations, 565 IPOs, from the swedish stock market between 2001 and 2024. The dataset includes stock returns during the year following each IPO and captures short-run market behavior after the offer date.

4.2 Variable Specification

The following section outlines the structure of the analysis by introducing the definitions of the variables used in the regression models. The aim is to explain whether the main variables, free float, secondary to primary share ratio, and price revision, affect the IPO performance, as measured by market-adjusted returns, while a set of control variables accounts for firm characteristics and other factors. The variables presented are later used in the regressions presented in the model specification section.

4.2.1 Dependent Variable

Post-IPO performance is measured using an event-study framework of Fama and MacBeth (1973) and Fama (1970) to isolate firm-specific effects. The SIX Return Index is used as the market benchmark, since it captures total returns with dividends reinvested (Fama & French, 2004). Following Ritter (1991), α is fixed at zero and β at one so that each day's abnormal return is simply the difference between the issuer's and the market's returns.

The market-adjusted return is defined as follows, where i and h is defined as the company

and time horizon, respectively.

$$\text{MAR}_{i,h} = \text{Return}_{i,h} \; - \; \text{Return}_{h}^{\text{mkt}}, \quad h \in \{1, 10, 252\} \tag{1}$$

Where the $\text{Return}_{i,h}$ and $\text{Return}_{h}^{\text{mkt}}$ over horizon h are defined as

$$\text{Return}_{i,h} = \frac{P_{i,h}^{\text{close}}}{P_{i}^{\text{offer}}} - 1, \qquad \text{Return}_{h}^{\text{mkt}} = \frac{P_{h}^{\text{mkt}}}{P_{0}^{\text{mkt}}} - 1, \tag{2}$$

To reduce the influence of extreme observations on both $\text{Return}_{i,h}$ and $\text{MAR}_{i,h}$, winsorization is used as described by Reifman and Keyton (2010). Values above the 99th percentile are replaced with the 99th percentile cutoff, and values below the 1st percentile are replaced with the 1st percentile cutoff. This procedure retains all observations while containing extreme values, yielding more robust summary statistics and regression estimates. Table 10 in the appendix presents the post-winsorization results. After winsorizing each return series at the 1st and 99th percentiles, the distributional properties of the market-adjusted returns become more stable. Winsorization compresses the tails of each return distribution. For one-day returns, volatility falls by 45 percent as the standard deviation shrinks from 0.56 to 0.31. The largest one-day loss moderates from about –0.76 to –0.56, and the largest gain retreats from 10.90 to 1.32. Similarly, the standard deviation of ten-day returns drops by 34 percent, the worst ten-day return improving from –0.76 to –0.60, and the best reducing from 10.90 to 2.64. Over the whole 252-day horizon, the annual return has a 14 percent decrease in the standard deviation since it falls from 1.17 to 1.01. Correspondingly, the most severe year-long loss eases from –0.97 to –0.93, and the largest gain is decreased from 10.10 to 4.73.

4.2.2 Main Variables of Interest

Free float measures the proportion of a firm's equity sold to outside investors at the IPO. It is defined as the fraction of shares the company offers, which ranges between zero and one, where zero is none and one represents all of the shares. This variable captures the trade-off between providing market liquidity and preserving insider control, a central theme in IPO pricing literature which is discussed in section 2.1 (Habib & Ljungqvist, 2001; Michel et al.,

2014). Because free float is highly skewed, many firms sell only a small portion of equity. It is logit transformed and defined as

$$\text{Free Float}_i^{\text{logit}} = \ln\left(1 + \frac{\text{Free Float}_i}{1 - \text{Free Float}_i}\right) \tag{3}$$

Equation 3 produces an approximately symmetric distribution and avoids functional-form misspecification when the variable is entered linearly in a regression (Derrien & Kecskés, 2013).

The secondary-share ratio indicates the percentage of the offering sold by pre-IPO shareholders rather than by the company. Its continuous value runs from zero, pure primary issuance, to one, pure secondary issuance, with intermediate values denoting mixed deals.

Price revision is constructed for the subset of book-built, open-priced offerings which is 36.5 percent of the sample. First, the raw revision is computed as the difference between the final offer price and the midpoint of the filed price range, setting it to zero whenever the high and low price is the same. This variable is positive whenever the offer price exceeds the midpoint during book-building. Revision is then expressed as a percentage of the midpoint:

$$\text{Price Revision}_i = \frac{\text{OfferPrice}_i - \frac{1}{2}(\text{High}_i + \text{Low}_i)}{\frac{1}{2}(\text{High}_i + \text{Low}_i)} \tag{4}$$

Following Derrien & Kecskés (2013), this variable is also logit transformed.

$$\text{Price Revision}_i^{\text{logit}} = \ln\left(1 + \frac{\text{Price Revision}_i}{1 - \text{Price Revision}_i}\right) \tag{5}$$

4.2.3 Control variables

Deal Value: The total deal value is transformed by its natural logarithm, serving as a proxy for firm size and the informational asymmetries inherent in large versus small offerings (Ljungqvist & Wilhelm, 2003; Loughran & Ritter, 2004). The logarithmic transformation reduces skewness in the variable and yields a more linear relationship when included in the

regression models.

Age: Firm Age at IPO is defined as the natural logarithm of the Age of the company, $ln(Age_i + 1)$, where Age_i denotes the number of years from founding to the offer date. Adding one year accommodates issuers that go public within their first year of operations and compresses the long right tail of young firms (Loughran & Ritter, 2004).

Solvency: The solvency ratio captures the financial leverage and default risk as the mirror image of the conventional debt-to-assets ratio, whilst preserving observations when debt figures are missing (Kim et al., 2008). The solvency ratio is the company's equity divided by its assets.

R&D Intensity: Is captured by capitalized R&D expenditures scaled by total assets. The R&D variable is included since R&D-intensive firms face greater information asymmetry and tend to exhibit larger underpricing (Darrough & Rangan, 2005; Cho & Lee, 2013).

Return on Assets: Return on Assets is defined as EBIT over total assets. To mitigate the influence of extreme observations, the ROA variable is winsorized at the 1st and 99th percentiles, and any remaining missing values are mean-imputed (Baraldi & Enders, 2010).

All continuous control variables are mean-imputed, ensuring that estimates of free float, secondary-share ratio, and price revision are not influenced by size, maturity, leverage, innovation, or profitability variation. Appendix Table 11 provides a detailed description of the variables.

4.3 Descriptive Statistics

Table 2 presents descriptive statistics for all variables used in the empirical analysis. It shows each variable's mean, median, standard deviation, minimum, and maximum values. The top section summarizes the market-adjusted returns over the three horizons. The following section displays the main explanatory variables, including free float in both logit and raw form, the secondary to primary shares ratio, and price revision in both logit transformed and untransformed versions. The table reports IPO-specific characteristics such as firm age and deal value (both in logarithmic form). Lastly, the solvency ratio, return on assets, and R&D

intensity.

Table 2: Descriptive statistics

Table 2 presents summary statistics for all variables used in our analysis of Swedish IPOs. The first row reports market-adjusted returns over three windows, one trading day (MAR), ten trading days (MAR_{10}), and 252 trading days (MAR_{252}), each computed as the stock's raw return minus the market return. It includes the variables of interest, which is free float, both as the logit-transformed fraction of equity sold and the untransformed fraction sold, the secondary to primary shares ratio, and price revision, both as a logit-transformed revision from the filed range and as a raw percentage. The natural logarithm of firm age at listing and the natural logarithm of deal value in SEKm. Lastly, it reports key company ratios, the solvency ratio, return on assets, and the ratio of R&D to total assets. The mean, median, standard deviation, minimum, and maximum is shown for each variable.

Variable	Obs.	Mean	Median	SD	Min	Max
Market-Adjusted Returns						
MAR	565	0.079	0.038	0.308	-0.568	1.328
MAR_{10}	565	0.103	0.017	0.462	-0.663	2.712
MAR_{252}	565	0.120	-0.119	0.969	-1.152	4.821
Variable of Interest						
Free float$^{\text{logit}}$	565	0.432	0.357	0.442	0.000	5.178
Free float	565	0.324	0.300	0.180	0.000	1.000
Secondary to Primary Shares	565	0.221	0.000	0.366	0.000	1.000
Price Revision$^{\text{logit}}$	565	0.002	0.000	0.030	-0.236	0.139
Price Revision	565	0.003	0.000	0.052	-0.266	1.000
IPO Characteristics						
Age_i	565	2.374	2.398	1.027	0.000	5.357
$DealValue_i$	565	4.776	4.434	1.877	1.099	10.043
Company Ratios						
$Solvency_i$	565	0.683	0.685	0.253	-0.870	1.000
ROA_i	565	-0.131	-0.037	0.311	-1.305	0.522
$R\&D\ asset_i$	565	0.083	0.000	0.170	0.000	0.938

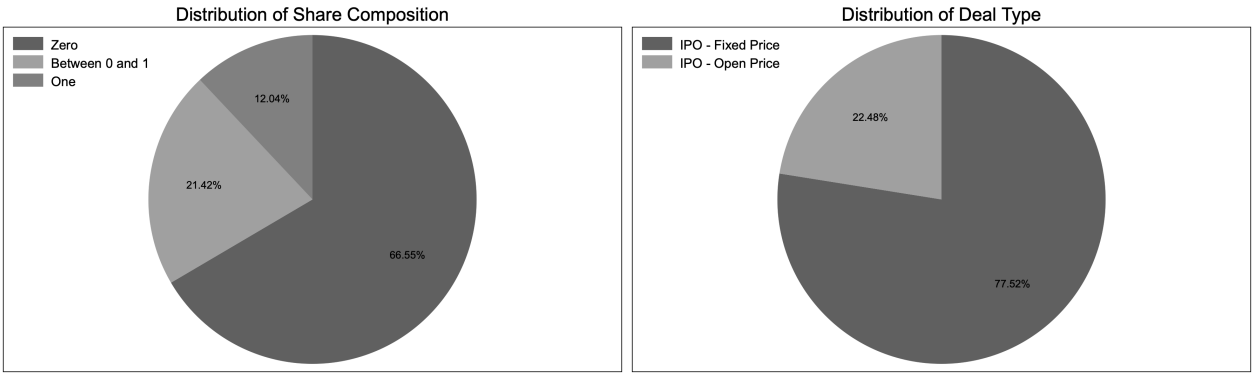

Figure 1: Side-by-side comparison of the two distributions

The descriptive statistics in Table 2 show variations in returns, free float, offer size, and

operating performance for Swedish IPOs during the sample period.

