Aalto University
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CLUSTERING OF GROSS SPREADS IN U.S. AND EUROPEAN IPOS

Evidence from the Era of the Rising Network Economy

Master's Thesis
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Abstract of master's thesis

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Abstract

I show that the "7% solution" of U.S. IPO gross spreads clustering at exactly seven percent level persists during my sample period of 2008-2018. In the $25-100 million USD issue size class, the proportion of 7.00% gross spreads is over 80% in U.S. issues. Compared with the U.S., the median gross spreads remain significantly cheaper in Europe during 2008-2018. The difference, varying between 0.25-3.25%, persists even after controlling for size, time and country effects. A "3% wedge" no longer exists between U.S. and European gross spreads. Moreover, by utilising a sample of hand-collected data, I find that the founder-managers with controlling voting rights do not achieve lower gross spreads relative to their peers.

Keywords clustering, gross spread, fee, initial public offering, IPO, underwriter, founder-manager, unicorn, United States, Europe

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Tiivistelmä

Osoitan, että niin kutsuttu ”seitsemän prosentin ratkaisu”, jossa listautumisantien bruttomarginaalit klusteroituvat Yhdysvaltojen markkinoilla tasan seitsemässä prosentissa, vallitsee edelleen tutkimusperiodini aikana vuosina 2008–2018. Tasan seitsemän prosentin bruttomarginaalien osuus on yli 80 prosenttia 25-100 miljoonan Yhdysvaltain dollarin emissiokokoluokassa. Yhdysvaltoihin verrattuna mediaanibruttomarginaalit ovat edelleen huomattavasti matalampia Euroopassa vuosina 2008-2018. Mediaanibruttomarginaalien erotuksen vaihteluväli on 0,25-3,25 prosenttia, huolimatta listautumisannin koosta, ajankohdasta tai Euroopan maasta. Yhdysvaltain ja Euroopan bruttomarginaalien välillä ei enää ole havaittavissa ”kolmen prosentin kiilaa”. Lisäksi, hyödyntämällä käsin kerättyjen tutkimusotosta huomaan, että äänivallan enemmistöä hallitsevat perustaja-johtajat eivät saavuta alhaisempia bruttomarginaaleja vertailukumppaneihinsa nähden.

Avainsanat klusteroituminen, bruttomarginaali, kustannus, listautumisanti, listautumisannin vakuutuksenantaja, perustaja-johtaja, yksisarvinen, Yhdysvallat, Eurooppa

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1. INTRODUCTION

I show that the "*seven percent solution*" persists to this day, based on my analysis of gross spreads of 1450 initial public offerings ('IPOs') in United States ('U.S.') and Europe from 2008 to 2018. Originally documented by Chen and Ritter (2000) and confirmed by Abrahamson, Jenkinson and Jones (2011), the '7% solution' refers to the U.S. gross spreads clustering at the exactly 7% level. I find that it is still present in the U.S. issues (IPOs), especially in the 'Small' $25 million to $100 million of total IPO proceeds class but can be found in other size classes as well. Despite not as extremely predominant as before, the proportion of 7.00% gross spreads is very high, on average greater than 80% in 2008-2018 in the U.S. Small issues.

The European median gross spreads remain significantly smaller compared with the U.S. ones during my sample period of 2008-2018. This difference varies between 0.25% and 3.25%, even after controlling for all issue sizes, time periods and European national markets. However, a certain "*3% wedge*", as coined by Abrahamson, Jenkinson and Jones (2011), no longer exists between U.S. and European issues. A striking example of the disparity between U.S. and European fees are the IPOs of Altice. Altice Europe went public on Euronext in 2014 with a 1.50% gross spread. Three years later, Altice USA, the exact same business but located in the U.S., was listed on NYSE in 2017 and had to pay a 3.30% gross spread instead, more than double what was demanded in Europe.

Considering the effects of different issue characteristics, I find that technology companies pay slightly higher gross spreads than their non-technology peers. This result is statistically significant and in line with results of Abrahamson, Jenkinson and Jones (2011). This 'technology effect' is also present in the gross spreads of the IPOs of so-called '*unicorns*'[1], technology companies with issue sizes over $1000 million. They pay lower fees to the underwriters due to their exposure to the 'size effect' of larger issues that have smaller gross spreads, but, in the end, slightly higher than their similarly sized peers due to their exposure to the 'technology effect'. Even the founder-managers of technology companies that retain control over the companies' businesses seem to not be able to avoid paying the 'technology premium'. Also, contrary to expectations, founder-manager-controlled companies do not have similar success as with earlier investors when negotiating with the

[1] The term "*unicorn*", originally meaning a start-up company with an over $1000 million valuation, was first coined by Cowboy Ventures founder Aileen Lee in her 2013 TechCrunch article "Welcome To The Unicorn Club: Learning From Billion-Dollar Startups." and has remained in use ever since.

underwriters over the gross spreads, and do not achieve smaller gross spreads than their control group. Similar to the '7% solution' and the difference between U.S. and European gross spreads, the results regarding different issue characteristics are also mostly consistent over time, issue size and different European markets on the national level.

My thesis was motivated by the spectacular success the 'FAANG[2]' companies have had after the financial crisis of 2008-2009. One similarity between the FAANG companies is that their business decisions are still heavily influenced by their founder-managers (excluding Apple's), even after several funding rounds and the IPOs. This unusual attribute inspired me to investigate the effect of the founder-managers with controlling voting rights on their companies' IPO fees. Moreover, the FAANG companies' business models are largely based on valuable information produced by their extensive data collection. In broader context, these business models are based on networks enabled by modern information technology, on one way or another. The prominence of these companies has indisputably increased during the time after the financial crisis coinciding with and constituting for my sample period of 2008-2018.

My research objective was to find out whether or not the significant negotiation power wielded by the founder-managers of companies whose business models are based social networks and enabled by modern information technology had affected the gross spreads charged by the organisers, the underwriters of IPOs. Moreover, I wanted to define if the clustering of the IPO fees observed previously both in the U.S. and Europe (e.g. Chen and Ritter (2000), Torstila (2003), Abrahamson, Jenkinson and Jones (2011)) still persisted to this day, and on what levels the clustering took place, if it any longer took place. The focus of this thesis was on the U.S. and European IPO markets, both being the largest and most prominent financial markets of the world, and due to the availability of precise IPO data from both markets. The sample period that was selected was from 2008 to 2018, as the importance of the information and communication technology sector in the global economy had increased significantly after the financial crisis of 2008-2009, and would also most likely continue to do so in the foreseeable future (for example, Jorgenson and Khuong, 2016). Moreover, to some extent, I intended my thesis to be a follow-up study to the ones by Abrahamson, Jenkinson and Jones (2011) and Chen and Ritter (2000). Thus, my sample period complements their sample periods of 1998-2007 and 1985-1998, respectively.

[2] The 'FAANG' group are the U.S. companies Facebook, Amazon, Apple, Netflix and Google (renamed to Alphabet in 2015).

