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Global Diversification and IPO Underpricing

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Abstract

We examine whether global diversification is influencing the underpricing of an initial public offering, and hypothesize that it reduces the first day return of an offering. To investigate this, we employ a quantitative approach and conduct OLS regressions with four different independent variables. We use two proxies for global diversification; foreign sales and foreign sales intensity. Further, we investigate whether it makes a difference if the foreign sales are derived from inside Europe or worldwide. We examine a total of 127 listings on the Swedish Stock Exchange during the time period 2012-2020. The study finds statistically significant associations between global diversification and underpricing, supporting the hypothesis that global diversification lowers the underpricing of an IPO. Moreover, we find that foreign sales inside Europe and foreign sales worldwide both decrease underpricing. However, we can neither accept nor reject whether an IPO is more fairly priced if a firm derives foreign sales from inside Europe or worldwide, if either. Our results contribute by generating more recent research on the relationship between global diversification and IPO underpricing, as well as to the IPO literature on the Swedish market.

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Keywords: *Global Diversification, Initial Public Offering, Underpricing*

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1 Introduction

1.1 Background

Globalization, the interdependence (economic, social, technical and political) between nations has been advancing throughout the world since World War II (Northouse, 2019). Globalization has increased international trade as well as the ability for companies to operate globally. Denis et al (2002) define global diversification as sales from foreign operations. They observe an increase in the prevalence of globally diversified firms over time, both regarding the fraction of firms operating in several markets as well as the fraction of total revenue stemming from foreign operations.

Whether engaging in international business, and being a globally diversified company, results in benefits or costs, is a topic which is actively researched. Gande et al (2009), Villalonga (2004) and Santos et al (2008) argue that global diversification has positive effects on firm value. Hitt et al (1997) state that firms being globally diversified have access to more resources than domestic firms. Further, Mauer et al (2015) suggest that firms operating globally have more diversified revenue streams. In contrast there is research implying that international business activity decreases firm value, resulting in a global diversification discount (Servaes 1996, Denis et al 2002). Denis et al (2002) find that global diversification reduces shareholder value by 18%. They propose that this discount can be a consequence of costs incurred from inefficient cross-subsidization and high costs of coordinating corporate policies as a result of a multinational firm being more complex, among others.

Initial public offering (IPO) is the process of a firm going public for the first time. It is considered a vital part in the firm's life time and often comes with a number of changes in the firm. After the firm is listed, shares can be bought and sold on the market, and the firm becomes publicly traded (Pagano et al, 2002). Ritter and Welch (2002) argue that the most important factor in the decision to go public are the market conditions. The second most important factor they argue is the state of the firm in its life cycle. Additionally, they observe that through raising equity capital and creating a public market, founders and other shareholders have the ability to exchange part of their wealth into cash at a future time period. Pagano et al (1998) found that the market-to-book ratio is the most common factor affecting the likelihood of an IPO, followed by the size of the

company. Notably, larger companies are more likely to go public (Pagano et al, 1998). Furthermore, there are non-financial reasons, however these have in research shown to play a smaller role (Ritter and Welch, 2002).

There are several scholars who provide evidence on benefits and costs of going public. Pagano et al (1998) presents benefits including diversification of owners, reduction in the cost of bank credit and reduction in borrowing after going public. Additionally, they mention investor recognition as an additional benefit that emerges from going public. Costs which are commonly presented in the literature include registration and underwriting costs (Ritter, 1987) as well as agency costs (Jensen and Meckling, 1976). There are costs which occur directly at listing time, and thereafter yearly expenses of auditing, monitoring and certifications (Pagano et al, 1998).

Initial public offerings have been widely researched. One factor which especially has engrossed scholars is the return of the share on the first day, also known as the underpricing of the share (Ritter 1984, Beatty and Ritter 1986). The price setting of the new issues results in first day returns which in general are much higher than the market return. Scholars have still not come to an agreement of exactly why shares are underpriced (Butler et al. 2014). Some of the most well-known explanations for the systematic underpricing of shares includes but are not limited to Rock's (1986) explanation of information asymmetry among informed and uninformed investors which leads to a winner's curse problem. Further, theories on reducing the information asymmetry includes signaling where firms try to perceive certain actions to reveal their private information (Certo et al, 2001). Beatty and Ritter (1986) also observe uncertainty to influence the underpricing of the share stating that more uncertain offerings are more underpriced. In more complex firms theories on agency costs as a result of the principal-agent dilemma (Jensen and Meckling, 1976) can influence the risk perceived, influencing the valuation of the firm. The increased risk could possibly lead to a higher underpricing.

The impact of global diversification on IPO underpricing is indecisive. Engaging in international business activity could contribute to lower uncertainty about future earnings, thereby the shares should be fairly priced to a greater extent (Mauer et al, 2015). However, as previously argued, there are risks and costs attributed to being globally diversified. Global diversification enables firms to expand revenue bases, as well as hedge the risk of domestic cash flow shocks. However,

there might be increased costs of monitoring when being diversified, in line with the agency theory. Furthermore, there are risks regarding exchange rates, cultural barriers, and unstable political regimes (Levchenko 2009, Denis et al 2002), which could act to increase the underpricing. Through examining the first day return of initial public offerings of firms in Sweden, one may be able to explore how the market perceives and values the benefits and drawbacks of engaging in international business activity.

1.2 Purpose

The purpose of this thesis is to contribute to the IPO literature by examining if global diversification could be an explanatory factor for underpricing in Sweden. To measure global diversification, two proxies are used, namely; foreign sales and foreign sales intensity. The research question is examined by regressing foreign sales against the first day return of stocks listed on the Stockholm Stock Exchange for the first time between 2012-2020. In line with previous research, we expect foreign sales to have an inverse relationship with the first day return (Mauer et al 2015). Additionally, as an extension to previous research made on the subject, we study whether the effect on underpricing is different if the foreign sales are only inside Europe or worldwide. We hypothesize that firms which have foreign sales worldwide, will have greater underpricing compared to firms with foreign sales inside Europe. This is due to the increased costs, in the form of monitoring and agency costs among others, stemming from having foreign operations. These costs are argued to outweigh the benefits of diversified revenue streams, when the foreign sales are worldwide, compared to if only deriving the foreign sales from inside of Europe. However, as no previous research has been made on the specific variable (to the authors knowledge), it proves difficult to gain support from previous literature. The results of this thesis are of interest to various stakeholders; including underwriters, issuers, and investors, as they can maximize shareholder value by gaining knowledge about the important characteristics of an IPO. Underwriters can support the issuers by suggesting that foreign sales might contribute to less underpricing, thereby helping issuers retain a larger fraction of their wealth. Issuers can choose either to signal their good prospectus to buyers or retain a larger fraction of their wealth for themselves whilst investors can use this to gain knowledge about the future risk of an offering.

1.3 Contribution

This paper contributes to the literature mainly in four ways. First, the phenomenon IPO underpricing has been extensively researched throughout the years and scholars have proposed different underlying explanations for the phenomenon. However, researchers have not come to consensus with the precise explanations for IPO underpricing. Therefore, this thesis aids in shedding light to potential determinants for IPO underpricing, Specifically, this thesis investigates whether global diversification is such a determinant. Second, this thesis contributes to further generate recent research on the IPO market in Sweden is scarce. The only previous research on global diversification and IPO underpricing (to the authors knowledge) has been made on the United States market. As there might exist differences between the two markets this thesis could serve as an addition to determine whether global diversification is a determinant applicable to supplemental markets than the United States. In particular, none have investigated the association between global diversification and IPO underpricing on the Swedish market. Thus, this thesis has substantial contribution potential. Third, this thesis contributes to a new area in global diversification research, assessing whether global diversification in different regions has an impact on first day return. Fourth, as scholars have struggled to come to agreements on the effect of global diversification on firm value, this thesis can shed light on the market's reactions to the perceived benefits and costs of global diversification by looking at the first day returns of initial public offerings.

1.4 Limitations

One limitation of the study is to control for all factors which can impact underpricing. Ideally, we should include all the control variables which prior research (Butler et al, 2014, Loughran and Ritter, 2004) has linked to IPO underpricing. This is to enable an assessment of to what extent the independent variable contributes to explaining the phenomenon. However due to time, resources, and data availability this has been difficult to attain. Further, the study is also limited by errors in the data where companies that had foreign sales at the time of the IPO possibly have been excluded from the sample due to lack of reported data in Capital IQ, potentially leading to an unintended selection bias. Another limitation of this thesis is the small sample which follows naturally from the study being conducted on the Swedish market, with a limited number of IPOs during the selected time period. Having a small sample imposes potential difficulties in regards to

interpretation of the result; as the variances can appear larger than they actually are, and the variables might show the opposite sign to the prediction supported by previous research. Moreover, the small sample leads to difficulties in attaining the desired result on the propensity score analysis conducted. Fourth, the ability to perform the endogeneity tests to secure the robustness of our results is hampered by data availability.

1.5 Disposition

The thesis proceeds as follows; Section 2 reviews the literature and presents our hypotheses. Section 3 describes the methodology used to investigate the research question. Section 4 presents the results. Section 5 provides an analysis of our findings. Section 6 presents the conclusions of this thesis, including suggestions for future research.

2 Literature review and framework

2.1 IPO Underpricing

Pricing an IPO correctly, as there is no prior market price, can often deem to be a difficult task. In practice, the price is often set below the market value of the firm, resulting in underpricing (Ibbotson, 1994). Several studies throughout the years have examined IPOs and the drivers of underpricing (Butler et al 2014, Loughran and Ritter 2004). Ritter and Welch (2002) argue that academics use first day returns and underpricing interchangeably. This thesis will therefore build upon their well-documented definition. Further, Ritter and Welch (2002) define the average first day return as the percentage change between the closing price and the offer price. When an issue ends the first day of trading at a closing price greater than the offer price it is identified as underpricing. Conversely, if the closing price is lower than the offer price, it will be considered as overpricing.