The average market–adjusted return on the listing day is 7.9 percent, whereas the median is 3.8 percent. The distribution is wide, with a standard deviation of 30.8 percentage points and values from −56.8 to 132.8 percent. Extending the window to ten trading days raises the average market–adjusted return to 10.3 percent, lowers the median to 1.7 percent, and enlarges the spread to 46.2 percentage points. Over one year, the average market–adjusted return is 12.0 percent, the median turns negative, and the range stretches from −115.2 to 482.1 percent. These figures confirm a noticeable, persistent volatility around the IPO date.

The logit–transformed free float and price revision are expressed on a logit scale. A zero value corresponds to an underlying fraction of 50 percent, positive values signal fractions above 50 percent, and negative values signal fractions below that level. For the logit–transformed free float, the mean is 0.432 and the median is 0.357. The distribution is wide because some issues approach the upper bound, where the free float is close to 100 percent. The untransformed free float measure confirms the pattern, where its mean is 32 percent, the median is 30 percent, and the maximum is 100 percent, showing that a few firms release their full equity on the offer date. Michel et al. (2014) report a comparable mean free float of 29 percent for US IPOs, but their upper tail rarely exceeds 70 percent. Thus, according to this paper Swedish owners are willing to divest far more than their US counterparts.

A similar reading applies to price revision. The mean logit is 0.002 and the median is zero, both mapping to a final offer price that centers on the mid-point of the initial filing range. The untransformed price revision shows the same, with a mean revision of only 0.3 percent. In the US, Hanley (1993) finds that roughly 25 percent of deals price above the indicated range and that these upward revisions account for much of the subsequent first-day return. Only 22 percent of the IPOs in our sample announce a range, and almost none shift the price upward. This reluctance to revise suggests that book-runners collect information during marketing but rarely use it to amend the offer price. The pie chart in Figure 1 underlines this point. About 22 percent of the IPOs rely on an open-range method, so the mean revision is calculated from a limited subset of IPOs, with a standard deviation of 0.052 units.

The secondary to primary shares ratio helps explain why Swedish underpricing remains low

despite limited price revision. Habib and Ljungqvist (2001) argue that large secondary sales raise the direct cost of leaving money on the table, giving owners a strong incentive to bargain for a higher offer price. Brennan and Franks (1997) observe a similar effect in the UK, where directors who unload bigger stakes insist on tighter pricing. Consistent with these studies, Swedish insiders dispose of one third of the firm at IPO, yet the average first-day return is only 7.9 percent. By contrast, Loughran and Ritter (2004) record mean first-day returns of 15 percent for the US IPOs in the 1990s and 65 percent during the dot com bubble, periods in which insider sales were typically small or absent (Ljungqvist and Wilhelm, 2003). Hence, Sweden combines heavy insider divestment with disciplined pricing.

However, price discovery is left mainly to the secondary market. Returns over the first ten trading days add another 2.4 percentage points, indicating that information not reflected in the static offer price is capitalised after listing. According to Benveniste and Spindt (1989), such a pattern emerges when underwriters compensate institutional investors for revealing demand by setting a slightly discounted price ex-ante, letting the market adjust it ex-post.

In summary, Swedish IPOs feature large free floats and limited price-range revision. Owners sell substantial blocks, reflecting the incentive story of Habib and Ljungqvist (2001), yet underwriters rarely adjust the indicated range, contrasting with Hanley's (1993) US evidence. The result is underpricing that is low by international standards, but an aftermarket that continues to revalue firms as information is gradually incorporated.

Table 3 and 4 shows the distribution of the IPOs between the different categories exchange, industry, underwriter tier and period. Table 3 shows that the majority of IPOs occurred between 2010 and 2019, accounting for 57 percent of the sample. The most common industry category is "Other" with 43 percent. Table 4 indicates that nearly half of all IPOs were listed on First North Stockholm with 49.6 percent, while the Nasdaq Stockholm exchange hosted 29.4 percent. Regarding the underwriter tier, most IPOs were managed by Tier 3 underwriters, at 68.5 percent, suggesting a majority of lower-tier advisory firms in the market.

Table 3: IPO Distributions: Period and Industry Category

Period	Frequency	Percent
2001–2009	52	9.20
2010–2019	323	57.17
2020–2024	190	33.63
Total	565	100.00

Panel A: By Period

Industry	Frequency	Percent
Biotech	143	25.31
Other	243	43.01
Tech	179	31.68
Total	565	100.00

Panel B: By Industry Category

Table 4: IPO Distributions: Exchange and Underwriter Tier

Exchange	Frequency	Percent
First North Stockholm	280	49.56
Nordic Growth Market	14	2.48
Spotlight Stock Market	105	18.58
Stockholm	166	29.38
Total	565	100.00

Panel C: By Exchange

Underwriter Tier	Frequency	Percent
Tier 1	43	7.61
Tier 2	135	23.89
Tier 3	387	68.50
Total	565	100.00

Panel D: By Underwriter Tier

Table 5 presents the average first-day return of IPOs across key drivers and periods. One clear pattern is that firms with high price revisions consistently experienced stronger aftermarket performance, especially during the 2020–2024 period, when the average return reached nearly 24 percent.

The outcomes also indicate that firms with a higher percentage of shares retained by insiders tend to perform better, particularly in the most recent period. In 2020–2024, these firms had an average return of 15.6 percent compared to just 1.2 percent for firms with lower insider ownership. The effect of free float on returns varies by period. During 2010–2019 and 2020–2024, IPOs with a low free float performed better on average than those with a high float.

Firm age does not show a consistent pattern. While younger firms outperformed older ones from 2010 to 2019, this trend reversed in the 2020s. Regarding deal size, larger IPOs measured by deal value in SEKm yielded higher returns. The underwriter tier also influences IPO

performance. Tier 2 underwriters led to the highest returns in the most recent period. Tier 3 underwriters were associated with lower average returns across all periods, while Tier 1 underwriters delivered strong but less extreme performance.

Finally, industry and exchange breakdowns show mixed values. Tech firms performed well during 2010–2019 but less so afterward, while biotech companies delivered stable returns over time. Most IPOs in the 2010s and 2020s were listed on First North Stockholm, which showed moderate performance. Notably, IPOs in the Nordic Growth Market performed poorly in the 2020s. In contrast, offerings on the Nasdaq Stockholm exchange yielded strong returns in the most recent period.

Table 5: Average first day return by driver and period

Table 5 presents the average first-day underpricing for IPOs, categorized at the median of each numerical variable across three subperiods. The IPOs are divided into High and Low groups based on the free float, price revision percentage, secondary-to-primary share ratio, firm age, and deal value in SEKm. It also, displays the results for categorical variables, including underwriter tiers, industries, and exchange listings. Each cell contains the mean return and the number of IPOs in that category.

	2001–2009		2010–2019		2020–2024	
	Return	Obs.	Return	Obs.	Return	Obs.
Free float						
High	0.070	23	0.093	164	0.041	96
Low	0.000	26	0.104	158	0.074	98
Price revision						
High	0.059	17	0.114	34	0.239	9
Low	0.019	32	0.097	287	0.049	186
Shares by shareholders						
High	0.062	28	0.104	103	0.156	62
Low	-0.006	22	0.096	219	0.012	131
Age						
High	0.062	23	0.086	147	0.065	91
Low	0.009	27	0.109	175	0.051	102
Deal value						
High	0.040	33	0.099	154	0.136	98
Low	0.019	18	0.098	167	-0.023	95
Underwriter category						
Tier 1: Bulge Bracket	0.030	10	0.077	21	0.134	11
Tier 2: Mid tier	0.043	24	0.114	67	0.177	48
Tier 3: Lower tier	0.021	16	0.096	234	0.008	134
Industry						
Tech	-0.016	3	0.132	108	0.034	31
Biotech	0.043	40	0.065	122	0.063	82
Other	-0.009	6	0.104	94	0.061	79
Exchange						
First North Stockholm	—	—	0.078	166	0.036	115
Nordic Growth Market	—	—	0.159	9	-0.107	4
Spotlight Stock Market	0.000	1	0.125	66	0.033	38
Stockholm	0.034	48	0.113	81	0.165	37

Table 4.3 presents the average deal value measured in SEKm across industries, exchanges,

and underwriter tiers for three periods. Among industries, biotech IPOs consistently exhibit the highest average deal values across all periods, rising from approximately 1,095 SEKm in the early period to 1,278 SEKm in the most recent. Tech IPOs show more variation, peaking at around 384 SEKm in the latest period, while the "Other" category increases notably in the 2020s.