Regarding methodology, my results were obtained with figurative, clustering and regression analysis. The regression analysis was done via multivariate ordinary least squares (OLS) regression analysis on the gross spreads, with a model that followed the one used by Abrahamson, Jenkinson and Jones (2011). With the regression analysis, I found out how the negotiation power of the founder-managers and other issue characteristics affected the gross spreads, the fees charged by IPO underwriters. When I evaluated the prior evidence available before conducting my analysis, I set the following hypotheses: 1) U.S. IPOs will have higher gross spreads (will be more expensive) than European ones, 2) IPOs with larger market capitalisations will have smaller gross spreads, 3) Technology IPOs will have smaller gross spreads than otherwise similar IPOs, 4) IPOs of companies controlled by founder-managers will have smaller gross spreads than otherwise similar IPOs, and 5) IPOs of 'unicorn' companies will have the smallest gross spreads.

The contribution of this study is to offer a deeper insight on how the significant negotiation power of the founder-managers of (technology) companies has affected the gross spreads of IPOs in the recent years. I seek to answer this question by utilising a hand-collected sample of 84 IPOs of companies controlled by founder-managers before, and in some cases, also after the issue. Additionally, I produce updated data of the levels on which the gross spreads have been on the European and U.S. IPO markets during my sample period of 2008 to 2018, and how different issue characteristics have influenced the gross spreads. Previously, the study on IPO gross spreads has focused on the hypotheses of explicit or implicit collusion between the IPO underwriters. I am approaching the phenomenon of high IPO gross spreads clustering around certain levels from a new angle, motivated by the rise an economic system based on networks, and the powerful founder-managers of the star companies of this new economy. Therefore, this thesis contributes to the existing equity market research on IPOs and IPO fees.

The thesis is structured as follows: In Section 1, I present the main results and discuss my contribution to existing research. In Section 2, I lay the background on the subject and review the most relevant literature about the clustering of the IPO fees. In Section 3, I set the hypotheses for this study based on prior research. In Section 4, I present the IPO gross spread data utilised in the analysis. In Section 5, I introduce the methodology of the thesis. In Section 6, I analyse and present the results. In Section 7, I compare the results vis-a-vis my hypotheses. Finally, Section 8 concludes the thesis.

2. LITERATURE

In this section, I start by laying the background for my thesis topic, from which the motivation to study the potential effects of founder-managers' negotiation power on the gross spreads is derived from. I explain the significance of the rising network economy and its star players, the huge technology-based 'unicorn' companies. I study the basis on which the strong negotiation power of the founder-managers is based on. Furthermore, I disclose how the fees and gross spreads of the initial public offerings (IPOs) are set by the organisers of the IPOs, the underwriters, after which prior evidence of the clustering of these gross spreads at certain integer levels is presented. Also, I dig into the proposed hypotheses and verified theories in earlier studies for the reasons behind this clustering. Finally, I recount the differences between European and U.S. IPO markets based on existing research.

2.1. Background

The idea to investigate the effect of founder-managers with controlling voting rights on the gross spreads of their companies' IPOs came from the tremendous success the FAANG companies have had after the financial crisis of 2008-2009. Their success also coincides with the rise of a 'new' economic system based on collecting data and refining it into valuable information. The business models of these companies are based on networks enabled by modern information technology, on one way or another. Further, what is also special about these kind of 'star' companies, is the fact that many of the companies are still controlled by founder-managers after several funding rounds, that usually dilute the founders' equity shares, and even after the companies' public listing through an IPO.

2.1.1. The post-industrial network economy

Although the idea of a services and information-based economy was already presented in 1974 by American professor Daniel Bell in his book "The coming of post-industrial society", only today, 46 years after its publication, are we truly beginning to notice the true scale of changes our economy has underwent since then and which will most likely continue to take place in the foreseeable future. In the late 1990s, during the early build-up of the infamous dot-com bubble, the French sociologist Manuel Castells further analysed the importance of information and networks in the post-industrial economy in his trilogy of books "The rise of the network society" (first published in 1996-1998, 2nd largely revised edition published in 2010). In his work, Castells (2010) explains how the economy will be based on and functions through networks as opposed to individuals (i.e. corporations and consumers), which is enabled by modern information technology like the Internet.

Nowadays most individuals living in the advanced economies are familiar with networks based on the modern information technology. For instance, according to the Internet World Stats (2020), 87% of Europeans and 95% of North Americans were using the Internet on a daily basis in December 2019. Moreover, the individuals in today's society are increasingly using interactive platforms based on the Internet to communicate with their acquaintances and to find out and express their views on what is currently going on in the society as a whole. For example, the most world's most popular social media platform Facebook had over 2.5 billion monthly active users in December 2019 (Statista, 2020). When comparing the number of Facebook's monthly active users to the global world population of 7.65 billion (April 2020 estimate, U.S. Census Bureau) we find out that nearly one in three people in the world are using a single social media platform. Contemplating this staggering number and the fact that Facebook is only one among the global social media platforms, the society in which we are living in starts to feel like a true network society.

2.1.2. The star players of the new economy

It is no secret that the social media platforms (and partially modern information technology itself) were not only developed to enable us to communicate with the people we are closest with. Constructing and developing global services functioning around the clock has a significant cost and the revenue side must come from somewhere to make the equation work. Contrary to the traditional revenue models where customers pay the service provider for the services provided to his benefit by the provider, the social media platforms create value by extracting information from the social media users' behaviour in the service and by selling this information to third parties that are interested in the users' hopes, dreams, beliefs and habits. The real customers of the social media platforms are the third parties, not the users themselves. In exchange of the information that the users bring about by acting in the social media network, they receive the service itself free of charge. This is how the basic business model of the social media platforms works, and as we have witnessed in the recent years, this business model has shown that it can be extremely profitable.

The companies who practice this business model are vast, and the companies whose products and services enable the business model to function are, in the reality, even more numerous. However, some of them are among the most successful companies of the world. Out of the current ten highest-valued public companies by market capitalisation, seven are associated with networks based on the modern information technology (FXSSI, 2020), and out of these, five are US and two Chinese. They include older players established decades ago, like Microsoft and Apple, and new stars like Amazon, Alphabet (Google), Facebook, Tencent and Alibaba. Whether they provide platforms (Facebook, Tencent, Alibaba), software (Alphabet, Microsoft) or devices (Apple) to the individuals that form the networks, they are all integral parts of the post-industrial network economy.

Furthermore, what is even more special about the new star companies, in addition to their huge market capitalisations, are their ownership structures and the amount of control the founder-managers still exercise over their businesses, even after several funding rounds and the IPOs. In many cases, the founder-managers still hold the voting majority, which is very unusual for companies of this size, especially in the U.S. (e.g. Gompers, Ishii and Metrick, 2009). For example, the two founders of Snap Inc., a 'camera' company listed on NYSE with a market cap of $23.03 billion, Evan Spiegel (CEO) and Robert Murphy (CTO) together hold 100% of the voting power (Snap Inc., 2020). Though an extreme example, Snap is not alone out in the field. Facebook's founder-manager and current CEO Mark Zuckerberg currently retains 53.1% of the total voting rights (Facebook Inc., 2020), while Alphabet's founder-managers Larry Page (CEO) and Sergey Brin (President) possess 53.1% of all votes (Alphabet Inc., 2019). Thus, the founder-managers certainly have been able to preserve their control of the companies throughout time and financing rounds while even successfully publicly listing their companies to major stock exchanges.