There is documented empirical evidence of underpricing on several different markets. Jenkinson and Ljungkvist (2001) conducted a study on IPOs in 35 different countries, finding evidence for underpricing. This finding is also supported by Loughran and Ritter (2004) who found that the average initial return in 25 countries, with figures collected from several studies by various authors, is positive. They find the average underpricing in the U.S. during the time 1980-2003 to

be 18.7%, and as high as 65 % during the Dot-com bubble. Ritter and Welch (2002) emphasize that to their knowledge, there are no exceptions to IPOs of operating companies being underpriced, on average in all countries. From a Swedish perspective, Bodnaruk et al (2008) found that the average first day return on the Stockholm Stock Exchange during the period 1995-2001 was 14.2%. Furthermore, a study by Abrahamson and de Ridder (2015) on the Swedish market during 1996-2011 indicated an average initial first day return of 7.7%. Moreover, Rydqvist (1997) found that before 1990, the mean underpricing on the Swedish stock exchange was 40.7%, whilst the average underpricing between 1990-1994 was 8%. These studies provide evidence for the appearance of underpricing on the Swedish Stock Exchange.

2.2 Reasons for underpricing

Beatty and Ritter (1986) further support that initial public offerings on average have positive initial returns, and propose an explanation for the degree of underpricing. They found that the greater the ex-ante uncertainty the greater the (expected) underpricing. They define ex ante uncertainty as the uncertainty about an offering's value once it starts publicly trading. In an offering with greater ex ante uncertainty, a representative investor will demand that more money be 'left on the table'. This is achieved through underpricing. They argue that if the firm does not leave money on the table, the initial public offering market will be subject to lemons, as each issuing firm has no incentive to leave money on the table as they will go public only once. As a result of the market being subject to lemons, uninformed investors will not participate in IPOs. The difficulty to secure that uninformed investors will participate in IPOs can further be explained by the Winner's curse. The winner's curse was first introduced by Rock (1986). The winner's curse is explained as if an investor subscribes to all shares, they will receive a larger fraction of the offerings declining in price than the offerings that appreciate. This is due to the presence of informed investors, incurring costs doing security analysis, only subscribing to the offerings that are likely to appreciate in price. This leads to informed investors making sufficient profits but creates a winner's curse problem for uninformed investors. In an attempt to free ride by the uninformed investors, they receive a fraction of their demand in the oversubscribed offerings whilst receiving full allocation in the undersubscribed offerings. Consequently, they will choose not to participate in any offerings. The information asymmetry arising from differential information among informed and uninformed investors results in a demand from

uninformed investors to underprice offerings due to the uncertainty about the implicit value of an offering (Ritter and Welch, 2002). Beatty and Ritter (1986) support the theory of winner's curse and develop it further by stating that it intensifies as ex ante uncertainty increases. As the information asymmetry increases, underpricing of the share will increase. Information available for investors before the IPO, will minimise the information asymmetry. Consequently, underpricing will be reduced (Beatty and Ritter, 1986).

Signaling theory (Certo et al, 2001) discloses that as information asymmetry causes uncertainty, firms will attempt to signal their quality to the market. A firm can signal its quality through certain indicators and thereby credibly reveal certain private information, such as certain firm specific factors (for example; age, firm sales, assets and underwriter reputation). These factors might reduce the information asymmetry as they give indications of a firm's quality (Loughran and Ritter 2004, Carter and Manaster 1990) and could thereby signal information about the firm's future prospects.

2.3 Global diversification

Theories on global diversification have proposed it to have a positive relationship with firm performance, as several benefits come with expanding globally (Vernon 1971, Santos et al 2008). De Loecker (2007) proposes that firms which start exporting eventually become more productive. Greenaway et al (2007) further develop this theory through core trade models, pointing to a direct link between exporting and productivity. Melitz (2003) notes that only the most efficient firms will benefit from trade whilst the least efficient firms will lose both market share and profit due to costs attributed to entering a foreign market.

Gande et al (2009) examine the effect of global diversification on firm value, finding that firm value increases with foreign sales. Errunza and Sebet (1981, 1984) argue that the effect on firm value from global diversification can be described through both financial and real sides of the economy. Value creation through the financial dimension of multinationality is described through theories and evidence based on market imperfections. The theory suggests that globally diverse firms complete markets by allowing investors indirect access to countries with restrictions on portfolio holdings. Furthermore, the internalisation theory (Caves, 1971) states that a multinational firm increases its value by internalising markets for certain of its intangible assets,

such as R&D. In contrast, Lang and Stulz (1994) find no evidence that diversification provides firms with a valuable intangible asset. Further benefits which come with diversifying include the ability to make use of economies of scale and scope, which increases profitability. Globally diversified firms have access to more resources than domestic firms (Hitt et al, 1997). It also provides access to broader learning opportunities and international experience, as well as access to cheaper and better resources, such as technology (Hitt et al, 1997, Contractor et al 2003). Denis et al (2002) point out that global diversification might increase firm value by creating a flexibility for firms to respond to changes in relative prices and institutional differences such as differences in tax codes. It has been demonstrated empirically by Rugman (1980), that a firm expanding into international business reduces the risk of future profits. This stems from the theory of portfolio diversification (Markowitz, 1959). The theory states that by investing in stocks that are not correlated, investors can reduce their risk. Relating this to international firms, this implies that firms with activities in countries which are not economically integrated, will experience a lower risk. Firms which have foreign operations will have a higher stability of profits compared to firms only operating locally (Rugman, 1980). Thereby, this reduces the uncertainty about the future performance of the firm.

There are indications that being globally diversified can decrease corporate risk. Kim et al (1993) argue for three things which multinational firms are equipped with which will reduce the corporate risk. First, operating in a vast number of markets, can allow firms to retaliate against aggressive competitors. Second, it can reduce effects of changes in interest rates, wage rates and raw materials. Third, it will protect firms from fluctuations in supply and demand in a single market. Consequently, a reduction in risk stemming from diversification is a benefit for firms with foreign operations. Connecting the theories around information asymmetry, signaling and portfolio theory, it can be argued that the benefits associated with global diversification in accordance with the potential risk reduction, sends positive signals to potential investors. A decrease in uncertainty results in a more fairly priced IPO (Beatty and Ritter, 1986).

Previous research conducted by Hadlock et al (2001) and Thomas (2002) on industrial diversification, suggests that industrial diversification reduces information asymmetry when the errors in valuing a diversified firm's different segments or divisions are not perfectly correlated. This is described as the information discount hypothesis (Thomas, 2002). This implies that

investors will make more accurate forecasts, when forecasting a diversified firm as the errors made in valuing a diversified firm partially cancel out one another. This results in lower information asymmetry for diversified firms, compared to focused firms. As the implications of global diversification are argued to be similar to industrial diversification (Denis et al, 2002), we argue that globally diverse firms should face less underpricing as a result of lower information asymmetry.

In contrast, other literature suggests that global diversification results in a valuation discount, as costs are incurred when expanding globally (Denis et al, 2002, Servaes, 1996). Contractor et al (2003) propose a three-stage model of international expansion where they suggest that the early internationalizes face large costs of entering a foreign market. The authors highlight how firms at this stage face insufficient economies and increased costs when expanding internationally. Therefore, firms at an early state of internalization might signal negative prospects to investors. For investors to participate they demand more money to be left on the table. Further they present a non-linear shape of internalization indicating that there is an optimal level of global diversification. Firms that approach stage three exhibit diminishing returns attributable to higher coordination costs and cultural distance arising from the increased global diversification. These costs can further be explained by the principal-agent dilemma.

Managerial objectives theory (Jensen and Meckling, 1976) proposes that the divergence of interest between managers (agents) and shareholders (principals) results in a principal-agent dilemma. Harris et al (1982) discuss how resource allocation within a firm can be misallocated due to information asymmetry. The authors argue that the presence of differential information among managers and divisional managers, might lead to divisional managers deriving personal benefits by overstating the resource requirements within multi segment organizations. Myerson (1982) argues that coordination systems must be designed to give the agent the incentive to do as the principal intends. Denis et al (2002) argue that the complexity of globally diversified firms lead to high costs of coordinating corporate policies. Further they build on the findings of Berger and Ofek (1995) by stating that similar to industrial diversification, global diversification can lead to cross subsidies that allow for poor segments to drain resources from better performing segments as a consequence of the misalignment of incentives between central and divisional managers. As a consequence of the separation of decision-making and ownership, wasteful

investments can be made, as agents can act in self-interest (Jensen and Meckling, 1976). Denis et al (2002) state that managers might derive personal benefits, for example power and prestige and managerial compensation, from global diversification. There is a potential that managers adopt and maintain value-reducing diversification strategies, even if it reduces the wealth of shareholders. Kim and Mathur (2008) state that as a result of being more geographically diversified, the firm is less transparent, which makes it more difficult to mitigate the agency costs through monitoring and internal control systems. Consequently, they argue that foreign operations result in even more difficulties in monitoring the actions of management (agents) than in companies with only domestic operations. Kim and Marthur (2008) assert that firms with international business activity would have large information asymmetry problems, and result in a higher discount rate and lower firm value. According to the agency theory, less ability to monitor and control a large globally diversified firm should result in higher underpricing because of the risk of potential agency costs and the increase in information asymmetry.

2.4 Hypothesis development

The discussion concerning the benefits and costs arising from global diversification has not yet reached a consensus by scholars. Global diversification can by reducing the information asymmetry among potential investors and the issuer decrease the uncertainty about the future prospects of the firm. As several benefits are perceived to follow from global diversification, this can signal high quality and in accordance with signaling theory decrease underpricing. This is consistent with Mauer et al (2015) implying that international business activity culminates in a net decrease in uncertainty, and it is therefore predicted in this paper that a globally diversified IPO will have lower underpricing than a domestic one.