Concerning exchange categories, offerings listed on the Nasdaq Stockholm exchange report significantly larger average deal values than other markets. In the most recent period, the average deal value in Stockholm reached nearly 2,906 SEKm, up from 983 SEKm in 2001–2009. In contrast, IPOs on the Spotlight Stock Market and Nordic Growth Market involve considerably smaller deals, typically below 35 SEKm.

Across underwriter tiers, IPOs led by Tier 1 underwriters have the largest average deal values in each period, rising sharply to over 7,000 SEKm during 2020–2024. Tier 2 underwriters also manage relatively large deals, averaging around 1,199 SEKm in the most recent period. In contrast, Tier 3 underwriters are associated with the smallest deals, averaging less than 100 SEKm from 2010 onward.

Table 6: Average Deal value (SEKm) by category and period

Table 4.3 reports average deal values and IPO counts across three subperiods: 2001–2009, 2010–2019, and 2020–2024. The table shows industry results, sorted into Tech, Biotech, and Other, where each cell gives the mean deal value (in SEKm) and the number of IPOs. It breaks out the sample by exchange category: First North Stockholm, Nordic Growth Market, Spotlight Stock Market, and Nasdaq Stockholm, noting that no IPOs occurred on First North or Nordic Growth in the earliest period and classifies IPOs by underwriter tier, with Bulge Bracket, Mid Tier, and Lower Tier showing how average deal size and volumes change.

	2001–2009		2010–2019		2020–2024	
	Deal Value	Obs.	Deal Value	Obs.	Deal Value	Obs.
Industry						
Tech	373	4	282	111	384	33
Biotech	1,095	43	981	121	1,278	80
Other	280	6	283	88	594	79
Exchange category						
First North Stockholm	—	0	167	170	394	119
Nordic Growth Market	—	0	11	8	21	5
Spotlight Stock Market	6	2	30	59	33	29
Stockholm	983	50	1,751	83	2,906	40
Underwriter tier						
Tier 1: Bulge Bracket	2,992	11	3,928	23	7,082	12
Tier 2: Mid tier	669	26	1,040	69	1,199	53
Tier 3: Lower tier	148	18	89	229	103	124

4.4 Model Specification

Three cross-sectional ordinary least squares models are specified and estimated using the high-dimensional fixed-effects estimator developed by Correia (n.d.). This approach absorbs fixed effects for listing exchange, industry classification, calendar quarter, and underwriter tier, thereby removing unobserved heterogeneity.

The dependent variable comprises market-adjusted returns measured over one, ten, and 252 trading days. The return series is winsorized at the 1st and 99th percentiles to reduce

extreme outlier influence and confirm that the distribution is approximately symmetric, thus justifying ordinary least squares estimation. Robust standard errors are applied to control for heteroskedasticity in the residuals.

The first model tests hypothesis 1 by relating the market-adjusted return to the free float and the control variables:

$$\begin{aligned} \text{MAR}_{i,h} = \beta_0 + \beta_1 \cdot \text{Free float}^{\text{logit}} + \gamma_1 \cdot \text{Solvency}_i + \gamma_2 \cdot \text{Deal value}_i \\ + \gamma_3 \cdot \text{Age}_i + \gamma_4 \cdot \text{R\&D asset}_i + \gamma_5 \cdot \text{ROA}_i \\ + \alpha_{e(i)} + \alpha_{s(i)} + \alpha_{q(i)} + \alpha_{u(i)} + \varepsilon_{i,h}, \quad h \in \{1, 10, 252\} \end{aligned} \tag{6}$$

Where the dependent variable $MAR_{i,h}$ denotes the market-adjusted return for firm i over horizon $h \in \{1, 10, 252\}$. The main variable of interest is $\text{Free float}_i^{\text{logit}}$, which measures the logit-transformed proportion of equity sold to public investors at the IPO. The control variables include Solvency_i, Deal value_i, Age_i, $\text{R\&D asset}_i$, and ROA_i. Fixed effects are included for exchange ($\alpha_{e(i)}$), industry ($\alpha_{s(i)}$), calendar quarter ($\alpha_{q(i)}$), and underwriter tier ($\alpha_{u(i)}$), and $\varepsilon_{i,h}$ is the error term.

Industry classification is divided into three categories defined as Tech, Biotech and Other and enters each regression as an absorbed fixed effect alongside exchange and underwriter tier. Underwriter prestige is coded into three ordered tiers: Tier 1 comprises top ranked global investment banks, Tier 2 comprises major Swedish universal banks and Tier 3 comprises smaller corporate finance boutiques.

The second model tests hypothesis 2 by including share composition:

$$\begin{aligned} \text{MAR}_{i,h} = \beta_0 + \beta_1 \cdot \text{Secondary to Primary Shares} + \gamma_1 \cdot \text{Solvency}_i + \gamma_2 \cdot \text{Deal Value}_i \\ + \gamma_3 \cdot \text{Age}_i + \gamma_4 \cdot \text{R\&D asset}_i + \gamma_5 \cdot \text{ROA}_i \\ + \alpha_{e(i)} + \alpha_{s(i)} + \alpha_{q(i)} + \alpha_{u(i)} + e_{i,h}, \quad h \in \{1, 10, 252\} \end{aligned} \tag{7}$$

The third model tests hypothesis 3 by incorporating price revision, and is only estimated on

the dataset when the IPO has an open pricing method[6].

$$\begin{aligned} \text{MAR}_{i,h} = \beta_0 + \beta_1 \cdot \text{Price Revision}^{\text{logit}} + \gamma_1 \cdot \text{Solvency}_i + \gamma_2 \cdot \text{Deal Value}_i \\ + \gamma_3 \cdot \text{Age}_i + \gamma_4 \cdot \text{R\&D asset}_i + \gamma_5 \cdot \text{ROA}_i \\ + \alpha_{e(i)} + \alpha_{s(i)} + \alpha_{q(i)} + \alpha_{u(i)} + u_{i,h}, \quad h \in \{1, 10, 252\} \end{aligned} \tag{8}$$

Diagnostic checks were estimated to confirm that the OLS regressions meet the requisite assumptions. Normality of the error terms was evaluated with Q-Q plots and residual histograms seen in Appendix Figure 6. The spread of residuals widens with fitted values, indicating heteroskedasticity, and therefore, robust standard errors are used in the model to obtain reliable inference. Multicollinearity was examined through the correlation matrix in Appendix Table 12. Although one pairwise correlation reaches 0.58, this is below the 0.80 – 0.90 range that signals serious collinearity problems (Kim, 2019). Consequently, variance inflation and coefficient instability are unlikely, and each predictor can be interpreted as contributing its distinct effect. Collectively, these diagnostics confirm that the regression estimates are robust and valid.

[6]Open pricing method is defined as an IPO structure where the prospectus includes a pricing range rather than a fixed price.

5 Results and Analysis

This section presents the main results. It shows the regression analyses testing how free float, share composition, and price revision relate to market-adjusted returns.

5.1 Regression Results

5.1.1 Free float Regressions

To assess Hypothesis 1 that the fraction of equity sold at IPO affects short-term performance, an OLS regression with market-adjusted returns at 1, 10, and 252 trading days is estimated, as well as first-day underpricing on the logit-transformed free float and a complete set of controls. The results are summarized in Table 7.

Table 7: Free-float: Market-adjusted returns

Table 7 presents the OLS estimates for Hypothesis 1, which proposes that the logit-transformed free float at IPO affects market-adjusted return and first-day underpricing. Columns 1–3 show the stand-alone regressions of market-adjusted returns over 1, 10, and 252 trading days on the free float, including industry classification, underwriter tier, exchange, and quarter fixed effects. Columns 4–6 add controls for the solvency ratio, deal value, firm age, and R&D intensity. Columns 7–9 show the whole model. Column 10 replaces market-adjusted returns with the first-day underpricing as the dependent variable. All specifications report robust standard errors in parentheses. The sample covers 535 to 556 Swedish IPOs, and at the bottom of the table, the number of observations, F-statistics, and R-squared is displayed. Statistical significance at the 10 percent, 5 percent, and 1 percent levels are indicated by *, **, and ***, respectively. Consistent with our prediction, higher free floats are significantly associated with lower short-term underpricing.