2.2. Voting rights, negotiation power and IPOs

From a retail investor's perspective, the majority control of the founder-managers could be seen as additional risk when considering whether to participate in an IPO or not. For example, Masulis, Wang and Xie (2009) find that in companies in which there is divergence between the voting and cash flow rights of different share classes, the corporate cash holdings are worth less to outsider shareholders, while (founder-manager) CEOs earn higher compensation and make overpriced acquisitions more often. In addition, they confirm that CEOs with majority control rights, but no majority cash flow rights, are more likely seek private benefits at shareholders' expense. In the IPO context, Smart and Zutter (2003) find that in IPOs with dual-class shares there is less *underpricing* (i.e. the difference between the price per share in the IPO and the closing price on the first day of trading in the stock exchange) than in single share class IPOs. After the IPOs, they find that the nonvoting shares of dual-class-share-companies trade at lower prices relative to earnings and sales compared with the shares of single-class companies. Thus, it seems that investors are adding 'voting premium' to their discounts rates, leading to lower valuations of companies with separated voting and cash flow rights.

Even though the founder-managers have been able to preserve their control (and protect their private benefits in some cases), after the IPOs at the expense of outsider shareholders, not much has been said about their respective "negotiation power" relative to the organisers of the IPOs themselves, the underwriters. Generally speaking, the fees charged by the underwriters (i.e. gross spreads) have remained at surprisingly constant levels throughout time. Already in 2000, over 20 years ago, Chen and Ritter (2000) found out that in more than 90% of medium-sized U.S. IPOs ($20-80 million) in 1995-1998, the gross spreads charged by the underwriters were exactly seven percent, calling this finding "*the seven percent solution*". Ten years later, Abrahamson, Jenkinson and Jones (2011) further confirm that the phenomenon of IPO gross spreads clustering around almost exactly 7% has become even more common in the U.S. and spread to larger IPOs up to $250 million. Moreover, clustering of IPO fees has been observed to also take place in Europe, though on lower levels by (e.g. Torstila (2003)). This seems rather odd, especially when no evidence of collusion between underwriters in the U.S. markets has been uncovered to this day.

To conclude, it seems that on one hand the founder-managers of large companies with business models affiliated with the social networks based on modern information technology have been able to preserve their control over their companies even after the companies have become the highest-valued publicly traded companies in the world, while simultaneously expressing significant negotiation power over the outside investors financing the growth on many occasions. On the other hand, the underwriters in charge of organising the last stage of the companies' financing cycle, the IPO, have been able to charge hefty fees from companies seeking public listings in the past, especially in the U.S., similarly exercising major negotiation power. Thus, it seems that the both founder-managers and the underwriters possess great negotiation power relative to their counterparties, outside investors for founder-managers and the companies going public for the underwriters. However, what will happen if we fuse these two things together? What would happen in a situation in which the founder-managers are looking to publicly list their company with the help of the underwriters?

2.3. IPO fees and gross spreads

The initial public offerings, or IPOs in short, have been a popular research topic in finance in the past decades. Popular research topics have been why IPOs are constantly underpriced (e.g. Ljungqvist (2007)) and why there is cyclicality in IPOs through time (e.g. Lowry and Schwert (2002)) and the performance of the companies going public after their IPOs (e.g. Jain and Kini (1994)). Overall analyses of IPOs have also been done, for example by Ritter and Welch (2002), who assess IPOs from several perspectives: why are companies going public, why is there underpricing in the IPO subscription prices, and how do the companies that went public perform after their IPOs. The fees charged by the underwriters, the ones organising the IPOs, and their clustering around certain levels have also been studied Chen and Ritter (2000), Ritter (2003), Torstila (2003) and more recently by Abrahamson, Jenkinson and Jones (2011).

As described before, the gross spread of an IPO is the compensation to the organiser of the IPO, the underwriter, paid by the company going public. In a sense, the *underwriters* are third parties evaluating the risk associated with the IPO in exchange for a fee and are responsible for the practical execution of the IPO. The *gross spread* is calculated as a percentage of the total proceeds collected in the IPO, i.e. the *issue size*. The gross spread, according to e.g. Ritter (1987), covers different types of underwriting costs, including management fees, underwriting fees and selling concessions, to mention a few. However, it is not equal to the costs of organising the IPO, and instead represents the compensation the underwriter receives for its services. In addition to the gross spread, according to Ritter (1987), the issuing company has to also pay other fixed costs, e.g. legal and other administrative fees. In my thesis, the focus is on the levels on which the gross spreads are set, as a result of negotiations between the underwriter and the company, and not on the cost structure behind the IPO fees.

2.4. Clustering of the IPO gross spreads

The clustering of IPO fees was first widely publicised after The Journal of Finance published the article “The Seven Percent Solution” by Chen and Ritter in 2000 who found that the gross spreads (i.e. the IPO fees) charged by the underwriters (i.e. the parties evaluating the risk associated with the IPO in exchange for a fee) are oddly consistent and cluster around the seven percent level in the U.S. financial markets. Evaluating this in the context of the basic theory on efficient markets, it intuitively seems very unlikely that the underwriters (the ‘suppliers’) would set their price on an exact same numerical value, if they would be pricing their services according to their own best interest to maximise profit without colluding with their competitors to establish a price cartel to further push up the profits. Even then, the incentive to break the cartel by setting prices slightly below the level agreed with the competition remains, as the underwriter pricing below the agreed-upon-level would drastically expand its market share and ultimately its profits at the expense of the other underwriters. Thus, a price cartel should not form on efficient markets in the first place, and even if it did, it would eventually collapse given the built-in instabilities due to the economic incentives to break the cartel explained by game theory (see e.g. Leslie (2005)).

Chen and Ritter (2000) offer several potential explanations for the observed clustering of the gross spreads. They propose 1) explicit collusion, 2) strategic pricing, 3) agency costs, 5) other forms of compensation, 6) resale price maintenance and 7) cross-subsidisation as potential explanations of the clustering at the seven percent level. Ultimately, they end up arguing against most of these, including ruling explicit collusion based on the large number of people involved in setting the fees (making it difficult for everyone to collude together in secret) and the legal liabilities as deterrents. Chen and Ritter (2000) offer strategic pricing as the most likely explanation. They propose that the individuals involved are forecasting future spreads based on what they are doing today and then set the spreads (i.e. prices) accordingly, resulting in each underwriter setting the spreads well above competitive levels. Moreover, they see that the strategic pricing is sustainable because the issuing firms are not choosing underwriters only based on the spreads, but the spreads are part of wider criteria on which the underwriters are evaluated. Thus, according to Chen and Ritter (2000), no explicit collusion is required to sustain the high levels of fees.

This strategic pricing explanation was later contested by several studies, notably by Hansen in 2001 and Torstila in 2003. Hansen (2001) finds that the U.S. IPO market is not concentrated and that the barriers of entry are low. He also finds the seven percent gross spreads not abnormally profitable while noting their persistence even after public investigations, further indicating against the existence of collusive practices. Hansen (2001) concludes that the seven percent gross spreads are part of the “industry standard” and the actual competition takes place on quality, for example on underwriter reputation. Moreover, Torstila (2003) finds that although there is clear clustering not only in the U.S. but also in other IPO markets as well, the clustering is more common in markets in which the gross spreads are lower than in markets that the gross spreads are higher, though this should be other way around if any collusion would be taking place. With company-level data, he also confirms Hansen's (2001) earlier result of the seven percent gross spreads not being abnormally profitable. Thus, considering the evidence presented by Hansen (2001) and Torstila (2003), the clustering of IPO gross spreads seems to not be caused by collusion between underwriters, as one would initially think.