Contractor (2003) argues that an increased intensity of foreign sales is beneficial for firms, as firms with only a low amount of foreign sales face large costs of entry. Though an increase is at favour, at a certain point, firms with foreign sales will start to exhibit diminishing returns because of an increase in agency and coordination costs. Based on this, there is a possibility our result concludes that with an increased intensity of foreign sales the first day return is higher, which then could be attributed to the costs outweighing the benefits of global diversification. Nevertheless, it is an empirical question considering the mixed support from previous literature

and theoretical frameworks. This leads to the following hypothesis, with two proxies for global diversification, a foreign sales dummy and intensity of foreign sales calculated as sales derived from foreign operations over total firm sales.

$\boldsymbol{H_1}$: *There is a negative relationship between IPO underpricing and Global diversification*

In addition, we would like to assess whether it has an impact on IPO underpricing if the foreign sales are derived from inside Europe or worldwide. Fratzscher (2002) argues that stock markets within the EU have been integrated since 1996, in particular in countries that participate in the European monetary union (EMU). Further, he emphasises that a higher integration potentially could lead to fewer possibilities to diversify within the Euro area. An increased correlation among the stock markets in the EU since the establishment of the EMU is further supported by Yang et al (2003). Boucrelle et al (1996) came to the conclusion that the benefits in regards to risk which arise from being a globally diverse firm, are reduced when the diversification is within the EU. Moreover, having foreign sales worldwide could bring advantages like diversifying the risk. As Sweden has not adopted the Euro, one could argue that Sweden could benefit from the increased integration as a consequence of EMU, without being equally fragile to the systematic risk of the highly integrated countries.

Despite an increased risk from operating only within the European Union there are potential benefits expanding into countries which also are members. The European Union enables free movement of people, goods, services, and capital without establishing the firm there permanently. One can expand throughout Europe, and thereby access a larger customer base without border bureaucracy, and other regulatory obstacles, which reduces the costs of diversification for firms (in ’t Veld, 2019). Second, organizing and coordinating a worldwide business implies complexity in terms of logistics. A firm with worldwide sales is most likely harder to monitor, resulting in an increase of complexity which leads to information asymmetry and potentially increases the agency costs. Even though there has been advances in technology, agency costs increase as a result of the need for monitoring and controlling when distance to the headquarters increases (Chang et al, 2016). The increased information asymmetry might imply that the investors will demand more money to be left on the table, to be compensated for the increased risk (Kim and Marthur, 2008). Whether there is a point when the costs of being

globally diversified outweigh the benefits, and when this exact point occurs, is unclear. However, we hypothesize that this might occur when having worldwide operations, as only expanding within Europe provides access to a larger revenue base, without incurring substantial costs for monitoring and border bureaucracy. As there is no previous research on this question (to the authors knowledge) the impact is yet to be investigated. This leads to the following hypothesis:

$\boldsymbol{H_2}$: *There is greater underpricing when a firm has worldwide sales compared to sales only inside Europe*

3 Methodology

3.1 Data Selection

The financial data is retrieved from Capital IQ. The data set consists of observations between 2012-2020. The time interval selected has market conditions which are comparable. By limiting the time interval to 2012-2020, the circumstances in the economic environment does not differ too much from recent years. However, the primary reason for limiting our sample to 2012-2020, is because it allows us to compare the listings manually with NASDAQs official main listings page, to ensure the credibility of the data, and that all listings during the specified time period are included in our sample. The official main listings page provides observations between 2011-2020, but observations on listings on First North are only reported for the time period 2012-2020. First North has been included to increase the sample size. As both First North and the main listing are included in our research, we use the time period 2012-2020 for our sample. Consequently, the sample in this thesis is based upon a sample from Capital IQ that has been manually checked to the main listings as reported by Nasdaq. Furthermore, we manually check the data for IPO underpricing and our control variables against the database SDC platinum provided by Swedish House of Finance when applicable. The reason for restricting the sample to only examining Swedish IPOs is primarily due to the scarce amount of research on IPO research on the Swedish markets. Further, the lack of research on global diversification on Swedish firms enables for great contribution potential.

3.2 Sample Construction

Table 1 provides details on data cleaning and sample construction. First, the sample retrieved from Capital IQ has been sorted by the following criteria; IPOs on OMX Nordic Exchange Stockholm. The sample was then narrowed down to the time period 2012-2020, motivated for in Section 3.1. This resulted in a sample of 304 unique firms. Thereafter international companies, all companies not ending with AB, have been excluded. This is to determine how Swedish firms specifically are affected by having foreign sales. Furthermore, companies that were not initially introduced on OMX Nordic Exchange Stockholm were excluded. Already having been listed on a stock exchange can have implications on the first day return when listing on a new exchange, since it has previously been priced by a market, and therefore these observations are excluded. Moreover, observations without a reported first day return in Capital IQ have been excluded. Returns reported to be zero are also excluded from the sample. This resulted in a dataset of 200 observations. The independent variables, foreign sales dummy, foreign sales intensity, foreign sales inside Europe and foreign sales worldwide, were retrieved manually from Capital IQ. However, observations labelled no data for foreign sales on Capital IQ were excluded. The prospectuses have been used as a support for looking into the intensity of foreign sales, foreign sales within Europe and foreign sales worldwide whenever it proved to be ill-defined on Capital IQ. The control variables, explained in detail in section 3.3.3, have been decided upon based on previous literature, where these have seemed to have an explanatory power to first day return. Thirteen companies were excluded as they lacked financial data on Capital IQ for the control variables. Companies only offering preference shares have also been excluded as those shares rather focus on diluting the control of the company rather than to distribute ownership. The final sample consists of 127 unique firms.

Table 1: Final sample

This table shows exclusions done to arrive at the final sample

Data samples and exclusions	Number of observations
Capital IQ data from 2012-2020	304
Non Swedish companies (eg. Ob, Oyj, Plc, AG)	-33
Change of exchange (from NGM or XSAT)	-24
Missing first day return	-37
Original data sample	**200**
Missing data foreign sales	-66
Missing financial data	-13
Only preference shares offered	-4
Final sample	**127**

3.3 Research design

This study aims to investigate if global diversification impacts the underpricing of IPOs on the Swedish stock market. We use a set of OLS regressions to study the research question, as this is deemed the most suitable for our research question and frequently used in IPO literature (Mauer et al 2015, Butler et al 2014, Loughran and Ritter 2004). We use two different proxies for global diversification; foreign sales dummy and foreign sales intensity. Additionally, we test for whether it has an impact on underpricing if the foreign sales are derived from inside of Europe or worldwide, using two dummies; foreign sales inside Europe and foreign sales worldwide. Further, we test a total of six different control variables used in previous literature (Butler et al 2014, Loughran and Ritter 2004, Mauer et al 2015); assets, age, firm sales, price to sales ratio, market return and tech dummy. To test the first hypothesis the following equation is used:

$$Log(1 + FIRST\ DAY\ RETURN)_{it} = \alpha_i + \beta 1_{Foreign\ sales\ dummy_{it}} + \beta 2_{Log(Assets)_{w_{it}}} + \beta 3_{Log(Age)_{w_{it}}} + \beta 4_{Log(Firm\ sales)_{w_{it}}} + \beta 5_{Log(Price\ to\ sales)_{w_{it}}} + \beta 6_{Market\ return_{w_{it}}} + \beta 7_{Tech\ dummy_{it}} + \varepsilon_{it} \quad (1)$$

$$Log(1 + FIRST\ DAY\ RETURN)_{it} = \alpha_i + \beta_{Foreign\ sales\ intensity\ it} + \beta 2_{Log(Assets)_{w\ it}} + \beta 3_{Log(Age)_{w it}} + \beta 4_{Log(Firm\ sales)_{w\ it}} + \beta 5_{Log(Price\ to\ sales)_{w\ it}} + \beta 6_{Market\ return_{w\ it}} + \beta 7_{Tech\ dummy\ it} + \varepsilon_{it} \quad (2)$$

To test our second hypothesis, we use the following equation:

$$Log(1 + FIRST\ DAY\ RETURN)_{it} = \alpha_i + \beta 1_{Foreign\ sales\ inside\ Europe\ it} + \beta 2_{Foreign\ sales\ worldwide_{it}} + \beta 3_{Log(Assets)_{w\ it}} + \beta 4_{Log(Age)_{w\ it}} + \beta 5_{Log(Firm\ sales)_{w\ it}} + \beta 6_{Log(Price\ to\ sales)_{w\ it}} + \beta 7_{Market\ return_{w\ it}} + \beta 8_{Tech\ dummy_{it}} + \varepsilon_{it} \quad (3)$$

Where:

$\alpha_i = constant$

$\beta = coefficent\ of\ the\ variable$

$i_w = the\ variable\ i\ has\ been\ winsorized$

$\varepsilon_i = error\ term$

3.3.1 Dependent variable

The dependent variable used in this study is the first day return. The variable is defined as the difference between closing and offering price, divided by the offering price. This definition of underpricing is used in previous literature (Ritter and Welch 2002, Loughran and McDonald 2013, Ritter 1991). A higher first day return implies a higher underpricing of the share. As the distribution of the dependent variable is skewed to the right, the variable has been logarithmically transferred by (1+underpricing), which is in line with Mauer et al (2015).

$$FIRST\ DAY\ RETURN\ = Log\ (1 + \frac{closing\ price - offering\ price}{offering\ price})$$

3.3.2 Independent variables

We introduce four different independent variables to test our two hypotheses.