	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}	First-day Underpricing
$Free\ float^{logit}$	-0.051**	-0.038	-0.018				-0.070***	-0.049*	0.002	-0.071***
	(0.022)	(0.026)	(0.053)				(0.024)	(0.028)	(0.056)	(0.023)
$Solvency_i$				0.000	0.097**	0.368**	0.007	0.090	0.339*	0.010
				(0.053)	(0.079)	(0.175)	(0.052)	(0.078)	(0.173)	(0.052)
$Deal\ Value_i$				0.029**	0.007	-0.033	0.030**	-0.002	-0.063	0.030**
				(0.014)	(0.023)	(0.047)	(0.014)	(0.019)	(0.044)	(0.014)
Age_i				-0.034**	-0.058**	-0.031	-0.034**	-0.052**	-0.012	-0.034**
				(0.014)	(0.023)	(0.043)	(0.014)	(0.021)	(0.042)	(0.014)
$R\&D\ asset_i$				-0.050	-0.183	-0.194	-0.046	-0.182	-0.209	-0.048
				(0.090)	(0.126)	(0.303)	(0.090)	(0.127)	(0.305)	(0.091)
ROA_i				0.136***	0.184***	0.343**	0.126**	0.177**	0.344**	0.125**
				(0.052)	(0.069)	(0.157)	(0.052)	(0.070)	(0.158)	(0.052)
Constant	0.104***	0.121***	0.131***	0.049	0.187	0.167	0.064	0.238*	0.281	0.066
	(0.017)	(0.023)	(0.046)	(0.089)	(0.139)	(0.283)	(0.088)	(0.132)	(0.276)	(0.088)
Fixed effects	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter
Observations	535	544	549	542	551	556	535	544	549	535
F statistic	5.400	2.120	0.120	3.280	3.140	2.420	3.660	2.770	2.090	3.600
R squared	0.152	0.117	0.160	0.173	0.142	0.180	0.181	0.145	0.180	0.181

Table 7 presents OLS estimates of market-adjusted returns at horizons of 1, 10, and 252

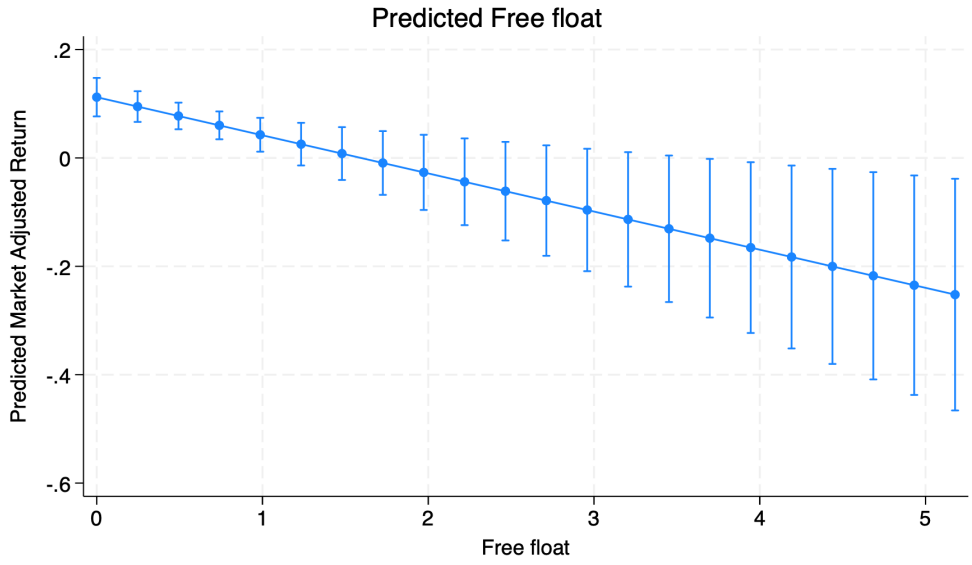

Figure 2: Margins plot Free float

trading days, regressed on the logit-transformed proportion of equity sold to public investors and the complete control variables. The free float coefficient in the specification that includes controls is -0.070 and is statistically significant at the one percent level for the first trading day. At ten days, the point estimate is -0.049, which is significant at the ten percent level. At 252 days, the estimate is statistically insignificant. The corresponding regression of the first-day underpricing yields a coefficient of -0.071 and is significant at one percent. These models predict that a one-unit increase in the logit-transformed free float reduces the first-day market-adjusted return by approximately 7.0 percentage points and lowers the ten-day market-adjusted return by approximately 4.9 percentage points, while having no significant effect over a full trading year. In terms of economic significance, the effect of moderate changes in free float is modest. For instance, raising free float from 30 percent to 40 percent is associated with about a 1.1 percentage-point drop in the first-day market-adjusted return (and roughly 0.8 pp over ten days). The impact becomes clearer when firms choose markedly different free-float levels. Increasing free float from 20 percent to 50 percent corresponds to a decline of roughly 3.2 percentage points on day 1 (and about 2.3 pp over ten days). This suggests that the economic relevance of free float is most apparent when firms make broader strategic decisions about how much ownership to retain at the time of listing.

The primary finding indicates that greater free float corresponds to lower short-term market-adjusted returns. This finding supports Hypothesis 1, which states that a lower free float increases short-term returns. Furthermore, it aligns with prior research emphasizing the role of insider retention in driving underpricing (Habib & Ljungqvist, 2001; Ljungqvist & Wilhelm, 2003; Bradley & Jordan, 2002; Brennan & Franks, 1997; Teti & Montefusco, 2022).

The negative association between free float and short-term returns is consistent with predictions from agency theory, which argues that when insiders retain more shares, they are less exposed to underpricing-related wealth losses and therefore have weaker incentives to ensure accurate IPO pricing (Habib & Ljungqvist, 2001). It also aligns with information asymmetry theory, which holds that a lower free float limits the transparency available to outside investors, making it more difficult to assess firm quality and increasing the risk of mispricing (Rock, 1986). This interpretation is further supported by Brennan and Franks (1997), who find that underpricing in fixed-price UK IPOs was used to generate oversubscription, allowing firms to allocate smaller share blocks and maintain insider control. Extending this logic, a lower free float may also constrain the supply of tradable shares in the early aftermarket, temporarily increasing buying pressure and driving up short-term returns. As lock-up periods expire and more shares become tradable, the effect of this supply constraint may fade, which aligns with the lack of a significant free float effect at the 252-day horizon. In the Swedish IPO setting, where open pricing is rare and investor-driven price discovery is limited, this strategic use of underpricing may similarly help explain why lower free float is associated with stronger short-term performance.

Among the control variables, three emerge consistently: Solvency, Deal value, and ROA. Solvency demonstrates a positive and statistically significant effect exclusively within the one-year horizon. Deal value is positive and significant in the one-day horizon for both models without a free float and with it. ROA, or profitability, has a positive and significant association on all horizons. In the one-day model, the ROA coefficient is 0.126, increasing to 0.344 in the one-year horizon, all being significant at least at 95 percent. Age shows a negative trend for the shorter time horizons, whereas R&D is not statistically significant.

The negative effect of the logit-transformed free float on market-adjusted returns is consistent

with prior studies showing that insider retention is associated with greater underpricing. Bradley and Jordan (2002), using an overhang ratio to measure retained insider ownership, find that firms whose insiders retain larger stakes experience higher underpricing across both hot and cold U.S. IPO markets. Brennan and Franks (1997), analyzing fixed-price UK IPOs, show that firms often underprice to generate oversubscription and allocate shares in smaller blocks, thereby limiting large external holdings. The Swedish sample extends these findings to a setting where 77.5 percent of IPOs use fixed pricing and where market conditions have varied over time. Subsample analysis in Appendix Tables 14 and 15 indicates that the negative effect of free float is statistically significant in the 2014–2024 period but not in the 2001–2013 period. This pattern suggests that heightened IPO activity and stronger investor sentiment in the more recent decade may have strengthened the strategic motivations for underpricing among firms with higher insider retention.

The interpretation is further supported by information asymmetry theory, which suggests that when a smaller portion of shares is offered to the public, there is less publicly available information about firm quality, increasing uncertainty for outside investors (Rock, 1986). To attract demand under such conditions, firms may need to offer shares at a discount. At the same time, agency theory implies that when insiders retain more ownership, they are less financially exposed to underpricing and may be less incentivized to monitor pricing outcomes closely (Habib & Ljungqvist, 2001). Taken together, these mechanisms help explain why lower free float is associated with higher short-term returns in the Swedish IPO market.

Robustness checks, as seen in Appendix table 17 and 16, confirm that complete case estimation yields nearly identical coefficients on a free float for both the 1 and 10-day horizon, albeit with only 90 percent significance at a 10-day horizon. This stability suggests that the mean imputation of control variables does not drive the main result. The findings carry practical implications for issuers, underwriters, regulators, and policymakers. Issuers should recognize that having a lower free float can generate deeper underpricing and that free float decisions involve a trade-off between preserving control and raising capital efficiently. Underwriters ought to consider how allocation strategies and book-building transparency influence the compensation required by uninformed investors. Regulators may assess whether listing rules

and disclosure requirements shape the interplay between free float and initial returns in ways that affect market fairness and price discovery. Policymakers could consider minimum free float requirements to mitigate extreme underpricing driven by control preservation motives.

Several control variables yield insights into IPO performance beyond the free float effect. Higher solvency does not consistently relate with 1 or 10-day market-adjusted returns but shows a positive association with year-long returns in the full sample. This result may reflect that financially stable firms attract long-term investor interest even if initial returns remain muted (Kim et al., 2008). The deal value correlates positively with one-day market-adjusted returns in the recent subsample. In the short term, larger offerings may benefit from greater institutional demand. However, they do not sustain this advantage over longer horizons.