More recently, Abrahamson, Jenkinson and Jones (2011) return to the subject and study the persistence of clustering of the U.S. gross spreads at the seven percent level. They found that the clustering at 7% level detected before Chen and Ritter (2000) in the $25 million - $100 million range had also extended to IPOs in $100 million - $500 million range, with 65% of all gross spreads in this range being equal to 7%. They argue that the increasing prevalence of exactly 7% gross spreads in the larger IPOs, while simultaneously the European underwriters entered the U.S. markets and the general volumes of IPOs fell, both of which should decrease the fees, not increase them, is in line with implicit collusion models. Thus, Abrahamson, Jenkinson and Jones (2011) see the strategic pricing i.e. implicit collusion as the most feasible explanation of U.S. gross spreads clustering around the seven percent level. Moreover, they state that the present value of future profits in the long run is larger than the profits in the short run that would result from decreasing gross spread in order to gain more market share. According to them, this gives the underwriters no incentive to compete on the spreads.

2.5. Differences between European and U.S. IPO markets

Some of the papers published on the clustering of IPO gross spreads also study the differences between U.S. and European IPO markets, and studies focusing entirely on European markets have also been done (e.g. Torstila (2001)). Generally speaking, the gross spreads are higher in the U.S., clustering around the 7% level (Chen and Ritter (2000); Abrahamson, Jenkinson and Jones (2011)) and that there is clustering in the European markets as well, although on a lower 3-4% level, depending on the country (Torstila, 2001 and 2003). Interestingly, Abrahamson, Jenkinson and Jones (2011) find that there is a "*3% wedge*" between the pricing, partially by the same banks, of IPOs in the U.S. and Europe not explained by outside factors like issue characteristics. However, in some national markets, there seems to be no clustering. For example, Chen, Fok and Wang (2006) find no clustering patterns in gross spreads in the Taiwanese markets during 1989-1999, but this can partially be explained by the different fee structure of the Taiwanese market.

In addition to the average levels of fees, there are also other differences between the U.S. and European IPO markets. For example, the processes on how the listing is completed and how the issue price is set are differing in the two markets. According to Ritter (2003), in the U.S. the book-building method has always been the most prominent one, while in Europe the mechanisms have been more variable. In a book-built IPO, the underwriter collects orders that include price and number of shares desired from several institutional investors, referred to as *book-building*. Moreover, Ritter (2003) lists the fixed price method, the auction method and the book-building method as ones that are commonly used in Europe. Out of these, IPOs conducted using the book-building typically have the highest gross spreads (Ritter, 2003). According to Abrahamson, Jenkinson and Jones (2011), the other methods of conducting the IPOs are especially popular in smaller issues in Europe.

As for other markets characteristics, the differences between European and U.S. IPO markets are not so significant. In an effort to explain the differences between the U.S. and European gross spreads, Abrahamson, Jenkinson and Jones (2011) recount other potential differences in market characteristics between the U.S. and Europe in the process. They find that for legal expenses, there are some differences between the two, but these differences are not significant enough to explain the difference in gross spreads. However, it must be noted that as the legal systems for the European markets are not uniform at the national level, the legal expenses also most likely vary between European countries as well. Furthermore, according to Abrahamson, Jenkinson and Jones (2011), the litigation risks, quality of analyst coverage or indirect costs of underpricing do not explain the difference in gross spreads between U.S. and European issues. Thus, according to prior evidence, it can be concluded that the U.S. and European IPO markets do not differ from each other in market characteristics in a way that would affect the levels of gross spreads, that otherwise would create bias to my study.

3. HYPOTHESES

My hypotheses are derived partially from the evidence shown by existing research on gross spreads of the initial public offerings in the European and U.S. markets, and partially from the proposed theory on how the negotiation power of founder-managers could affect the gross spreads charged by the underwriters of the IPOs. I will also test if technology companies, with business models based on modern information technology, are also able to publicly list themselves while paying lower fees to the underwriters, and how the 'founder-manager' and 'technology' effects are working when combined. Additionally, the IPO gross spreads charged from the largest technology companies with market capitalisations[3] exceeding one billion U.S. dollars, the 'unicorns', are subject to analysis.

Abrahamson, Jenkinson and Jones (2011) find that 1) European IPOs are cheaper than U.S., even after controlling for market capitalisation, IPO characteristics, time period and country effects and that 2) the gross spreads of larger IPOs are lower in both Europe and the U.S. The existence of both these factors has already been confirmed before them by e.g. Ritter (2003) and Torstila (2003). Abrahamson, Jenkinson and Jones (2011) also find that technology companies faced slightly higher fees during their sample period. However, I propose that this would no longer be the case and that the effect has actually reversed thereafter. Moreover, based on the evidence on how the founder-managers of technology companies have been able to preserve control over their companies throughout several financing rounds and IPOs, I propose that they could be able to utilise their increased negotiation power in the bargaining processes over IPO gross spreads with the underwriters, similarly as they have been clearly able to do with the investors in previous funding rounds.

Thus, I will set my hypotheses as follows:

H1: U.S. IPOs will have higher gross spreads (will be more expensive) than European ones
H2: IPOs with larger market capitalisations will have smaller gross spreads
H3: Technology IPOs will have smaller gross spreads than otherwise similar IPOs
H4: IPOs of companies controlled by founder-managers will have smaller gross spreads than otherwise similar IPOs
H5: IPOs of "Unicorn" companies will have the smallest gross spreads

[3] The '*market capitalisation*' of a publicly listed company is defined as the total market value of shares outstanding. It is calculated by multiplying the number of shares outstanding with the current market price of the shares and is commonly used as a measure of the 'size' of the company.

The first hypothesis is set to confirm if the fees charged by the underwriters in the U.S. still remain on significantly higher levels than in Europe, as observed before by Ritter (2003) and Torstila (2003) and later by Abrahamson, Jenkinson and Jones (2011). I will also test the persistence of the “7% solution” originally found by Chen and Ritter in 2000 and further confirmed by Abrahamson, Jenkinson and Jones in 2011. Earlier, Chen and Ritter (2000) found that in over 90% of the U.S. IPOs in which total proceeds were $20 million - $80 million, the gross spreads charged by the underwriters were exactly 7%. A decade later, Abrahamson, Jenkinson and Jones (2011) found a similar clustering pattern: again, in over 90% of U.S. IPOs with total proceeds of $25 million - $100 million the gross spreads were exactly 7%. As noted earlier, they even found that the clustering at 7% level had spread to larger offerings in $100 million - $500 million range, with 65% of all gross spreads in this range being equal to 7%. However, Abrahamson, Jenkinson and Jones (2011) found no significant clustering in European IPOs on any particular level.