Foreign sales

To test our first hypothesis, we use a foreign sales dummy variable as a proxy for global diversification (Denis et al, 2002). The dummy is represented with a 1 if the firm has foreign sales and with a 0 if a firm does not have sales outside of Sweden, at IPO date. This is in line with previous literature on IPO underpricing and global diversification (Mauer et al, 2015). The variable is expected to have a negative relationship with the first day return.

$$FOREIGN\ SALES\ DUMMY = \ firm\ sales\ outside\ of\ Sweden\ at\ IPO\ date$$

Foreign Sales Intensity

As a second proxy for global diversification, we test for the effect intensity of foreign sales has on IPO underpricing, further testing our first hypothesis. To calculate the intensity of foreign sales, firm sales outside of Sweden is divided by total firm sales, retrieved from the latest reported year before the IPO date. The variable is expected to have a negative relationship with the first day return.

$$FOREIGN\ SALES\ INTENSITY = \frac{sales\ outside\ of\ Sweden}{Total\ sales}$$

Foreign Sales Inside Europe

To test our second hypothesis, a dummy variable is constructed, and it is given a value of 1 if a firm has foreign sales inside of Europe at IPO date. If a firm derives sales either only from Sweden or worldwide it is given the value 0. We expect a negative relationship with the first day return, indicating foreign sales inside Europe results in less underpricing.

$$FOREIGN\ SALES\ INSIDE\ EUROPE\ DUMMY = \ firm\ sales\ inside\ of$$

$$Europe\ at\ IPO\ date$$

Foreign Sales Worldwide

To test our second hypothesis, a dummy variable has been constructed, and it is given a value of 1 if the firm has foreign sales worldwide. The dummy is given a 0 if it corresponds to only

having foreign sales inside of Europe, or if the firm only has sales inside of Sweden. This information is collected at IPO date. The variable is expected to have a negative relationship with the first day return.

$$FOREIGN\ SALES\ WORLDWIDE\ DUMMY\ =\ firms\ sales\ worldwide\ at\ IPO\ date$$

3.3.3 Control variables

Butler et al (2014) have proposed robust determinants of IPO underpricing, which they suggest that future researchers use if considering pursuing research on IPO underpricing. Following Mauer et al (2015) and Butler et al (2014) we add the following control variables; assets, age, firm sales, price to sales, market return and a tech dummy. Due to data availability, we were not able to include the whole set of variables which Butler et al (2014) have linked to IPO underpricing. Therefore, we have added additional control variables which are frequently used in IPO literature (Loughran and Ritter 2004, Lowry et al 2010). The final set of control variables represent both characteristics of the firm, characteristics of the offer as well as the market conditions at the time of the IPO. The variables; assets, age, firm sales and price to sales ratio have been logarithmically transferred to adjust for large variances in the sample.

Assets

A control variable, the logarithm of a firm's assets at announcement of the IPO, is constructed. This variable is used in previous IPO literature such as Loughran and Ritter (2004). The data is downloaded from Capital IQ and defined as Issuer LTM Financials Total Assets (at announcement) in USDmm. In line with previous research, we expect a negative relationship between the logarithmic function of firm assets and first day return (Loughran and Ritter, 2004).

$$FIRM\ ASSETS\ =\ Log\ (firm\ total\ assets)$$

Age

Similar to Lowry et al (2010), Hanley et al (2012) and Loughran and Ritter (2004), we use the firm's age at the time of the IPO as a control variable. Analogous to what was used in Field and Karpoff (2002), the firm's age at IPO is defined as the year of IPO minus the year the company

was founded, where both data points are collected from Capital IQ. Loughran and Ritter (2004) support this finding and conclude that this might be due to older companies being perceived to be less risky for an investor, implying a lower return. Further, Lowry et al (2010) find the variable to have an inverse relationship with first day return. Hence, we expect a negative relationship between this variable and stock return.

$$FIRM\ AGE\ =\ Log\ (1 + Firm\ age)$$

$$where\ Firm\ age\ =\ Year\ IPO\ Issued\ -\ Year\ Company\ founded$$

Firm Sales

The variable firm sales is classified as a robust determinant of IPO underpricing (Butler et al, 2014). Firm sales are frequently used as a control variable in IPO literature (Ritter 1984, Loughran and Ritter 2004). Therefore, the logarithm of firm sales at announcement of IPO is used as a control variable. The financials are collected from Capital IQ and are defined as the Issuer LTM Financials Total Revenue (at announcement) in USDmm. Consistent with Loughran and Ritter (2004) we expect a negative relationship between the logarithm of firm sales and first day return.

$$FIRM\ SALES\ =\ Log(firm\ sales)$$

Price to sales ratio

Butler et al (2014) provide evidence that the offer price to sales ratio is a robust determinant of IPO underpricing and recommend using it in future IPO literature. This variable is used in our study as a control variable. The data for the offer price, shares outstanding and total firm revenue at IPO is collected using the Capital IQ database. We expect a negative relationship between the control variable and the first day return of the stock in line with Butler et al (2014).

$$PRICE\ TO\ SALES\ RATIO\ = Log\ (\frac{offer\ price\ *\ shares\ outstanding}{Annual\ Firm\ Sales})$$

Market return OMX 30 days prior

It is argued by Butler et al (2014) that prior 30 day NASDAQ return is an explanatory variable for IPO underpricing. The underpricing of an IPO in the current period is suggested by the authors to reflect the equity market conditions at the time the firm goes public. As the authors of the article have based their article on US firms they use NASDAQ as the benchmark index. As this thesis examines IPOs on the Swedish market, the OMX30 is used as the benchmark index. The data for the 30 day prior return has been manually retrieved from Capital IQ. Butler et al (2014) report a positive relationship between Nasdaq 30 days prior market return, and we expect the same for OMX30.

$$MARKET\ RETURN = \ Return\ of\ OMX30, 30\ days\ prior\ to\ IPO\ date$$

Tech Dummy

A tech dummy variable has been constructed to serve as a control variable. The variable is constructed so that if the company is considered to be a high-tech company it is given a value of 1, otherwise 0. To define tech, Kile and Phillips (2009) definition of high tech firms has been used. They have found 11 SIC codes representing high-tech firms. Capital IQ has been used to find the primary SIC codes for the firms in our sample, to be able to distinguish firms with SIC codes representing high tech. This variable is included in previous research on IPOs (Loughran and Ritter, 2004), and in line with their research we argue that a tech company has a greater risk than a non tech company, as it is seen as more complex. We expect a positive relationship between tech and first day return.

$$TECH\ DUMMY\ = firms\ being\ classified\ as\ a\ high\ tech\ company$$

Table 2: Control variables expected signs

This table shows the control variables and their expected sign based on previous literature

Control Variable	Expected sign	Literature supporting
Assets	-	Loughran and Ritter, 2004
Age	-	Lowry et al 2010, Hanley et al 2012, Loughran and Ritter 2004
Firm Sales	-	Butler et al 2014, Ritter 1984, Loughran and Ritter 2004
Price to sales ratio	-	Butler et al 2014
Market return	+	Butler et al 2014
Tech dummy	+	Loughran and Ritter, 2004

4 Results

4.1 Descriptive statistics

As seen in Appendix 1 and 2, the portion of firms having foreign sales are approximately 55%, and the intensity of foreign sales is dependent upon the industry and year. The time period between 2014-2017 seems to be a boom regarding the IPO activity on the Swedish stock market. Notably, over the whole time period companies with foreign sales are slightly below 50% with the exceptions of 2014 (87.5%) and 2015 (78.9%). Notably, even though a large fraction of firms exhibited foreign sales in 2015 the intensity is lower than comparable years, with only two years exhibiting a lower fraction if 2012 is not considered. In our sample no observations are retrieved from 2012 as they were filtered out from the sample construction as they did not fill certain criteria we set up. The industries are reported according to Fama-French 12 industry categories. Firms are not fairly distributed among industries. Firms classified as business equipment and healthcare are common in our sample. Together they serve for 41.4% of the firms in our sample which have foreign sales.

Table 3: Descriptive statistics

This table shows descriptive statistics of the main variables used in this study. All continuous variables are winsorized at the 5th and 95th percentiles. The subset of IPOs includes only the IPOs which have foreign sales.

N = 127	Mean	Sd	Min	25th	Median	75th	Max
Dependent variables							
First day return	0.101	0.298	-0.872	-0.042	0.073	0.201	1.470
First day return Log $_w$	0.066	0.196	-0.326	-0.043	0.071	0.183	0.405
Independent variables							
Foreign sales	0.551	0.499	0	0	1	1	1
Foreign sales intensity	0.326	0.387	0	0	0.074	0.655	1
Foreign sales intensity $_w$	0.325	0.386	0	0	0.074	0.655	0.992
Foreign sales intensity $_w$ on subset	0.590						
Foreign sales inside Europe	0.220	0.416	0	0	0	0	1
Foreign sales worldwide	0.331	0.472	0	0	0	1	1
Control variables							
Assets Log $_w$	3.567	2.169	0.191	1.591	3.504	5.567	7.070
Age Log $_w$	2.737	0.893	1.386	2.079	2.565	3.367	4.543
Firm sales Log $_w$	2.868	2.742	-2.146	0.784	3.340	4.995	6.815
Price to sales ratio Log $_w$	0.396	1.618	-1.942	-0.883	0.210	1.598	3.656
Market return $_w$	0.005	0.037	-0.061	-0.021	-0.001	0.029	0.088
Tech dummy	0.433	0.497	0	0	0	1	1

As presented in Table 3, the average first day return is positive as expected, with a mean average first day return of 10.1%. This implies that the result presented in Table 3 is in line with the literature on Swedish initial public offerings, such as Rydqvist 8.0% (1990-1994), and Bodanurk et al 14.2% (1995-2001), stating that first day return is on average positive. Using a logarithmic function as well as winsorizing the variable first day return, the mean turns out to be lower at 6.6%. Our sample presents both positive and negative values on the variable first day return indicating, there are both underpricing and overpricing present in the sample. Further, from the

subsample of IPOs with foreign sales, the average foreign sales intensity was 59.0%, implying that firms with foreign sales have a large fraction of foreign sales to total firm sales.