The firm's Age at IPO negatively relates to short-term returns in the most recent decade. This result aligns with evidence that younger firms face higher information asymmetries and, thus, stronger underpricing pressures (Loughran & Ritter, 2004). However, during the earlier period in Appendix Table 15, Age showed no relation to short-run returns and a positive relation to year-long returns, suggesting that mature firms may deliver more sustained performance when market sentiment stabilizes. Innovation intensity, R&D, does not significantly affect short-term returns in the regressions. Pre-IPO profitability measured by ROA positively affects the 10 and 252 day horizons, suggesting that financial performance signals may matter more for investors who hold long-term shares than for initial pricing decisions.

5.1.2 Share-based Composition Regressions

To evaluate Hypothesis 2 that the mix of secondary and primary shares at IPO affects the short-run returns, an OLS regression of market-adjusted returns at 1, 10, and 252 trading days, as well as first-day underpricing, on the secondary-to-primary share ratio and a complete set of controls. The main results are displayed in Table 8.

Table 8: Secondary to Primary share ratio: Market-adjusted Returns

Table 8 reports OLS estimates testing Hypothesis 2, which predicts that the proportion of secondary shares sold at IPO affects subsequent market-adjusted return and underpricing. Columns 1–3 present the stand-alone specifications of market-adjusted returns over 1, 10, and 252 trading days on the secondary-to-primary shares ratio, controlling for industry classification, underwriter tier, exchange, and quarter fixed effects. Columns 4–6 add controls for the solvency ratio, the natural logarithm of deal value, firm age, and R&D asset intensity. Columns 7–9 show the fully specified models, including all controls. Column 10 replaces market-adjusted returns with the raw first-day underpricing as the dependent variable. All regressions report robust standard errors in parentheses. The sample covers between 542 and 556 Swedish IPOs. Below the coefficient estimates is the number of observations, F-statistics, R-squared, and adjusted R-squared. Statistical significance at the 10 percent, 5 percent, and 1 percent levels is indicated by *, **, and ***, respectively.

	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}	First-day Underpricing
Secondary to Primary Shares	0.046	0.028	0.079				0.028	0.045	0.098	0.028
	(0.033)	(0.041)	(0.118)				(0.038)	(0.048)	(0.137)	(0.038)
$Solvency_i$				0.000	0.097	0.368**	0.003	0.101	0.378**	0.006
				(0.053)	(0.079)	(0.175)	(0.052)	(0.080)	(0.176)	(0.053)
$Deal\ Value_i$				0.029**	0.007	-0.033	0.027*	0.005	-0.038	0.027*
				(0.014)	(0.023)	(0.047)	(0.015)	(0.024)	(0.048)	(0.015)
Age_i				-0.034**	-0.058**	-0.031	-0.036**	-0.061***	-0.038	-0.036**
				(0.014)	(0.023)	(0.043)	(0.015)	(0.023)	(0.044)	(0.015)
$R\&D\ asset_i$				-0.050	-0.183	-0.194	-0.049	-0.182	-0.191	-0.051
				(0.090)	(0.126)	(0.303)	(0.090)	(0.126)	(0.303)	(0.090)
ROA_i				0.136***	0.184***	0.343**	0.131**	0.175**	0.325**	0.129**
				(0.052)	(0.069)	(0.157)	(0.054)	(0.071)	(0.164)	(0.054)
Constant	0.073***	0.102***	0.111**	0.049	0.188	0.168	0.050	0.191	0.175	0.052
	(0.016)	(0.023)	(0.050)	(0.089)	(0.139)	(0.282)	(0.089)	(0.139)	(0.283)	(0.089)
Fixed effects	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter
Observations	542	551	556	542	551	556	542	551	556	542
F statistic	1.940	0.490	0.450	3.280	3.140	2.420	3.000	2.700	2.210	2.950
R squared	0.143	0.110	0.160	0.173	0.142	0.180	0.174	0.142	0.181	0.174

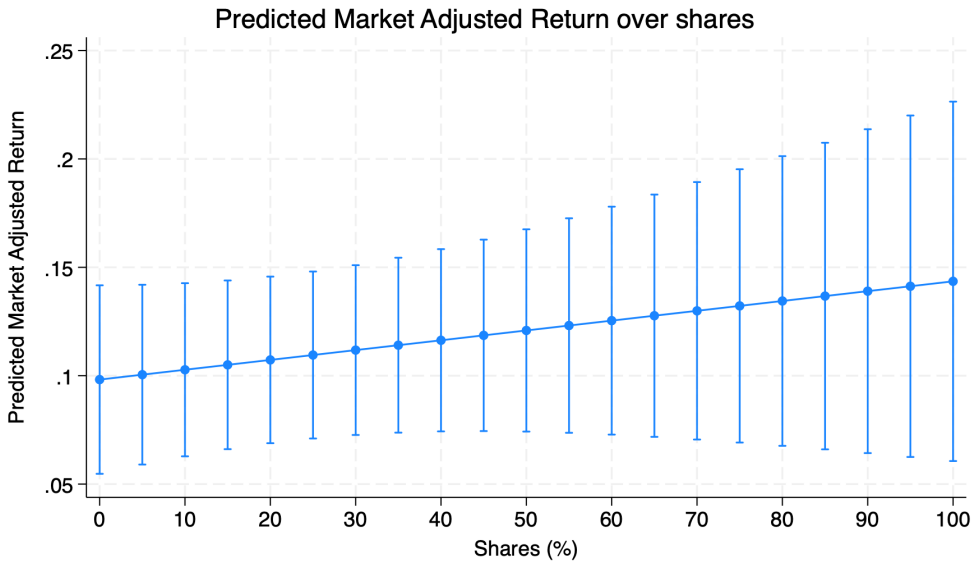

Figure 3: Margins plot Share composition

Table 8 reports OLS estimates of market-adjusted returns at horizons of 1, 10, and 252 days

regressed on Secondary and Primary shares and the complete set of controls. Hypothesis 2 predicts that a higher fraction of secondary shares lower aftermarket performance. In the full specification, the coefficients on share composition and one-week return were not statistically significant. Therefore, no conclusions can be drawn regarding hypothesis 2, aligning with Loughran and Ritter (2004) and Brau et al. (2007) who also find no significant relationship between secondary shares and first day returns. Empirical work highlighting the role of insider motivations offers a plausible explanation for the lack of results. Chua and Nasser (2016) demonstrate that secondary sales driven by genuine liquidity needs correspond with lower underpricing, yet opportunistic sales have ambiguous effects. If Swedish issuers engage in secondary sales primarily for liquidity rather than to capitalize on information asymmetries, investors may not interpret these transactions as negative signals. Furthermore, the fixed effects for exchange, industry, and underwriter tier absorb much cross-sectional variation, so any residual impact of share composition may fall below detectable thresholds. The sample's relatively large share of pure primary offerings further restricts observable variation in secondary issuance ratios.

Figure 3 plots the marginal effect of share composition on predicted 1-day market-adjusted returns. As the proportion of secondary shares increases from 0 to 1, the fitted return rises gradually from about 0.10 to roughly 0.14.

Furthermore, signaling theory predicts that a high secondary-to-primary ratio conveys reduced insider confidence and should dampen aftermarket performance (Spence, 1973; Leland & Pyle, 1977). From an agency theory perspective (Jensen & Meckling, 1976), substantial insider sales could exacerbate agency conflicts by diminishing post-IPO insider stakes and misaligning incentives. Yet the data provide no evidence that these agency concerns affect initial or medium-term returns consistently.

However, several control variables remain economically and statistically significant. Solvency shows a positive effect at the long-run horizon, with an estimated 0.378 in the 252-day regression. Deal value is positive and significant in the one-day horizon, with an estimated 0.027. Age negatively affects the 1 and 10-day horizon for market-adjusted returns, with its coefficient being –0.035 and –0.061, respectively. Research intensity and other controls do

not produce significant associations once the complete set of regressors is included.

Larger deal values relate positively to first-day excess returns, which aligns with Ljungqvist and Wilhelm (2003), who find that sizable offerings attract stronger investor demand during book-building. Younger firms display greater underpricing at 1 and 10 days, consistent with the information asymmetry framework (Rock, 1986), whereby inexperienced issuers must offer steeper discounts to attract uninformed investors. Higher solvency predicts better long-run performance, echoing the findings of Kim et al. (2008) on the stabilizing role of strong equity positions. Research intensity and pre-IPO profitability do not maintain significance once the complete set of controls is included, indicating that other firm characteristics may subsume their effects.

5.1.3 Revision Percentage Regressions

To evaluate Hypothesis 3, which states that the price revision at IPO influences short-term performance, the regression is restricted to only IPOs with open pricing methods. OLS regressions of market-adjusted returns at 1, 10, and 252 trading days, and first-day underpricing, on the logit-transformed price revision and a complete set of controls. The main results are reported in Table 9.

Table 9: Price revision: Market-adjusted Returns

Table 9 presents OLS estimates testing Hypothesis 3, which predicts that the logit-transformed price revision at IPO affects market-adjusted returns and underpricing. This model is estimated only for IPOs with a book-building process and an open pricing method. Columns 1–3 report the standalone regressions of market-adjusted returns over 1, 10, and 252 trading days on price revision, controlling for industry classification, underwriter tier, exchange, and quarter fixed effects. Columns 4–6 add controls for the solvency ratio, the natural logarithm of deal value, firm age, and also includes R&D asset. Columns 7–9 show the fully specified models. Column 10 replaces market-adjusted returns with the first-day underpricing as the dependent variable. All regressions report robust standard errors in parentheses. The sample covers 110–112 Swedish IPOs. Below the coefficient estimates are the number of observations, F-statistics, R-squared, and adjusted R-squared. Statistical significance at the 10 percent, 5 percent, and 1 percent levels is indicated by *, **, and ***, respectively. Consistent with the predictions, larger upward price revisions are associated with higher short-term returns.