The second hypothesis will show if there is still inverse relationship between company size (measured by the company’s market capitalisation) and gross spread as observed before. The relationship is most likely a result of the economies of scale related to larger offerings from the underwriters’ perspective, resulting in more competitive pricing on larger IPOs. Both Chen and Ritter (2000) and Abrahamson, Jenkinson and Jones (2011) find strong evidence about this inverse relationship. It is also somewhat intuitive to assume that companies with larger market capitalisations are being charged lower fees by the underwriters: given the fixed legal and administrational costs associated with every public offering resulting from the IPO legislation and the percentage-based IPO fees received by the underwriter(s), a larger IPO should always be more profitable to underwrite, if the fee percentage stays the same. This is known by both the companies seeking public listing and the underwriter, and thus it should also be reflected in the final IPO fees, the gross spreads. Moreover, based on the same logic, a larger company should also have more leverage in the fee negotiations with potential underwriters, resulting in lower gross spreads.

The third hypothesis will test the technology effect observed before by Abrahamson, Jenkinson and Jones (2011). They find that IPOs of technology companies have slightly higher gross spreads than non-technology ones but offer no explanation to this result. However, since their sample covers the pre-financial crisis period of 1998-2007 and includes the dot-com bubble of 1998-2000 and its aftermath, it can be theorised that the underwriters at the time, with the excesses of the dot-com bubble in recent memory, would have demanded somewhat higher fees to cover the perceived higher risk associated with technology companies going public. Thus, the higher fees charged from technology companies in 1998-2007 could be explained by the underwriters' pricing policies affected by their experiences during the dot-com bubble and its aftermath. The sample period of Abrahamson, Jenkinson and Jones (2011) also predates the true breakthrough of the FAANG companies and the social network-based business models. Considering these thoughts, I hypothesise that the technology effect observed by Abrahamson, Jenkinson and Jones (2011) will now work the other way around, resulting in technology IPOs facing lower fees than non-technology IPOs.

The purpose of the fourth hypothesis is to test whether the negotiation power of the founder-managers exercising effective control over their companies truly affects the ability of underwriters to charge high gross spreads. The hypothesis is set to test the logic behind the proposed theory of founder-managers' increased negotiation power. If the founder-managers repeat the prior success they had in negotiations with the investors participating in earlier funding rounds, their companies should be able to complete their IPOs while paying lower fees. Thus, I suggest that the companies controlled by founder-managers will end up paying lower fees than their otherwise similar peers. However, on the other side of the negotiation table will be sitting the investment bankers, who for their part have been able to charge high fees before. The result will show who ultimately ends up saying the last word in the negotiations over the gross spreads.

The fifth and last hypothesis concerns the special 'unicorn' companies. It combines the previously proven inverse relationship between company size and gross spread with the technology effect explained before. It is meant to capture and measure the effects of hypotheses two and three working simultaneously and see if this 'double' effect results in the smallest IPO fees. Again, considering prior evidence, technology companies going public have faced slightly higher fees (Abrahamson, Jenkinson and Jones, 2011) but given the characteristics of their sample period, I hypothesise that things have now turned around for technology companies. Combining this with the economies of scale associated with larger issues that should be at their strongest with these huge IPOs, I expect that the "unicorn" companies with over $1000 million market capitalisations and business models based on technology to pay the smallest fees to the underwriters.

4. DATA

In order to test the hypotheses set in Section 3, a sample of good quality initial public offering (IPO) data was required. Also, to ensure the credibility of the results obtained later on, the data sample was also required to be of sufficient size. The data selection and filtering processes were constructed on top of the foundation laid down by these two requirements. Through data selection, I retrieved a sample of raw data containing 4515 U.S. and European observations (IPOs) from the years 2008-2018 from the Securities and Data Company (SDC) Platinum Database. The selected sample period follows and slightly overlaps the sample period 1998-2007 of Abrahamson, Jenkinson and Jones (2011). The European observations included IPOs from the United Kingdom, Germany, Netherlands, Russia, France and other less prominent European markets. The distribution of the IPOs that were included in the analysis after filtering and removal of missing observations is visualised in Appendix 1.

The raw data retrieved from SDC was then filtered through three levels of filters to preserve comparability with earlier results, mainly to the results of Abrahamson, Jenkinson and Jones (2011). First, all non-book-built IPOs were excluded. Second, a cut-off threshold based on the issue size was set on $25 million U.S. dollars, and all IPOs below the threshold were left out. Third, issues were excluded based on the 'standard exclusions', that are commonly used in IPO research according to Abrahamson, Jenkinson and Jones (2011). Finally, all observations for which gross spread data was not available, were removed from the sample. The resulting 'Full' sample consisted of 1450 U.S. and European IPOs.

4.1. Issues with data quality and availability

For the sake of data quality and availability, I only utilised data from European and U.S. IPOs[4]. Especially for the U.S., the gross spread data can be easily obtained from the SDC Platinum database and it is available for almost every IPO (1543 out of 1581). However, even for Europe, the gross spread data is a lot more difficult to obtain from SDC as only 24% (317 out of 1301) of European IPOs include gross spread data. On the contrary to the U.S., the gross spreads are generally not required to be listed on the prospectuses, and thus are not available in SDC. The same issue was already encountered by Abrahamson, Jenkinson and Jones in 2011, and still exists today even with newer data (2008-2018) from

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[4] The nationality of the IPO is defined by as the '*domicile nation*' variable in SDC data, meaning the country where the business is incorporated; in almost all cases this also matches the nationality of the stock exchange where the company is primarily listed.

SDC. As a result, the data sample for European IPOs obtained from SDC is significantly smaller than the U.S. dataset. However, the potential sampling issue is mitigated by the fact that the European IPOs omitted were somewhat evenly spread over time, size and different countries, preserving the representativeness of the European sample as a whole, although a larger sample would always be preferred in principle.

The same availability problem is encountered with other markets as well. Even though it would have been very interesting to include data from alternative markets as well, e.g. China and Japan given the large number of interesting technology IPOs in the both, unfortunately this would have required too much time and effort in contrast to the magnitude of the task, in addition to the fact that the U.S. and European IPO markets are the most prominent in the world. Moreover, the Asian financial markets are very different by nature when compared to Europe and U.S., creating potential for comparability issues. For example, in the Taiwanese markets (although Taiwan as a society is organised in a more Western-orientated way than e.g. China) the IPO underwriting fees have been found to be much lower than in Western markets, and for example Chen, Fok and Wang (2006) find that the average gross spread in Taiwan is only 0.99%. They explain this strikingly low figure, compared to U.S. and European markets, with different incentives from the underwriters' perspective: the underwriters' main revenue comes from processing fees and capital gains instead of gross spreads, giving them incentive to maximise the issue size and try to emulate it with low underwriting fees.

4.2. Data filtering process

To preserve comparability with earlier results, the raw sample of 4515 IPOs ('observations') was filtered, in similar fashion to both Chen and Ritter (2000), and Abrahamson, Jenkinson and Jones (2011), boiling down to 1450 observations constituting the 'Full' sample. This data filtering process is visualised in Appendix 1. The first filter is related to the way in which the IPO is conducted. In line with Abrahamson, Jenkinson and Jones (2011), all IPOs conducted by other methods than book-building are excluded from the analysis. As they have already noted earlier, the IPOs conducted by other methods than book-building have different fee structures and pricing. Would these be included in the analysis, it would also endanger the feasibility of the results. Filtering out other than book-built IPOs, this leaves us with 3787 observations.