The univariate analysis in Appendix 3 shows that the group with foreign sales consists of 70 firms, whilst the group without foreign sales consists of 57 firms. Mauer et al (2015) find foreign sales divided by total firm sales to be 33.7%. The difference between their finding and ours might depend upon their sample being retrieved from the US, the different time periods, and the size of the sample. Between the two groups firms with foreign sales and firms without foreign sales some differences can be perceived. First, the first day return is reported to be higher in general in the group without foreign sales as the mean is 7.0% compared to 6.3% in the group with foreign sales. Firms operating globally are reported to be older, have a larger share of assets and a larger fraction of firm sales. Firms with foreign sales also have an average lower price to sales ratio. The data set contains less firms being high-tech than firms that are not, as high-tech firms only correspond to 43% of the sample. These differences in means are significant and are in line with the findings of Mauer et al (2015). The median underpricing in the group with foreign sales is higher than the group without foreign sales. This finding is in line with the findings of Mauer et al (2015) but neither of us receive significance on the difference in median. Furthermore, four of the control variables (assets, age, firm sales and price to sales) show a significant difference in medians.

4.2 Correlation matrix

Table 4: Correlation matrix

This table shows the pairwise correlation of the main variables used in the study. A correlation which is equal to +1/-1, indicates either the strongest positive correlation (+1) or the strongest negative correlation (-1) between the two variables. All continuous variables are winsorized at the 5th and 95th percentiles. ***, **, * is used to denote significance at the 1%, 5% and 10% levels respectively.

	First day return	Foreign sales	Foreign sales intensity	Foreign sales inside Europe	Foreign sales worldwide	Assets	Age	Firm sales	Price to sales	Market return	Tech dummy
First day return	1										
Foreign sales	-0.017	1									
Foreign sales intensity	-0.030	0.764***	1								
Foreign sales inside Europe	-0.036	0.480***	0.025	1							
Foreign sales worldwide	0.013	0.634***	0.786***	-0.374***	1						
Assets	0.155	0.462***	0.356***	0.356***	0.175**	1					
Age	0.055	0.427***	0.358***	0.243***	0.237***	0.484***	1				
Firm sales	0.193**	0.584***	0.442***	0.394***	0.271***	0.882***	0.566***	1			
Price to sales	-0.185**	-0.391***	-0.239***	-0.348***	-0.108	-0.548***	-0.473***	-0.817***	1		
Market return	0.163*	0.162*	0.151*	0.187**	0.007	0.106	0.134	0.175**	-0.228***	1	
Tech dummy	-0.028	-0.138	-0.014	-0.273***	0.095	-0.486***	-0.256***	-0.382***	0.244***	-0.034	1

Table 4 presents the pairwise correlation matrix among variables and may denote whether certain variables should be further investigated. If any findings have a correlation exceeding 0.8, Grewal, Cote et al. (2004) assert that this could potentially indicate a problem with multicollinearity. This is further elaborated on in section 4.4.1.

Firm sales is the variable with the strongest correlation to the first day return of an IPO, significant at a 5% level. Firm sales, assets and age all have a positive correlation with first day return. Based on literature they were expected to have a negative correlation. Price to sales ratio has a rather high negative correlation with first day return, significant at 5%. This is in line with expected signs. Moreover, the variable market return also has a rather high significant correlation to the first day return. This finding suggests that market conditions correlate with the first day return as supported by Butler et al (2014). In contrast, Beatty and Ritter (1986) argue that

adjustments for market conditions are not necessary, as it will only lead to minor changes according to their findings. The correlation between tech dummy and first day return is negative. This was not in line with the expected sign based on previous studies. As the sign contradicted previous research whilst not being significant this could be an error attributed to our small sample.

Neither foreign sales dummy, foreign sales intensity, foreign sales inside Europe nor foreign sales worldwide dummy reveal a significant nor strong correlation to the first day return. The correlation between foreign sales and first day return, respectively foreign sales intensity and first day return, is negative, as expected in H1. However, these correlations lack significance. The variable foreign sales inside Europe has a negative correlation with first day return, but is not significant. Further, the variable foreign sales worldwide has a positive correlation with first day return, but also insignificant. Foreign sales dummy has a significant correlation with all variables except tech dummy and first day return. The high correlation between foreign sales dummy and foreign sales intensity comes to no surprise as firms engaging in foreign sales surely have a certain percentage of their revenue from there. To be able to draw further significant conclusions regarding the variables of interest and their relationship with the first day return, we need to perform regressions, including control variables as well as including other fixed effects.

Some significant relationships between control variables can be naturally explained. Assets and age have a rather high positive correlation supporting that older firms have more assets. Assets and firm sales have a high correlation (0.882). Assets and firm sales are often used as a proxy for firm size in corporate finance research (Dang et al, 2018). Consequently, a strong positive correlation between the two is logical to expect. Moreover, the high correlation between firm sales and price to sales ratio (-0.817) is reasonable as price to sales ratio depends upon the firm sales.

4.3 Regression results

Table 5: Regressions

This tables shows the regressions performed in the study. Model 1, 2, 3 and 4 tests H1. Model 5 and 6 test H2. All continuous variables are winsorized at the 5th and 95th percentiles. The t-statistic is presented in the parentheses. ***, **, * is used to denote significance at the 1%, 5% and 10% levels respectively.

First day return	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Foreign sales	-0.007	-0.112**				
	(-0.19)	(-2.45)				
Foreign sales intensity			-0.015	-0.110**		
			(-0.34)	(-2.00)		
Foreign sales inside Europe					-0.017	-0.130**
					(-0.37)	(-2.39)
Foreign sales worldwide					-0.001	-0.100**
					(-0.00)	(-2.00)
Assets		-0.047*		-0.041*		-0.045*
		(-1.96)		(-1.71)		(-1.84)
Age		-0.012		-0.013		-0.013
		(-0.51)		(-0.54)		(-0.54)
Firm sales		0.077***		0.066**		0.074**
		(2.65)		(2.34)		(2.51)
Price to sales		0.037		0.033		0.033
		(1.43)		(1.28)		(1.27)
Market return		0.805*		0.080*		0.832*
		(1.73)		(1.70)		(1.77)
Tech dummy		0.003		0.011		-0.001
		(0.08)		(0.28)		(-0.03)
Constant	0.070***	0.085	0.071***	0.070	0.070***	0.093
	(2.69)	(1.18)	(3.12)	(0.91)	(2.68)	(1.24)
Industry and year effects	No	No	No	No	No	No
Observations	127	127	127	127	127	127
R^2	0.0003	0.118	0.010	0.104	0.001	0.121
F	0.04	2.28**	0.11	1.97*	0.08	2.03**

Models 1, 2, 3 and 4 test H1, by regressing the proxies for global diversification against first day return. In model 1, foreign sales dummy is regressed against the dependent variable first day return, without any control variables nor fixed effects. This is to determine if there is significant explanatory power from this variable alone. From the regression it can be concluded that the foreign sales dummy has a negative coefficient, but close to nil, which is in line with our predicted H1. However, the results are not significant at a 10% level. Furthermore, the constant term is significant at 1%, implying that there are other variables in the residual that impact first day return. In this case, the omitted variables have more impact on first day return than foreign sales. When adding our set of control variables in model 2, the variable of interest, foreign sales dummy, is significant at a 5% level, with a negative coefficient. Consequently, it remains in line with H1. The variable firm sales is significant at 1%, and the variables market return and assets are significant at 10%. An increase in R^2 in model 1 (0.0003 to 0.1180) when adding the control variables, demonstrates that the control variables aid in explaining IPO underpricing.

In model 3, foreign sales intensity is regressed against the dependent variable first day return, without any control variables nor fixed effects. Similar to model 1, this is to determine if this variable alone provides any significant explanatory power. The foreign sales intensity variable has a negative coefficient, which is in line with H1 although insignificant. The model has a significant constant term at 1%. Consequently, there are other variables than the independent variable explaining more of the first day return. In model 4, control variables are added, making the variable of interest, foreign sales intensity significant at 5%. The negative coefficient further supports H1. The control variables assets and market return are significant at 10%, while the control variable firm sales is significant at 5%. There is an increase in R^2 from model 3 (0.010 to 0.104). Hence, when the control variables are added, the model is better at explaining the first day return.

In model 5, the independent variables foreign sales inside Europe and foreign sales worldwide are regressed against the dependent variable first day return, without any control variables nor fixed effects. Both foreign sales inside Europe dummy and foreign sales worldwide dummy have a negative coefficient, but neither is significant at a 10% level. When testing for the difference in means of the two coefficients, we are not able to reject that they are equal. Hence we can not find

support for H2. When adding the controls in model 6, the foreign sales inside Europe dummy and foreign sales worldwide dummy are significant at 5% and have negative coefficients. We find evidence that foreign sales inside Europe and foreign sales worldwide both decrease underpricing as the signs of the coefficients are negative and significant. This implies that foreign sales results in lower underpricing over the benchmark only sales within Sweden both when having sales only inside Europe and having foreign sales worldwide, supporting H2. The inability to reject that they are equal imposes difficulties as it hinders us to make further interpretations regarding if it results in lower underpricing having foreign sales worldwide or foreign sales only inside Europe. However, the regression supports that foreign sales either inside Europe or worldwide are beneficial over only sales within Sweden if wanting a more fairly priced IPO.

4.4 Statistical considerations

4.4.1 Multicollinearity

One potential concern regarding our results is the possible presence of multicollinearity. When two or more independent variables are highly correlated with each other, multicollinearity arises. High multicollinearity does not violate any of the OLS assumptions, but it will increase standard errors (Wooldridge, 2019). Accordingly, it can deem problematic to interpret the significance of the results. Farrar and Glauber (1967) conclude that the problem of multicollinearity is that it could lead to an inability to make a proper specification of how the independent variable contributes to the explanatory value of the model as it is hard to distinguish each variable's contribution.