	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}	First-day Underpricing
$Price\ Revision^{logit}$	0.485*	0.731**	1.295				0.438*	0.624**	1.201	0.415
	(0.255)	(0.317)	(0.813)				(0.246)	(0.285)	(0.809)	(0.252)
$Solvency_i$				-0.005	0.016	0.162	-0.007	0.012	0.154	-0.003
				(0.053)	(0.096)	(0.294)	(0.054)	(0.096)	(0.300)	(0.055)
$Deal\ Value_i$				0.025*	0.048	0.032	0.023	0.045	0.027	0.024
				(0.018)	(0.031)	(0.096)	(0.019)	(0.031)	(0.097)	(0.019)
Age_i				0.017	0.015	0.058	0.017	0.016	0.060	0.016
				(0.014)	(0.020)	(0.048)	(0.013)	(0.019)	(0.050)	(0.013)
$R\&D\ asset_i$				0.622***	1.416**	1.456*	0.599**	1.382*	1.394*	0.605**
				(0.233)	(0.698)	(0.756)	(0.236)	(0.699)	(0.757)	(0.241)
ROA_i				0.195**	0.219	0.498	0.189**	0.211	0.484	0.182*
				(0.094)	(0.153)	(0.371)	(0.093)	(0.148)	(0.388)	(0.095)
Constant	0.067***	0.074***	0.109*	-0.156	-0.331	-0.399	-0.149	-0.321	-0.380	-0.155
	(0.014)	(0.021)	(0.059)	(0.133)	(0.203)	(0.641)	(0.138)	(0.202)	(0.650)	(0.140)
Fixed effects	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter	Industry Exchange Underwriter Quarter
Observations	110	112	111	110	112	111	110	112	111	110
F statistic	3.620	5.330	2.540	2.030	1.870	1.040	2.520	2.570	1.120	2.320
R-squared	0.431	0.289	0.394	0.490	0.434	0.416	0.509	0.455	0.425	0.509

Table 9 reports OLS estimates of market-adjusted returns at horizons of 1, 10, and 252 days regressed on the logit-transformed price revision and the complete set of controls. Hypothesis 3 predicts that a larger positive price revision increases short-term excess returns. In the complete model, the coefficient on price revision is 0.438 in the 1-day model and statistically significant at the ten percent level. Since Hypothesis 3 explicitly predicts a positive effect, a one-sided test is appropriate, under which the result is significant at the five percent level. At ten days, the estimate is 0.624 and significant at the five percent level. At 252 days, the coefficient is 1.201 but not statistically significant. The corresponding regression of the raw one-week return gave no significant results. These models predict that a one-unit increase in logit-transformed price revision is associated with an approximately 43.8 percentage point higher market-adjusted return on the first trading day and a 62.4 percentage point higher

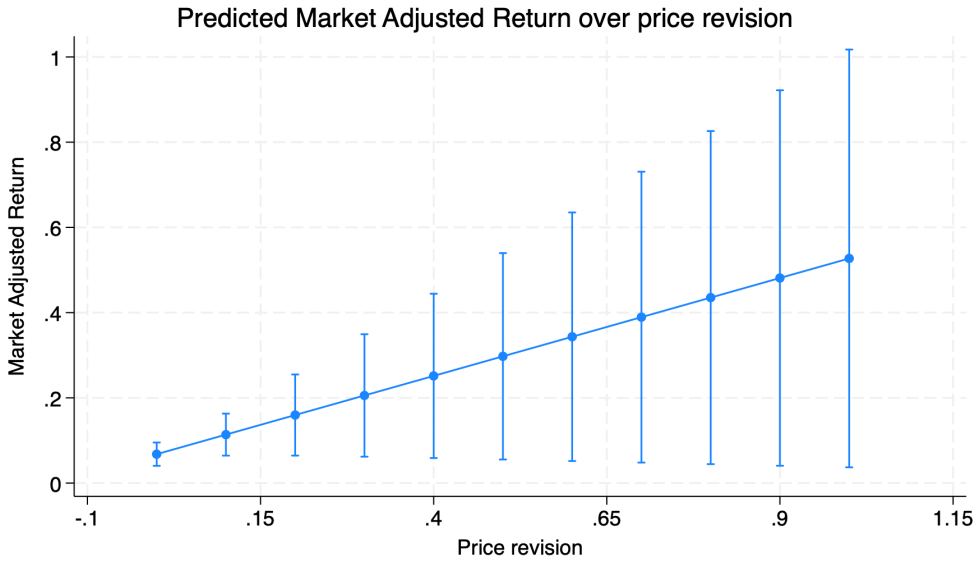

Figure 4: Margins plot Price revision

return over ten days, with no detectable effect over a full trading year. In economic terms, the magnitude of this effect depends on how far the offer price is moved during book-building. Increasing the price revision from 0 percent to 10 percent raises the first-day market-adjusted return by approximately 4.6 percentage points and the ten-day return by about 6.6 percentage points. A larger adjustment, from a 10 percent reduction to a 30 percent increase, increases the first-day market-adjusted return by approximately 19.8 percentage points and the ten-day return by around 28.2 percentage points. Hence, price revision carries most economic weight when book-building leads to sizeable upward adjustments. Moderate changes in the offer price are associated with a more limited impact on short-term returns.

Among the control variables, R&D intensity is statistically significant in both the 1-day and 10-day models, and partially at the 252-day horizon. This suggests that firms with higher R&D spending tend to experience stronger short-term returns, potentially due to higher investor uncertainty or growth expectations. ROA also enters positively and is significant in the 1-day model, though its effect weakens at longer horizons. Deal value is statistically significant at the 1-day horizon, while solvency and firm age do not show meaningful associations with returns in any specification once price revision and other controls are included.

Figure 4 plots the marginal effect of price revision on predicted one-day market-adjusted

returns. As price revision increases from its minimum to its maximum observed value, the fitted market-adjusted return rises smoothly from about 7 percent to roughly 50 percent, with confidence bands widening at the extremes where observations are sparse.

The short-run association between positive price revisions and higher market-adjusted returns is consistent with theoretical predictions of adverse selection, as described by Akerlof (1970) and Rock (1986) in the IPO context. These models suggest that underpricing occurs because uninformed investors face a winner's curse due to asymmetric information about firm value. During bookbuilding, underwriters collect private demand signals and adjust the offer price only partially, as outlined in the information-revelation model by Benveniste and Spindt (1989). This partial adjustment mechanism encourages informed investors to reveal their information in exchange for short-term trading gains. Empirical support comes from Hanley (1993), who finds that IPOs priced above the filing range generate average first-day returns of around 21 percent. Ljungqvist and Wilhelm (2003) observe similar results during the dot-com period. This study contributes to the literature by demonstrating that positive price revisions are associated with higher market-adjusted returns over 1 and 10 trading days in the Swedish IPO market, using a high-dimensional fixed-effects framework. It extends prior findings by documenting sustained short-term price momentum in a single-country setting.

An additional explanation for the observed relationship between positive price revision and higher short-term returns could relate to systematic differences across underwriters. As shown in Table 5, Tier 2 underwriters, primarily large Swedish universal banks, are associated with the highest average first-day returns in the most recent period, while Tier 3 underwriters consistently display lower performance. These fixed effects, included in all regressions, account for average differences in pricing behavior and suggest that part of the return variation may reflect underwriter-specific strategies during the pricing process. For instance, mid-tier underwriters may apply more optimistic pricing when they perceive strong investor demand, contributing to higher observed returns following upward revisions.

Issuers should set their initial price-range midpoints to balance capital needs against expected short-term market momentum. Measuring the expected magnitude of book-building revisions can improve issuance strategies for firms seeking to manage their cost of capital. Underwriters

might improve allocation strategies by forecasting likely revision magnitudes and adjusting their investor targeting accordingly. Regulators could require more granular disclosure of initial price ranges and revision rationales to improve market transparency. In Sweden, introducing detailed reporting requirements for price-range revisions may reduce information asymmetry and lower underpricing costs for issuers.

Innovation intensity remains significant, in line with Darrough and Rangan (2005), who argue that R&D-intensive firms face greater information asymmetry, resulting in deeper underpricing. This confirms that the innovation channel remains a key driver of short-run returns in the Swedish IPO market even after controlling for price revision. Variables such as solvency ratio, deal value, and firm age lose significance in multivariate models, suggesting that price revision may subsume much of the variation previously attributed to these traditional proxies. This divergence from Ljungqvist and Wilhelm (2003) on deal size and Loughran and Ritter (2004) on firm age suggests that short-term returns are driven more by demand signals than by size, age, or leverage in this sample. These control-variable insights indicate the stronger role of information signals compared to traditional firm characteristics in explaining short-term IPO performance.