The second filter comes from the issue size, which is measured as the sum of total proceeds in all markets[5]. Similar to Abrahamson, Jenkinson and Jones (2011), I will use the $25 million market capitalisation valuation as a cut-off threshold and include no IPOs below the $25 million threshold or those with no issue size data available (only three observations). According to Abrahamson, Jenkinson and Jones (2011), the small issues below $25 million are suffering from diseconomies of scale, thus facing significantly higher fees, and may include underwriter warrants. This also links up with the inclusion of IPOs conducted exclusively by the book-building method. IPOs smaller than $25 million are commonly done by auction or fixed price methods in Europe while the U.S., the book-building method is used almost exclusively (e.g. Ritter (2003)). After size filtering, 2882 observations remain.

The third and final filter are the 'standard exclusions' of the IPO research, according to Abrahamson, Jenkinson and Jones (2011): all closed-end funds, blank check companies, special purpose acquisition companies (SPACs), real estate investment trusts (REITs), unit offerings, and offerings with only depositary receipts are excluded. These exclusions are mainly based on the fact that the ones mentioned above are not 'regular' companies seeking financing and valuation through the stock market; their purpose of public listing has more to do with the aim of easing capital flows in and out of the company or acquisition purposes. In total, 410 IPOs are omitted from the sample based on these standard exclusions. Lastly, all observations for which there is no gross spread data available, are removed from the sample. In total, I removed 1022 observations from the sample, including 984 European and 38 U.S. ones, due to missing gross spread data. After the three filters have been applied and the missing observations have been removed, the final full sample consists of 1450 IPOs, 1178 U.S. and 272 European ones.

[5] The total amount of proceeds in all markets is defined as the sum of proceeds in different markets. In case of the same company is simultaneously seeking listing to two or more markets, the total issue size is the sum of issues on each market

5. METHODS

The methodology of my thesis closely follows the methodology of earlier studies on the subject, to ensure that the results of my thesis are feasible and comparable to earlier results. The two main reference used in constructing the methodology is the ‘preceding’ study by Abrahamson, Jenkinson and Jones (2011), and to some extent, the one by Chen and Ritter (2000). My methods are also similar to methods used in earlier research regarding the gross spreads of initial public offerings, for example by Chen and Ritter (2000), Torstila (2001) and Torstila (2003). To examine the determinants of the gross spreads, a multivariate regression model is utilised, resembling the model used by Abrahamson, Jenkinson and Jones (2011). Moreover, my methodology includes the subsampling and classification of the IPO data, also conducted in accordance with the preceding studies. However, an additional ‘unicorn’ class is added to the classification. Further, unlike any study before, I include two founder-manager dummy variables in my regression model to help uncover if the powerful founder-managers are able to negotiate lower gross spreads from the underwriters.

5.1. The gross spread model

To measure the IPO fees collected by the underwriters, in the form of gross spreads of the IPOs, I employ a multivariate regression model as shown in Figure 1. The model will be an ordinary least squares (OLS) regression *gross spread model* that resembles the earlier model used by Abrahamson, Jenkinson and Jones (2011). The dependent variable will be gross spread (as a percentage of the total amount of proceeds in the IPO) and the independent variable the proceeds, the investors’ contributions to the initial public offering, collected by the underwriter(s), on a natural logarithmic scale. The use of a logarithmic scale is a common method that aims to minimise the effect of large outliers on the results and enables us to detect variation on multiple scales at once. The use of a logarithmic scale is also in line with Abrahamson, Jenkinson and Jones (2011) and with earlier IPO research (e.g. Chen and Ritter (2000), Torstila (2001) and Torstila (2003)).

The gross spread model includes dummy variables for technology (to sort out technology IPOs from other IPOs), privatisations and book-builder syndicates (multiple book-runners). Differing from the model used by Abrahamson, Jenkinson and Jones in 2011, the ‘venture capital’ dummy variable is omitted from the analysis. This is due to difficulties in obtaining consistent data about the venture capitalist backing in the IPOs. Most importantly, two ‘founder-manager’ dummy variables and one ‘unicorn’ dummy variable are added. In the case of voting power being in founder-managers' hands, the founder-manager ('F-M') dummy is utilised to isolate the effect of founder managers' negotiation power on IPO fees. In a similar founder-managerial control situation, but except for the company being a technology company (according to SCD), the founder-manager-technology ('F-M-T') dummy is used instead. This is done in order to better study the founder-manager and technology effects, both separately and playing together when combined. The unicorn dummy is included to inspect the IPO gross spreads faced by the huge technology-based unicorn companies. Moreover, I will include year dummies to isolate the possible yearly seasonality as well as country dummies for the more significant European markets (United Kingdom, Germany, Netherlands, Russia and France) to inspect the country-specific effects on IPO fees.

Figure 1. The multivariate gross spread model.

The regression model used resembles the model used by Abrahamson, Jenkinson and Jones (2011). The most significant differences are the addition of the founder-manager dummy variables, the addition of the unicorn dummy and the omitting of the venture capital dummy. Furthermore, the country dummies differ to some extent from the ones used by Abrahamson, Jenkinson and Jones (2011).

$$GrossSpread_i =$$

$$\propto +\beta_1 lnProceeds_i + \beta_2 Technology_i + \beta_3 Privatisation_i + \beta_4 Syndicate_i + \beta_5 F - M_i$$

$$+ \beta_6 F - M - T_i + \beta_7 Unicorn_i + \left(\sum_{j=2009}^{2018} \beta_j Year_j \right)_i + \left(\sum_k \beta_k Country_k \right)_i + \varepsilon_i$$

5.2. Subsampling and classification

In order to compare the fees charged by U.S. underwriters with the fees charged by European ones, the full sample of 1450 IPOs was divided into two subsamples, one for European and one for U.S. IPOs. To measure the effect of economies of scale on the fees charged by the underwriters, the two samples were also further divided into smaller subsamples according to the market capitalisation of the IPO. This classification was also applied to the combined (U.S. and Europe) 'Full' sample. Chen and Ritter (2003) use two size classes for IPOs, \$20-80 million and over \$80 million, while Abrahamson, Jenkinson and Jones (2011) use three size classes for IPOs: \$25-100 million, \$100-500 million and over \$500 million. In my research, I added two size classes to their framework: the over \$1000 million market capitalisation class and the over \$1000 million '*unicorn*' class, with the additional requirement of the IPO being a technology one[6]. The 23 unicorn flagged IPOs are presented in Appendix 4. In this way, the gross spreads of the unicorn IPOs can be compared with the gross spreads otherwise similarly sized IPOs. Hence, I will use the following five classes for the IPOs: \$25-100 million ('Small'), \$100-500 million ('Medium'), \$500-1000 million ('Large'), over \$1000 million ('Huge') and the over \$1000 million unicorn class ('Unicorn').

5.3. Founder-manager flagging

The founder-manager flagging of IPOs was done via online searching and to some extent, going through the prospectuses of the IPOs. For example, news articles from Bloomberg and the prospectuses filed on the U.S. Securities and Exchange Commission (SEC) were used to obtain information about the voting power of the founder-managers. This proved to be very time-consuming, but in the end I was able to identify 84 IPOs where the founder-manager(s) were in *absolute control*[7] before and in some cases even after the IPO. The hand-collected sample of founder-manager flagged IPOs is presented in Appendix 3. The 84 IPOs included 56 technology founder-manager IPOs (F-M-T = 1), and the IPOs could also be divided to 81 U.S. ones and 3 European (Russian) ones. The Council of Institutional Investors (CII) "Dual Class Companies List" proved to be a helpful reference (for the U.S. data) in the process.