According to Grewal, Cote et al. (2004) one indicator of multicollinearity is a correlation above 0.8 between predictor variables. By looking at the collinearity matrix in section 4.2, there are signs of multicollinearity, specifically between firm sales and assets (0.882) statistically significant at 1%, and firm sales and price to sales (-0.817) statistically significant at 1%. To further investigate multicollinearity, we construct variance inflation factors, VIF, for our models 2,4 and 6, presented in Appendix 5. Wooldridge (2019) suggests that an indication of serious multicollinearity is a VIF factor which is greater or equal to 10. Appendix 5 shows the variables' VIF factors and it becomes evident that the variable firm sales's VIF factor in all models is greater than 10. Farrar and Glauber (1967) conclude that multicollinearity can be tolerated among

non-critical variables, and that if critical variables are affected additional information is required. As the critical variables in our models, foreign sales dummy, foreign sales intensity, foreign sales inside Europe and foreign sales worldwide do not face multicollinearity, it can be tolerated.

4.4.2 Heteroscedasticity

Our OLS regressions are based on the assumption of homoscedasticity, which implies that the conditional variance of the error term is constant. If this is not the case, and model uncertainty is not identical across observations, heteroscedasticity is present. This may cause the variances to be larger than they should, and thereby may result in an inaccurate interpretation of statistical significance tests, such as t-tests and F-tests. The heteroscedasticity can be driven by unexplained errors in the residual. To test the presence of heteroscedasticity in our regressions, we perform a Breusch Pagnan test which is reported in Appendix 6. In all the models except for model 1, we fail to reject on a 5% that homoscedasticity is present, hence only model 1 exhibits heteroscedasticity. In model 1, as control variables are not accounted for, the residual accounts for unexplained factors of first day return. Heteroscedasticity disappears after adding control variables; thus the second model does not exhibit heteroscedasticity and therefore it is not deemed to be a problem in our regressions and interpretations.

4.4.3 Selection bias

Campa and Kedia (2002) concluded that the effects of global diversification might partly be a result of selection bias. According to the authors, certain firms self-select into global operations based on their firm characteristics. A quasi-experimental design is conducted in the form of propensity score matching in order to mitigate selection bias, as suggested by Rosenbaum and Rubin (1983). Mauer et al (2015) states that the main aim with performing a propensity score matching in a study investigating global diversification and underpricing is “to statistically replicate the undoable test of “treating” an observation (e.g. a firm going public) with an effect (e.g. international business activity) and comparing the outcome for the treated observation to what it would be if the same observation were untreated.” The propensity score model (appendix 7) is based on two of the covariates that we use as control variables, namely assets and firm sales. These covariates have been selected as they have the highest correlation to the independent variable foreign sales dummy, which can be seen in Table 4. In the univariate analysis in

Appendix 3, the difference in means of assets and firm sales, are significant at a 1% level. This implies that before performing propensity score matching, there are significant differences in assets and firm sales between the two groups.

We perform our analysis based on two factors, assets and firm sales as well as industry fixed effects. Ideally, we would perform PSM based on the whole set of controls. The reason for not using all the control variables, is because this would narrow our sample even further and consequently would decrease the number of observations quite dramatically. When executing propensity score matching each observation is matched to an observation of the other group, and if we are including more control variables, the test would be more robust in some ways, but at the disadvantage of an even smaller sample. There is a trade-off that needs to be taken into consideration, but with our original small sample size, having a vast amount of controls would make propensity score matching difficult to perform.

Based on the propensity score calculated in the model, nearest-neighbor matching has been performed to implement one-to-one matching. Replacement is allowed as an IPO in the control group can possibly be a match for more than one IPO in the treatment group. A balance test is performed to test if the difference in means in the two covariates assets and firm sales are insignificant in the treated and control groups. Appendix 7 panel B, shows that all passed the tests since the differences in means were insignificant. Notably, this was the only set of covariates where we were able to achieve an insignificant difference in means. As can be seen in Appendix 7 panel C, the result indicates that the treated group exhibits a lower first day return, further supporting H1. However, as our results are insignificant, it limits our ability to interpret the results. Again, the inability to interpret the results, as a consequence of insignificant results, is plausibly a consequence of our small sample size.

4.5 Robustness tests

The results from Appendix 8, shows a significant negative relationship between underpricing and global diversification when controls are included, in line with H1. However, one potential concern with our results is that time trends might affect our results. For instance, for the year 2013, there are only two firms present in our sample. Ritter (1984) and Loughran and Ritter

(1994) argue that companies time their offerings for when valuations are high, which is further supported by Ibbotson (1975). Ritter and Welch (2002) emphasize how IPO underpricing differs over time, and that the number of IPOs varies year to year. Thus, to ensure that our results are not driven by time trends we repeat our main analysis with year fixed effects. Further, we perform the same test with industry fixed effects to ensure that different industries do not drive the result rather than our independent variables, as certain industries are more common in our sample.

After adjusting for industry and year fixed effects, the independent variables; foreign sales dummy and foreign sales intensity, remain significant as can be seen in Appendix 8. Foreign sales dummy is significant at 10% and the intensity foreign sales is significant at 5%. As the significance is kept when adding both industry and year fixed effects, this implies that foreign sales have explanatory value even when adjusting for these effects. However, the coefficient of foreign sales dummy changes from -0.112 to -0.105. This infers that the variable has a lower impact and explanatory value on the first day return. The coefficient of foreign sales intensity has on the other hand changed from (-0.110 to -0.139), meaning that the explanatory power of the intensity variable has increased. In model 9, the variable foreign sales inside Europe is significant at a 10% level. However, the variable foreign sales worldwide loses its significance, implying the result might be driven by year and industry fixed effects rather than the independent variable. Tests for multicollinearity and heterogeneity tests for the models are presented in Appendix 5 and 6, and since it does not indicate to be an issue in regards to the models it is not further elaborated on.

5 Analysis

5.1 Research method

5.1.1 Data selection

One of the main concerns of this thesis is the prevalence of a rather small sample as it only consists of 127 observations. We are aware of this econometric problem, and that this potentially is creating biases and poses difficulties in obtaining significant results. There is a trade-off between being able to control the sample and having a larger sample, with arguments against and for. Much of the reduction of observations depends on the short time period of our study as a

consequence of us wanting to control the data set. Compared to Mauer et al (2015) we naturally have a limited number of observations as they perform their study on US firms whilst we perform it in Sweden. As there are more IPOs in the US, as well as the authors conducting their study over a longer time period, they naturally receive a larger sample. To expand the data set further one plausible solution could have been to include Nordic countries as these are also present on Nasdaq's portal. In our thesis we want to assess what impact global diversification has specifically on the Swedish market, and therefore the purpose of the thesis would have to be adjusted if reconstructing the sample. Besides, there might exist other error terms to correct for if including other countries.

Another reduction of the data set that could have been eliminated is the removal of firms where Capital IQ did not report foreign sales for the year of the IPO. There is a plausible reason that there might be errors in the database and that companies have been excluded wrongfully. There might exist a pattern among the wrongfully removed observations, which could have been accounted for. If this is the case, it could be argued that the sample collection was not random but rather experienced a selection bias. To correct for the potential selection bias, we performed propensity score matching, and were able to achieve insignificant differences between the treated and control group for assets and firm sales. However, as can be seen in Appendix 7 panel C the differences in mean underpricing in the treated and control groups is not significant. Thus, we are unable to draw further meaningful conclusions.

5.1.2 Issues related to proxies for global diversification

Endogeneity issues are concerned with variables that the model is supposed to determine, endogenous variables, and whether they have an impact of explaining the dependent variable, in our case IPO underpricing. When constructing a regression model, there is a potential risk not including an explanatory variable, called the omitted variable bias. The excluded variables could lead to the regression model over-or underestimating the effect of the included variables. In our case foreign sales might not be the explanatory variable, as it might be influenced by other variables outside the model. There might exist unexpected behavior between variables that one has to account for (Chang et al, 2016).

Previous research regarding diversification and firm value finds that they might be endogenously related. Denis et al (2002) mention that lower valued firms might choose to diversify, or firms diversify by purchasing lower-valued firms. Lang and Stulz (1994) find that firms perform poorly already before the firm is diversified, indicating that it is not the diversification aspect per se that affects why diversified firms perform poorly. Further they conclude that firms which diversify tend to be in slow-growing industries, and that they might seek growth opportunities through diversification. The arguments elaborated on above suggest that certain types of firms choose to diversify. Campa and Kedia (2002) argue that firms choose to diversify when the benefits of global diversification outweigh the costs. They suggest that researchers should take firm-specific characteristics which affect firm value and the decision to diversify into account, to fully determine the effect of diversification on firm value. They argue that when controlling for the observed firm characteristics and firm fixed effects, global diversification is a value-enhancing strategy. In other words, Campa and Kedia (2002), argue that the endogeneity of the diversification decision must be considered. Santos et al (2008) conduct a robustness test to control for endogeneity as suggested by Campa and Kedia (2002) to determine whether it has an impact. However, they do not find support for unobserved firm-specific characteristics having an explanatory value of the valuation effects of global diversification.

It would be desirable to control for the potential endogeneity issue through for example instrumental variables as suggested by earlier research (Campa and Kedia 2002, Mauer et al 2015), for example productivity and industry trade openness (Melitz, 2003 and De loecker, 2007). However, the data availability of the instrumental variables is a limiting factor as both Campa and Kedia (2002) and Mauer et al (2015) retrieve this information from Compustat which includes firms from the United States. After extensive research we were not able to retrieve similar data for Swedish firms, which is a limiting factor of this thesis. Instead, we attempt to manage the problem with endogeneity somehow through the robustness test in section 4.5 where we incorporate industry fixed effects. However, we are aware that one way to control for endogeneity in global diversification research, would be to include instrumental variables.