5.2 Robustness test

To assess the robustness of our results to mean imputation, we re-estimate all models using complete-case analysis, as shown in Tables 16 and 17. For our primary variable of interest, Free float$^{\text{logit}}$, the coefficient remains negative and stable across MAR, MAR_{10} and MAR_{252}, with statistical significance preserved in both the MAR and MAR_{10} specifications. This supports the robustness and reliability of Free float$^{\text{logit}}$ as an explanatory variable of short-term IPO performance.

For Price Revision$^{\text{logit}}$, the sign and magnitude of the coefficient remain stable across specifications, but the level of statistical significance is more sensitive to the inclusion of imputed observations. While significance is retained in the MAR_{10} model with imputation, it weakens in the complete-case version, likely due to reduced sample size. Nevertheless, the consistency of the estimated effect across MAR, MAR_{10} and MAR_{252} provides suggestive evidence in

favor of Price Revision^{logit} as a driver of short-term IPO returns. However, its robustness should be interpreted with more caution.

Appendix Figure 6 presents QQ plots and residual histograms for each regression. Across the three specifications, Free float, Secondary to Primary Shares, and Price Revision. The QQ plots adhere closely to the 45-degree reference line within the central distribution, indicating approximate normality of residuals. Both tails fan out, revealing some excess kurtosis. The Free float model exhibits a slight upward bend in the upper tail and a gently right-skewed histogram. The Secondary to Primary Shares model shows heavier tails on both sides and a broader, flatter histogram. The Price Revision model retains a tight center but diverges in the positive tail. These minor departures confirm that the regression assumptions hold and that our results are valid and robust.

6 Conclusion

This thesis examines how deal level characteristics affect the market performance of Swedish initial public offerings. It explores three variables, the proportion of equity sold to outside investors at the time of listing, the ratio of shares sold by existing owners relative to newly issued shares, and the price adjustment from the midpoint of the initial pricing range to the final offer price. The analysis uses market-adjusted returns over one trading day, ten trading days, and one year after the listing date. Furthermore, it includes controls for deal size, financial stability, firm age, research and development intensity, profitability, exchange listing, industry sector, and underwriter tier. The regression framework uses fixed effects to account for time and market segmentation, and it applies robust standard errors to control for heteroskedasticity.

The results reveal that a higher proportion of equity sold to public investors leads to lower initial market-adjusted returns, implying that when insiders retain more shares, investors face greater uncertainty and insiders have less incentive to prevent underpricing. The share composition results do not significantly impact existing owner sales on short-term returns, suggesting that insider sell-offs do not consistently signal firm quality in the Swedish market

context. The price revision variable shows a positive relationship with market-adjusted returns, indicating that larger price increases between the filed range and the offer price reflect strong investor demand and yield higher first-day returns.

These findings carry several implications. Theoretically, the results support models that predict greater underpricing when insiders retain larger stakes. They also extend information asymmetry theory by demonstrating that limited free float can heighten uncertainty and influence how investors value IPO shares. From a practical standpoint, issuing companies may consider calibrating the number of available shares to balance capital-raising objectives with aftermarket performance goals, and underwriters may design allocation strategies that consider how offering size and price revisions shape investor compensation requirements.

Despite its contributions, this study has limitations. First, the sample covers IPOs on Swedish exchanges from 2001 to 2024, which may not generalize to other markets or periods. Second, the measure of price revisions applies only to offerings that disclose a pricing range, representing 22.5 percent of the sample, so analyses of price revisions concern book-built issues and may not extend to fixed-price offerings. Third, winsorization may obscure extreme underpricing events. Fourth, although fixed effects control for time-invariant heterogeneity, they ignore dynamic feedback loops and may absorb important cross-sectional variation. The focus on pure primary issues reduces variation in secondary-share ratios, potentially masking subtle effects. Endogeneity between insider selling and unobserved firm characteristics also remains unaddressed. Finally, robustness tests confirm that coefficient signs remain stable, but statistical significance sometimes weakens in complete-case specifications, so interpretations should be cautious.

Future research could explore whether differences in post-IPO liquidity contribute to the relationship between free float and short-term returns. While this study does not include direct liquidity measures, future work may examine whether underpricing partially reflects a premium for holding less liquid shares in the early aftermarket. Additional liquidity proxies beyond free float and secondary-share ratios could help isolate this mechanism. The role of share composition could also be examined more closely, especially in settings where insider sales convey different signals depending on market norms or disclosure practices. To address

potential endogeneity, future studies might apply instrumental variable approach or exploit natural experiments involving changes in offer structure or regulatory shifts. Sentiment-driven explanations also warrant further attention. Incorporating investor sentiment indices, media coverage, or order-book dynamics could clarify whether non-fundamental demand pressures amplify short-run excess returns. Finally, cross-country comparisons and analysis of underwriter reputation, investor composition, or long-term firm outcomes could extend the generalizability and depth of IPO performance research.

In conclusion, this research presents new evidence on how offer structure influences the market-adjusted return of IPOs in Sweden. It highlights that free float, insider incentives, and investor-demand signals are central to return patterns.

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8 Appendix

Table 10: Summary statistics before and after winsorization

Variable	Obs	Mean	Std. Dev.	Min	Max
Return_1	565	0.0991229	0.5605858	-0.7047273	10.9
Return_1_w	565	0.0788066	0.3082306	-0.5575	1.318485
Return_10	565	0.1313513	0.6984669	-0.7556363	10.9
Return_10_w	565	0.1068202	0.4634094	-0.5964187	2.64
Return_252	565	0.2033268	1.17105	-0.9708	10.1
Return_252_w	565	0.1765312	1.005133	-0.927619	4.725

Table 11: Variable definitions and descriptions

Variable	**Description**
Free float	Fraction of the firm's equity sold in the IPO i.e., free float. A higher value means that a greater proportion of the company was made available to public investors.
Secondary to Primary Shares	Fraction of shares retained by pre-IPO shareholders. 0 indicates a fully primary offering, all new shares, 100 indicates a fully secondary offering, no new shares, and values between 0 and 100 represent a mix.
Price Revision	Percentage difference of the offer price relative to the midpoint of the initial pricing range disclosed in the prospectus.
$Deal\ Value_i$	Natural logarithm of the total IPO deal value.
Age_i	Natural logarithm of the firm's age in years at IPO, calculated from founding year.
ROA_i	Return on assets pre-IPO.
$Solvency_i$	Solvency ratio pre-IPO. Indicates financial stability and capital structure.
$R\&D\ asset_i$	R&D intensity, measured as R&D expenditure relative to total assets.
$Exchange\ Category_i$	Categorical variable indicating exchange listing: 1 = First North Stockholm, 2 = Nordic Growth Market, 3 = Spotlight Stock Market, 4 = Nasdaq Stockholm.
$Industry\ Classification_i$	Industry category: 1 = Tech, 2 = Biotech, 3 = Other.
$Underwriter\ Tier_i$	Underwriter tier: 1 = Bulge Bracket, 2 = Mid-tier, 3 = Lower-tier. Classification based on a predefined underwriter list.
$Quarter_i$	Quarter and year of IPO e.g., an IPO in the second quarter of 2021 is defined as 2021Q2, used for time fixed effects.

Table 12: Correlation matrix

	MAR	MAR_{10}	MAR_{252}	$Free\ float^{logit}$	Shares	$Price\ Revision^{logit}$	Solvency	Deal Value	Age	R&D asset	ROA
MAR	1.000										
MAR_{10}	0.808	1.000									
MAR_{252}	0.470	0.545	1.000								
$Free\ float^{logit}$	-0.015	-0.019	-0.008	1.000							
Shares	0.086	0.018	0.049	0.211	1.000						
$Price\ Revision^{logit}$	0.071	0.051	0.050	0.068	0.197	1.000					
Solvency	0.022	0.072	0.078	0.036	-0.217	-0.029	1.000				
Deal Value	0.100	-0.007	-0.019	0.350	0.596	0.120	-0.138	1.000			
Age	-0.019	-0.091	-0.007	0.005	0.453	0.006	-0.200	0.400	1.000		
R&D asset	-0.075	-0.074	-0.055	-0.071	-0.222	-0.010	0.076	-0.306	-0.116	1.000	
ROA	0.127	0.102	0.095	0.041	0.358	0.023	-0.018	0.320	0.197	-0.274	1.000