5.4. Trustworthiness of the study

The usage of similar methods and research practices as in earlier studies ensures the general trustworthiness of my thesis. Main reference points are the studies by Abrahamson, Jenkinson and Jones (2011) and Chen and Ritter (2003). In order to ensure the feasibility of my analysis and the comparability with earlier results, I closely follow similar methodology and research practices as they do. Moreover, the data selection and the data filtering process, as described in Section 4, are carried out in a way that intends to minimise bias in the final sample. Finally, a wide-ranging selection of control variables are made use of in the regression analysis, to make sure that the results are consistent over e.g. different issue sizes and yearly time periods. In the technical part of the analysis, the guide written by Sheppard (2018) provided useful assistance.

[6] The dummy variable *Technology* = 1, when the IPO receives a non-void value of the 'High Tech Industry' variable in the SDC Platinum database.

[7] *Absolute control* means that the one(s) in control retain over 50% of the total votes outstanding. In case of dual-class shares, this does not always mean that the one(s) in control must hold over 50% of the total equity.

6. RESULTS

The results are based on as analysis of U.S. and European initial public offerings from 2008 to 2018. The majority of the sample consists of U.S. initial public offerings, with almost four out of five IPOs being from the U.S., and which is strongly reflected in the results. To alleviate the likely bias resulting from this, the sample was divided to U.S. and European subsamples. Both subsamples, along with the combined U.S. and European 'Full' sample, were then further divided into classes relative to the amount of proceeds collected in the IPO, resulting in four size classes and an additional 'unicorn' class. Then, a data filtering process as described in Section 4, was followed to preserve comparability with earlier results, mainly with the results of Abrahamson, Jenkinson and Jones (2011), and to some extent, Chen and Ritter (2003) and Torstila (2003). Also, there was the necessary task to clean the data of missing and incorrectly inserted information. Now, through formatting, visualisation and regression analysis, I will refine the cleaned and classified data into actual results.

6.1. Figurative analysis

The figurative analysis reveals that the results are strongly affected by the ratio of U.S. versus European IPOs, and that most of IPOs fall in the two lowest size classes. It also indicates that the clustering of U.S. gross spreads at the 7% level persists. Moreover, the 'size effect', due to which IPO fees decrease as the issue size increases, is clearly detectable from my sample. In the case of the 'unicorn' companies, it can be deduced that they face slightly higher gross spreads than their similarly sized non-technology peers. In every size class and throughout the sample period of 2008-2018, U.S. IPOs have substantially higher gross spreads than European ones. This is true for all cases except for the 'Small' size class that includes IPOs with total proceeds from $25-100 million U.S. dollars, and in which U.S. gross spreads are only slightly higher.

The classification of the full sample of 1450 U.S. and European IPOs is illustrated in Table 1. The sample is divided into three categories; the U.S. subsample (1178 observations), the European subsample (272 observations) and the 'Full' sample of 1450 observations. For all categories, the number of IPOs (the counts), arithmetic averages and medians of both the gross spreads and total amounts of proceeds per IPO are listed. Moreover, the sample is divided into size classes relative to the total amount of proceeds of the IPOs. Panel B lists the 'Small' IPOs with total proceeds from $25 million to $100 million, which is also the corresponding sample in which Chen and Ritter (2000) and Abrahamson, Jenkinson and Jones (2011) found over 90% of the U.S. gross spreads to be exactly 7%. Panel lists C the 'Medium' IPOs with total proceeds from $100 million to $500 million and Panel D lists the 'Large' IPOs with total proceeds from $500 million to $1000 million. Furthermore, Panel E includes the 'Huge' IPOs with total proceeds of over $1000 million, and Panel F includes the 'Unicorn' technology IPOs with total proceeds over $1000 million. Lastly, Panel A consists of the 'Full' sample of IPO of all market capitalisations, and is further divided into time classes, on a yearly basis.

By examining the summary statistics in Table 1, it can be clearly seen that the 'Full' sample is dominated by U.S. IPOs on one hand and small and medium issues of under $500 million on the other hand. The median gross spreads of the Full sample are exactly seven percent in 7 out of 11 years of the sample period. The median gross spread is also seven percent during all years of the Full sample. In the U.S. subsample, the median gross spread is below 7% only in the financial crisis years of 2008 and 2009. Strikingly, the median gross spread of all years in the European subsample is 3.75%, almost half of the U.S. percentage. However, the median gross spreads in Europe have gradually increased over the decade while the U.S. ones have stayed on the seven percent level. This is clear evidence of the persistent clustering in the U.S. markets.

Looking at the IPO size classes in Panels B-E, the gross spreads are strongly decreasing as the issue size increases. In the Huge class of IPOs of issue size over $1000 million dollars, the median gross spread drops to 3.63% in the U.S. and further to only 1.50% in Europe (to 2.38% in the combined "huge" sample). This clearly suggests that the underwriters are taking the economies of scale into account while setting the spreads for the bigger issues. However, contradicting the expectations, the issues of the Unicorn class do not achieve the smallest median gross spreads. In the U.S. subsample, both the average and median Unicorn class gross spreads are slightly lower than in the Huge class. In the European subsample, the average Unicorn class gross spread is actually six basis point above the Huge class gross spread, while the median gross spread is equal to the 1.50% gross spread of the Huge class. In the 'Full' sample, that includes all the 1450 IPOs, both the average and median gross spreads are slightly above the Huge class in the Unicorn class. Therefore, it can be deduced that the 'unicorn' companies face slightly higher gross spreads than their similarly sized, non-technology peer companies. However, it must be noted that the number of unicorn companies' IPOs even in the Full sample is low, only 23 (13 in the U.S. and 10 in the European subsample), which must be kept in mind when drawing conclusions.

Another matter that can be noticed from Table 1 by looking at the Count columns, is the centralising of U.S. IPOs around the lower size classes and adversely, the centralising of European IPOs around the higher size classes. Almost 90% of U.S. IPOs within the sample fall into the Small and Medium classes, while in the European subsample, the IPOs are more evenly spread over the size classes. In both subsamples, the Medium class is the largest and the Small class the second largest. Noticeably, the Huge class actually contains more European than U.S. issues, while in all other classes, there are more U.S. than European issues. Consequently, the amount and strong centralising of U.S. IPOs around the two lower size classes causes the results of these classes in the 'Full' sample to be heavily influenced by the proportion of U.S. IPOs. This can be clearly seen from the average and median gross spreads of Small and Medium IPOs in the Full sample, which are very close to the levels in the U.S. subsample. This is particularly evident in the median gross spread of Small issues in the Full sample, which is exactly 7%, perfectly equal to the U.S. value.

Table 1. Summary statistics for the full sample of 1450 U.S. and European IPOs from 2008-2018.