5.1.3 Selection of control variables

When selecting the control variables for our study, extensive research was done on previous literature on IPO underpricing, to find which determinants that are deemed to be important in

explaining first day return. Though there are several different control variables used in research, the robust determinants as suggested by Butler et al (2014) appear in a vast majority of the recent research on IPO underpricing. However, due to aspects such as time, scope, resources, and ability to collect data, it was difficult to include all the variables. Specifically, since our study is conducted on the Swedish exchanges, much of the data which is available for US companies, was to our knowledge not available for Swedish companies. Hence, we included three of the variables from Butler et al (2014) and added three others which frequently appear in IPO literature (Loughran and Ritter 2004, Lowry et al 2010), and are argued to have explanatory power for first day return. Not including a large amount of control variables, implies that we could neglect additional variables which can make the models better at explaining first day return. Furthermore, not including all control variables could result in the effect of our independent variables to be seen as higher or lower than what it actually is as a result of the omitted variable bias. This is important to acknowledge when interpreting our results.

5.2 Analysis of results

5.2.1 Hypotheses 1

Both our independent variables (foreign sales dummy and foreign sales intensity) show the intended signs as expected in H1 in all our models. Model 2 suggests that foreign sales dummy has a coefficient of -0.112 and a t-score of -2.45, hence significant at a 5% level. This result suggests that a firm which is globally diversified has a lower first day return than firms without foreign sales. In model 4 the coefficient for foreign sales intensity is -0.110, indicating that the first day return is lower for firms having a higher percentage of foreign sales compared to firms with a lower percentage. This coefficient has a t-score of -2.00, indicating that it is significant at a 5% level.

The variables foreign sales dummy and foreign sales intensity are only significant when controls are added. This could be a result of the fact that the omitted variables in models 1 and 3 have a substantial impact on the dependent, making the magnitude of the impact of the variable of interest insignificant. The problem with the potential omitted variable bias is that it might overestimate or underestimate the strength of the effect of the variable and can even change the sign of the variable of interest. As the results are only significant with controls, this indicates that

global diversification by itself does not provide explanatory value as the residual accounts for most of the explanatory value. However, when adding controls, they contribute to explain parts of the residual giving the model statistical significance. One additional reason why the variables of interest, proxies for global diversification, are only significant when the controls are added, is due to the fact that the control variables might correlate with the variable of interest.

Our findings are in line with the research of Mauer et al (2015) who also found results indicating that foreign sales correspond negatively to the first day return of an initial public offering. Furthermore, the negative sign of the coefficient for the variable foreign sales intensity is also in line with previous research (Mauer et al, 2015). As discussed earlier there might be an alternative explanation to the IPO being more fairly priced with foreign sales. As suggested by Campa and Kedia (2002) there might be a certain type of firm engaging in foreign operations with desired characteristics leading to a lower first day return. This could have been accounted for by for example instrumental variables, but due to the lack of available data such tests have not been performed as further elaborated in section 5.1.2. When adding year and industry fixed effects, the significance of the variable of interest remained, which is in line with Mauer et al (2015). This indicates that industry nor year are the driving effects of the result.

5.2.2 Hypothesis 2

Furthermore, we hypothesized that firms with foreign sales inside Europe will face lower underpricing than firms with foreign sales worldwide. We argue that there might exist benefits of diversifying to foreign countries inside Europe as there is a potential for broader revenue streams, whilst being subject to trade benefits through the European Union. Moreover, we suggest that trade outside of the union might lead to complex organizational structures that can lead to increased agency costs. The results of the regressions for this hypothesis were presented in model 5 and 6. Model 6, including controls, showed that both independent variables, foreign sales inside Europe and foreign sales worldwide, have a negative coefficient, and are significant at 5%. When testing for the difference in the means of the two coefficients, we were not able to reject that they are equal. Therefore, we can not draw any meaningful conclusions whether it results in lower underpricing if having foreign sales inside Europe or worldwide. Consequently, we do not find support for H2. Our inability to reject the null hypothesis could partly be attributed to our small

sample. Moreover, the lack of previous research on the effects on underpricing of sales in specific geographical areas, results in difficulties in making comparisons with previous literature.

5.2.3 Control Variables

Assets In all performed regressions, the variable assets display a negative coefficient. Furthermore, it is significant at 10% in models 2, 4 and 6. Accordingly, in these models it is possible to draw some conclusions about the variables impact on first day return. The variable assets is used as a control variable in previous IPO literature (Loughran and Ritter 2004, Helwege and Liang 2004), as assets is frequently used as a proxy for firm size in corporate finance literature (Dang et al, 2018). The results in our models support that an increase in assets implies a decrease in first day return. The negative coefficient is in line with the results of previous research, as well as our predicted sign. However, in models 7,8 and 9, the coefficient is negative but lacks significance, and in these specific models we can not draw any conclusions on the impact on the first day return.

Age The variable age shows a negative coefficient in all performed regressions. This is in line with expectations, and also consistent with the results in previous research on IPO underpricing (Lowry et al 2010, Loughran and Ritter 2004, Carter and Manaster 1990). Older companies are perceived as less risky for an investor, which suggests a lower first day return (Loughran and Ritter, 2004). As the control variable is never significant at a 10% level, it poses difficult to conclude what impact the variable has on the first day return.

Firm sales The variable firm sales is significant at 10% in all models with a positive coefficient. The variable is a robust determinant of IPO underpricing according to previous research (Butler et al, 2014). It is frequently used in studies on IPO underpricing (Ritter 1984, Loughran and Ritter 2004, Mauer et al 2015). However, these papers indicate the opposing finding for the variable compared to ours. Hence, they suggest a negative relationship between first day return and firm sales. The deviating sign could potentially be a result of our small sample.

Price to sales ratio The variable price to sales ratio has a positive coefficient in all our models. Nonetheless, none of these are significant at a 10% level. Price to sales is a robust determinant of

underpricing in IPO literature and frequently used by scholars (Butler et al 2014, Mauer et al 2015). Moreover, in previous papers the price to sales variable has an inverse relationship with first day return. However, since none of our results are significant, it becomes difficult to make any noteworthy conclusions about the variable and its power to explain the first day return.

Market return In model 2, 4 and 6 the variable market return is significant at 10% with a positive coefficient. This is in line with previous literature, such as Butler et al (2014). When adding the industry and year fixed effects, the variable market return loses its significance. This implies that in our models the results are driven by industry and year rather than market conditions.

Tech Previous research (Loughran and Ritter 2004, Lowry et al 2010) argues that high tech companies seem to be more risky and complex. The uncertainty tends to lead to high tech firms having a higher first day returns. Thereupon, a positive relationship between first day return and tech companies is expected. In the models testing H1, tech dummy has a positive coefficient, but not significant at a 10% level. This is in line with the previous research. In model 6, testing H2, the variable tech dummy has a negative coefficient, though it is very close to nil. It is not significant at a 10% level. In model 9, testing H2 with year and industry fixed effects, tech dummy has a positive coefficient but lacks significance. The lack of significance in the tech dummy variable in any of our models, makes it hard to draw any meaningful conclusions.

5.2.4 Statistical considerations

As has been discussed in section 4.4.1, there are indications that multicollinearity might be present in our sample. We believe this is not a problem as it does not concern our variable of interest. The reason for the potential existence of multicollinearity is most likely due to our small sample size. One way to decrease multicollinearity could be to increase the sample size. However, as previously mentioned, our sample size is chosen with great caution and an increase in the sample size would mean offsetting some of the benefits with smaller size, for example being able to manually check all data against several sources. Furthermore, to have a more robust regression, one idea could be to drop one of the control variables (Woolridge, 2019). Therefore, as we decide not to drop any of the control variables or to increase sample size, it is important to

keep in mind that the coefficients in the model might be poorly estimated and show caution in the interpretation of its t-value.

6 Conclusion

This thesis aims at researching whether global diversification is an explanatory variable of the first day return of an initial public offering. Previous literature has found that information asymmetry explains to IPO underpricing, and that when ex-ante uncertainty increases the underpricing increases (Beatty and Ritter, 1986). We hypothesized that a globally diversified firm could signal a promising future prospectus of the firm as the revenue streams are more diverse. Consequently, we argue that a decrease in the uncertainty of the firm at the time it goes public could contribute to lower underpricing. Due to scholars not being in unity in regards to global diversification's impact on firm value and attributed from firm risks, the question whether a globally diversified firm has a higher first day return is to its extent an empirical question.

This study finds evidence supporting that firms with foreign sales have a lower first day return, hence are more correctly priced from the beginning. These results are significant at 5% and remain significant when controlling for industry and year fixed effects. Furthermore, we find support that underpricing of the shares is lower if the intensity of foreign sales increases, with the findings being significant at 5%. The support found for the inverse relationship between global diversification and IPO underpricing, is consistent with the only previously conducted study on the subject, Mauer et al (2015). To further advance the research on global diversification and its implications, we assess whether there is a difference in the effect of underpricing if having foreign sales only inside Europe or foreign sales worldwide. Our result suggests that the underpricing is lower if the firm has foreign sales either inside Europe or worldwide, and the findings are significant at 5%. This suggests that an IPO is more fairly priced if it has foreign sales over only having sales within Sweden. However, we were not able to find support for whether having foreign sales inside Europe or worldwide, results in less underpricing, if either.

Our findings could be of interest to various stakeholders such as; key persons at the issuing firm, investors and underwriters. Specifically, managers responsible for strategic decisions could benefit from knowledge on how the strategic choice of globally diversifiying affects the

underpricing of an initial public offering if a firm is considering going public. Furthermore, it can be of particular interest to future researchers, both on the subject of IPO underpricing and the area global diversification. Scholars have not yet reached a consensus on the implications being a multinational firm has on firm value, nor on the benefits and costs associated with having foreign operations. As researchers are not in unity, this thesis can contribute with additional perspectives on the effects of multinational firms by generating more recent research on global diversification.