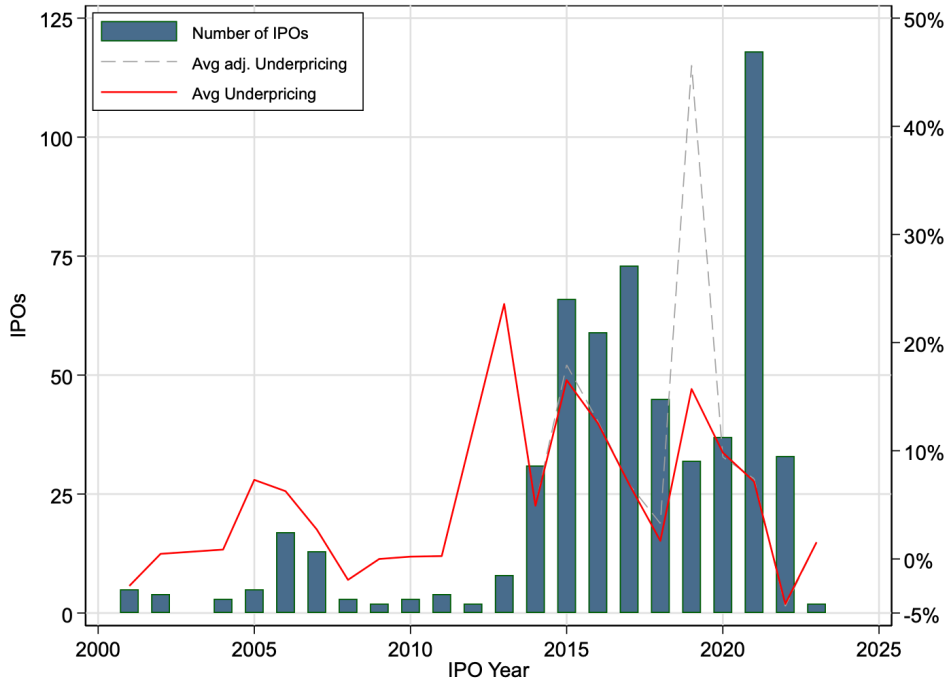


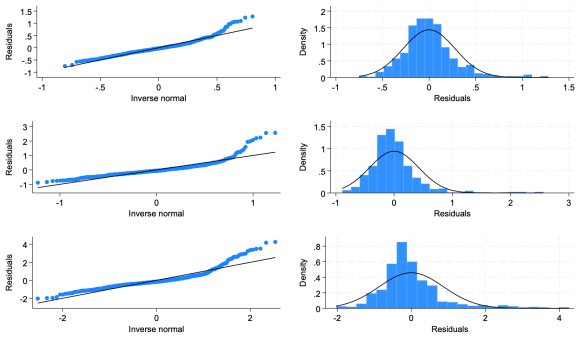
Figure 5: IPOs per Year

Table 13: Market-adjusted and Underpricing

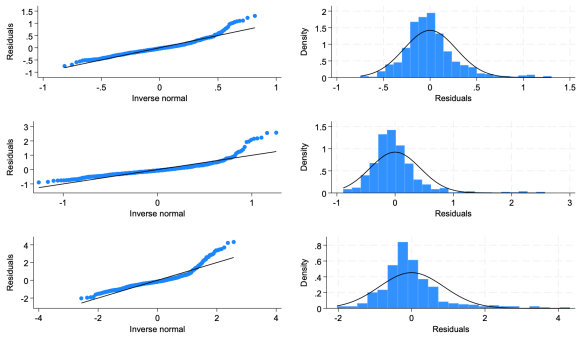
Window	MAR	Return
1 day	0.080***	0.079***
	(0.013)	(0.013)
2 days	0.094***	0.094***
	(0.015)	(0.015)
5 days	0.097***	0.098***
	(0.016)	(0.016)
10 days	0.105***	0.109***
	(0.020)	(0.020)
21 days	0.105***	0.117***
	(0.021)	(0.021)
63 days	0.143***	0.160***
	(0.025)	(0.026)
126 days	0.135***	0.177***
	(0.030)	(0.031)
189 days	0.153***	0.200***
	(0.038)	(0.038)
252 days	0.120**	0.177***
	(0.041)	(0.042)

Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05.

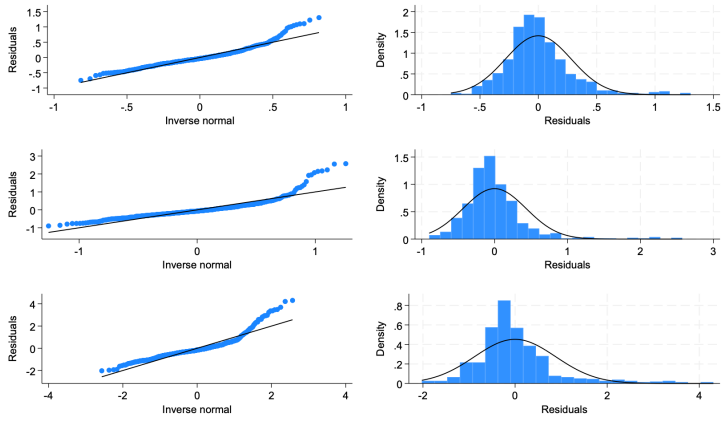
Figure 6: Residual-diagnostic panels, QQ plots and histograms, for (a) Free-Float, (b) Share-Compensation, and (c) Price-Revision regressions.



(a) Free Float Model



(b) Share Composition Model



(c) Price Revision Model

Table 14: Market-adjusted Returns (IPOs from 2014)

	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}
$Free\ float^{logit}$	-0.094***	-0.067*	0.015						
	(0.031)	(0.036)	(0.073)						
Secondary to Primary Shares				0.000	0.000	0.000			
				(0.000)	(0.001)	(0.002)			
$Price\ Revision^{logit}$							0.798*	0.891	3.296*
							(0.475)	(0.552)	(1.892)
$Solvency_i$	0.013	0.108	0.323*	0.007	0.120	0.361*	-0.010	0.016	0.161
	(0.056)	(0.084)	(0.189)	(0.057)	(0.086)	(0.192)	(0.074)	(0.136)	(0.479)
$Deal\ Value_i$	0.035**	-0.004	-0.059	0.029*	0.002	-0.027	0.017	0.036	0.048
	(0.016)	(0.021)	(0.050)	(0.016)	(0.026)	(0.054)	(0.027)	(0.039)	(0.125)
Age_i	-0.038**	-0.061**	-0.030	-0.038**	-0.070***	-0.055	0.020	0.011	0.128
	(0.016)	(0.024)	(0.049)	(0.016)	(0.026)	(0.050)	(0.022)	(0.031)	(0.103)
$R\&D\ asset_i$	-0.059	-0.202	-0.233	-0.063	-0.204	-0.215	0.627**	1.412*	1.642**
	(0.090)	(0.126)	(0.306)	(0.089)	(0.125)	(0.303)	(0.242)	(0.711)	(0.793)
ROA_i	0.125**	0.179**	0.369**	0.135**	0.182**	0.359**	0.221**	0.221	0.532
	(0.054)	(0.072)	(0.162)	(0.055)	(0.073)	(0.168)	(0.106)	(0.157)	(0.476)
Constant	0.063	0.272*	0.324	0.051	0.225	0.205	-0.092	-0.225	-0.704
	(0.095)	(0.146)	(0.308)	(0.096)	(0.154)	(0.315)	(0.216)	(0.275)	(0.880)
R-squared	0.192	0.148	0.163	0.182	0.145	0.164	0.503	0.429	0.431
Observations	488	495	489	494	501	495	82	82	81
F-statistic	3.857	2.963	1.887	3.028	2.828	2.015	1.789	1.162	1.093

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Market-adjusted Returns (IPOs before 2014)

	MAR	MAR_{10}	MAR_{252}	MAR	MAR_{10}	MAR_{252}
$Free\ float^{\text{logit}}$	0.007	0.008	-0.045			
	(0.016)	(0.014)	(0.036)			
$Shares_i$				-0.000	-0.000	0.003*
				(0.001)	(0.001)	(0.002)
$Solvency_i$	-0.023	-0.080	0.490	-0.028	-0.078	0.554*
	(0.071)	(0.076)	(0.292)	(0.071)	(0.082)	(0.293)
$Deal\ Value_i$	0.013	0.029	-0.112*	0.013	0.029	-0.121*
	(0.020)	(0.025)	(0.062)	(0.019)	(0.024)	(0.060)
Age_i	0.019	0.030	0.111***	0.010	0.027	0.067
	(0.025)	(0.024)	(0.040)	(0.028)	(0.030)	(0.046)
$R\&D\ asset_i$	0.673	1.165*	1.337	0.503	1.141*	1.024
	(0.611)	(0.587)	(2.552)	(0.592)	(0.601)	(2.526)
ROA_i	0.288**	0.222*	-0.052	0.332**	0.240*	-0.268
	(0.139)	(0.122)	(0.331)	(0.133)	(0.138)	(0.377)
Constant	-0.052	-0.178	0.058	-0.014	-0.164	0.051
	(0.127)	(0.137)	(0.363)	(0.118)	(0.129)	(0.341)
R-squared	0.653	0.658	0.593	0.639	0.655	0.602
Observations	54	58	60	55	59	61
F-statistic	1.325	1.506	2.529	1.441	1.750	3.034

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 16: Robustness of $Free\ float^{\text{logit}}$ to Mean Imputation vs. Complete-Case Analysis

Return Window	**Specification**	**Observations**	**Coefficient**	**p-value**	**Significant**
MAR	Mean Imputation	535	-0.0704	0.003	Yes
	Complete-Case	444	-0.0663	0.003	Yes
MAR_{10}	Mean Imputation	544	-0.0494	0.073	Partially
	Complete-Case	451	-0.0591	0.049	Yes
MAR_{252}	Mean Imputation	549	0.0015	0.979	No
	Complete-Case	456	-0.0219	0.729	No

Table 17: Robustness of $Price\ Revision^{\text{logit}}$ to Mean Imputation Across Return Windows

Return Window	**Specification**	**Observations**	**Coefficient**	**p-value**	**Significant**
MAR	Mean Imputation	109	0.459	0.075	Partially
	Complete-Case	85	0.329	0.231	No
MAR_{10}	Mean Imputation	111	0.640	0.034	Yes
	Complete-Case	87	0.502	0.131	No
MAR_{252}	Mean Imputation	111	1.201	0.142	No
	Complete-Case	87	1.627	0.096	Partially