6.1 Future research

The results that have been gathered in this study imply that there are future research areas to be explored in relation to global diversification and IPO underpricing. First, as we were not able to find support for whether having foreign sales in Europe or foreign sales worldwide results in an offering being more fairly priced, this provides an interesting topic to be subject to future research. Since the relationship between the first day return and foreign sales might vary by the geographical region where the foreign sales are conducted, it would be interesting to further investigate which regions these are and the reasons behind this.

Second, as this study was conducted on the Swedish market, it would be intriguing to see if the same results are found on other markets. To our knowledge, only one similar study has been conducted, specifically it has been performed on the United States market. It follows that there are several possibilities to examine the relationship between first day return and global diversification on other markets to see if the results remain robust and find further support for global diversification as a robust determinant of IPO underpricing. Moreover, it would be interesting to assess whether the domestic market impacts the importance of foreign sales in relation to IPO underpricing.

Third, this thesis only investigates the short-term performance of global diversification, by examining the effect on IPO underpricing. One potential future research topic is to investigate the effects on the long run performance of firms which are globally diversified in comparison to other firms. To further drive forward the discussion around global diversification and its effect on firm value, as well as the perceived benefits and costs, an analysis on the long-term performance could provide interesting insights.

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8 Appendix

Appendix 1
The distribution of firms with foreign sales and the average foreign sales intensity over the years 2012-2020.

	Number of IPOs	Foreign sales	Average foreign sales intensity
2012	0	0	0
2013	2	1	0.139
2014	16	14	0.678
2015	19	15	0.534
2016	20	9	0.683
2017	35	16	0.540
2018	14	5	0.492
2019	12	5	0.617
2020	9	5	0.601
Total	**127**	**70**	**0.536**

Appendix 2
The distribution of firms with foreign sales and the average foreign sales intensity according to Fama French 12 industries.

	Number of IPOs	Foreign sales	Average foreign sales intensity
Consumer nondurables	4	3	0.443
Consumer durables	3	0	-
Manufacturing	14	8	0.760
Oil, gas and coal extraction	2	1	0.799
Chemicals and allied products	4	1	0.969
Business Equipment	25	15	0.763
Finance	15	10	0.399
Telephone and television	1	1	0.717
Wholesale and retail	9	5	0.448
Health care, medical equipment and drugs	30	14	0.609
Utilities	0	0	-
Other	20	12	0.440
Total	**127**	**70**	**0.635**

Appendix 3

This table shows a univariate analysis which shows the descriptives between the two groups; firms with foreign sales and firms without foreign sales. The significance of the difference is based on a t-test that assumes unequal variances across groups when a test of equal variances is rejected at a 10% level. The significance of the difference in the median is tested using the nonparametric Wilcoxon Rank sum test. First-day return, age, market return are the variables where an unequal variance test has been performed. All continuous variables are winsorized at the 5th and 95th percentiles. ***, **, * is used to denote significance at the 1%, 5% and 10% levels respectively.

	Firms with Foreign Sales			Firms without Foreign Sales				
N = 127	Mean	Median	Sd	Mean	Median	Sd	Difference in mean	Difference in median
First day return	0.063	0.08	0.021	0.070	0.05	0.030	-0.007	-0.03
Assets	4.467	4.58	1.960	2.460	1.81	1.894	2.007***	2.77***
Age	3.080	3.02	0.924	2.316	2.20	0.646	0.764***	0.82***
Firm sales	4.308	4.54	2.008	1.099	0.95	2.483	3.208***	3.59***
Price to sales ratio	-0.173	-0.51	1.190	1.094	1.13	1.803	-1.267***	-1.64**
Market return	0.011	0.00	0.040	-0.001	-0.00	0.033	0.012*	0.00
Tech dummy	0.371	-	0.487	0.509	-	0.504	-0.137	-

Appendix 4

This table shows the test for the difference in means of coefficients, where H_0: Equal difference in means between foreign sales inside Europe and foreign sales worldwide

	Model 5	**Model 6**	**Model 9**
Prob > F	0.7292	0.5425	0.813

Appendix 5

Variance inflation factors (VIF) for the variables in models 2,4,6,7,8 and 9. Mean VIF is also provided.

	Model 2	**Model 4**	**Model 6**	**Model 7**	**Model 8**	**Model 9**
Foreign sales	1.84			2.07		
Foreign sales intensity		1.54			1.84	
Foreign sales inside Europe			1.79			1.89
Foreign sales worldwide			1.96			2.64
Assets	9.5	9.15	9.72	1.47	11.91	13.16
Age	1.52	1.52	1.52	2.07	2.07	2.09
Firm sales	22.13	20.63	22.72	29.67	28.29	32.41
Price to sales	5.98	6.03	6.24	7.47	7.52	8.22
Market return	1.07	1.07	1.08	1.47	1.47	1.52
Tech dummy	1.35	1.38	1.39	2.53	2.56	2.62
Mean VIF	6.2	5.91	5.8	6.95	6.87	6.97

Appendix 6

Breusch Pagnan tests for heterogeneity, where H_0: Homoscedasticity.

	Breusch Pagnan
Model 1	0.037
Model 2	0.306
Model 3	0.335
Model 4	0.075
Model 5	0.114
Model 6	0.338
Model 7	0.948
Model 8	0.340
Model 9	0.995

Appendix 7

This table shows the propensity score matching to correct for selection bias in the relation between global diversification and IPO underpricing. All continuous variables are winsorized at the 5th and 95th percentiles. The treatment group is IPOs with foreign sales that is compared to the control group of IPOs without foreign sales. ***, **, * is used to denote significance at the 1%, 5% and 10% levels respectively.

Panel A. Logit model estimations used to predict foreign sales for propensity score matching

	Coefficient	Z-statistic
Assets	-0.404*	-1.67
Firm sales	0.935***	4.08
Industry Effects	Yes	
Pseudo R^2	0.324	
Chi-square R^2	54.66***	
Observations	123	
Untreated	54	
Treated	69	

Panel B. Balance test: Mean comparison of covariates from Logit model in Panel A

	Treatment group	Control group	Difference	t-statistic
Assets	4.430	4.720	-0.290	0.050
Firm sales	4.283	4.268	-0.422	-0.940

Panel C. Average first day return for treatment and control firms

One-to-one match	Treatment group	Control group	Difference	z-statistic
	6.42%	7.37%	0.009	0.050

Appendix 8

This table shows the robustness regressions performed in the study. Model 7 regresses foreign sales dummy against first day return with controls and industry respectively year fixed effects. Model 8 regresses foreign sales intensity against first day return with controls and industry respectively year fixed effects. Model 9 regresses foreign sales inside Europe dummy and foreign sales worldwide against first day return with controls and industry respectively year fixed effects. All variables except dummy variables are winsorized at the 5th and 95th percentiles. The t-statistic is presented in the parentheses. ***, **, * is used to denote significance at the 1%, 5% and 10% levels respectively.

First day return	**Model 7**	**Model 8**	**Model 9**
Foreign sales	-0.105**		
	(-2.13)		
Foreign sales intensity		-0.139**	
		(-2.30)	
Foreign sales inside Europe			-0.112
			(-1.97)*
Foreign sales worldwide			-0.097
			(-1.65)
Assets	-0.035	-0.032	-0.032
	(-1.25)	(-1.19)	(-1.14)
Age	-0.015	-0.016	-0.014
	(-0.54)	(-0.59)	(-0.51)
Firm sales	0.071**	0.067**	0.068*
	(2.08)	(2.10)	(1.91)
Price to sales	0.031	0.034	0.029
	(1.08)	(1.16)	(0.95)
Market return	0.517	0.506	0.541
	(0.93)	(0.92)	(0.95)
Tech dummy	0.009	0.017	0.006
	(0.16)	(0.36)	(0.11)
Constant	0.010	-0.049	0.009
	(0.05)	(-0.25)	(0.05)
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Observations	127	127	127
R^2	0.22	0.226	0.221
F	1.20	1.24	1.15

Appendix 9
Definitions of variables used in the models.

Variable	Definition
First day return	Log of 1 plus closing price minus offering price divided by the offering price.
Foreign sales	Foreign sales outside of Sweden at the time of the IPO. Constructed as a dummy variable, given a 1 if the company has sales outside of Sweden. Otherwise, given a 0.
Foreign sales intensity	Defined as sales outside Sweden divided by total sales.
Foreign sales inside Europe	Foreign sales inside Europe at the time of the IPO. Constructed as a dummy variable, given a 1 if the company has foreign sales inside Europe, and 0 if only sales inside Sweden or if the foreign sales are worldwide.
Foreign sales worldwide	Foreign sales worldwide at the time of the IPO. Constructed as a dummy variable, given a 1 if the company has foreign sales worldwide, and 0 if only sales in Sweden or only foreign sales inside Europe.
Firm assets	Defined as Log of firm total assets. Defined as Issuer LTM Financials - Total assets (at announcement) in USDmm.
Firm age	Defined as Log (1 + firm age), where firm age is defined as year IPO issued - year company founded.
Firm sales	Defined as Log of firm sales. Defined as the Issuer LTM Financials total revenue (at announcement) in USDmm.
Price to sales ratio	Defined as Log of offer price times shares outstanding divided by annual firm sales.
Market Return OMX 30 days prior	Defined as the market return of OMX 30, 30 days prior to the IPO.
Tech dummy	Tech defined from SIC code suggested by Kile and Phillips (2009). Constructed as a dummy variable, given a 1 if the firm is a high-tech firm based on the SIC code. Otherwise, given a 0.

All variables are retrieved from Capital IQ.