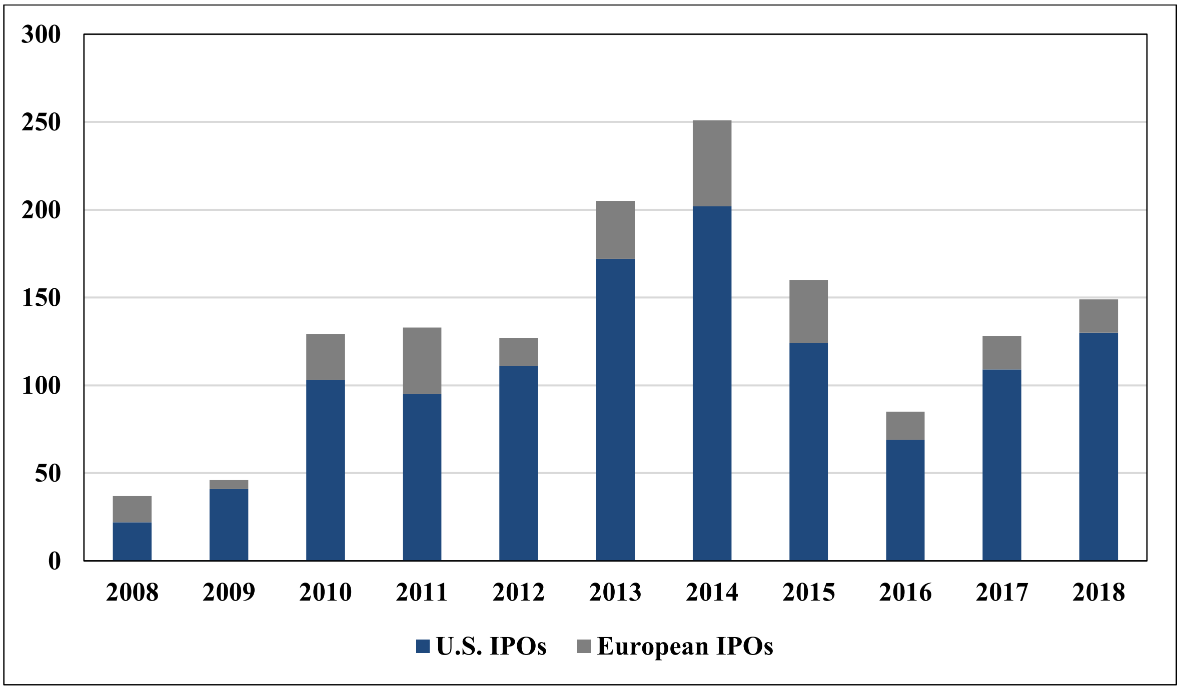
Table 1 presents the full sample of 1450 IPO (the result of filtering process described in section '4.2. Data filtering process'), of which 1178 are U.S. and 272 European IPOs from the time period of 2008-2018. 'Count' refers to the number of IPOs (observations) in each category. 'Gross spread' is calculated as a percentage of the total amount of proceeds collected in the IPO. The 'Proceeds' columns list the total amount of proceeds collected in the IPOs of each category, disclosing the issue size, on million U.S. dollars basis.

	U.S.					Europe					U.S. and Europe				
	Count	Gross spread, % (Mean)	Gross spread, % (Median)	Proceeds, $ Million (Mean)	Proceeds, $ Million (Median)	Count	Gross spread, % (Mean)	Gross spread, % (Median)	Proceeds, $ Million (Mean)	Proceeds, $ Million (Median)	Count	Gross spread, % (Mean)	Gross spread, % (Median)	Proceeds, $ Million (Mean)	Proceeds, $ Million (Median)
Panel A: All Proceeds															
2008	22	6.31	6.88	1071.6	177.8	15	4.17	4.25	673.9	220.0	37	5.44	6.5	910.4	189.0
2009	41	6.35	6.50	338.6	156.3	5	4.61	2.50	1013.2	1215.5	46	6.16	6.5	411.9	158.3
2010	103	6.72	7.00	308.7	103.0	26	3.06	2.50	885.6	638.0	129	5.98	7.0	425.0	145.0
2011	95	6.46	7.00	286.0	145.6	38	3.69	2.99	1041.3	368.4	133	5.67	6.5	501.8	166.3
2012	111	6.55	7.00	325.3	113.8	16	4.13	4.00	553.1	190.0	127	6.24	7.0	354.0	120.0
2013	172	6.64	7.00	258.2	116.1	33	4.11	4.01	370.1	250.6	205	6.24	7.0	276.2	127.5
2014	202	6.52	7.00	230.6	100.1	49	4.25	4.00	487.6	227.4	251	6.08	7.0	280.8	105.6
2015	124	6.56	7.00	200.4	100.9	36	4.15	3.25	340.9	195.2	160	6.02	7.0	232.0	116.0
2016	69	6.56	7.00	156.5	94.5	16	4.14	3.88	486.8	95.1	85	6.11	7.0	218.7	94.5
2017	109	6.35	7.00	236.6	125.0	19	5.69	6.00	393.3	200.0	128	6.25	7.0	259.9	125.0
2018	130	6.52	7.00	208.6	107.1	19	4.89	5.46	211.8	129.7	149	6.31	7.0	209.0	108.0
All years	1178	6.53	7.00	264.9	112.0	272	4.16	3.75	567.2	229.3	1450	6.09	7.0	321.6	121.7
Panel B: "Small" Proceeds {$25 Million - $100 Million}															
All years	501	6.92	7.00	63.8	65.0	70	5.47	6.75	61.5	58.4	571	6.74	7.00	63.6	65.0
Panel C: "Medium" Proceeds {$100 Million - $500 Million}															
All years	557	6.56	7.00	204.0	168.0	116	4.81	5.48	237.6	216.0	673	6.26	6.75	209.8	179.2
Panel D: "Large" Proceeds {$500 Million - $1000 Million}															
All years	87	5.34	5.50	688.4	660.0	44	2.80	2.50	699.6	707.3	131	4.48	5.00	692.2	667.8
Panel E: "Huge" Proceeds {≥ $1000 Million}															
All years	33	3.41	3.63	3229.7	1820.0	42	1.60	1.50	2181.8	1746.2	75	2.40	2.38	2642.9	1766.6
Panel F: "Unicorn" Proceeds {≥ $1000 Million} & *Technology* = 1															
All years	13	3.40	3.30	4378.6	1918.3	10	1.66	1.50	1579.5	1690.5	23	2.64	2.80	3161.6	1760.4

The number of IPOs per year is strongly varying throughout the sample period of 2008-2018, which can already be seen from Table 1. This yearly fluctuation is further illustrated in Figure 2 below as in the years of the financial crisis, 2008 and 2009, the total number of IPOs in the sample is below 50. When the crisis eased and liquidity returned to the markets, the number of IPOs jumps to over a hundred in the U.S. alone. The number of European IPOs again drops in 2011, most likely because of the Euro sovereign debt crisis. The total number of IPOs reaches 250 in 2014, before again sharply decreasing below one hundred in 2016 and then climbing again in 2017 and 2018. These strong yearly fluctuations in the number of IPOs per year demonstrate the cyclicality of the IPO market, which has been frequently researched before e.g. by Lowry and Schwert in 2002. This cyclicality has clearly not gone anywhere, continuing throughout the sample period. It is commonly called 'the opening and closing of the IPO window' in the financial world.

Figure 2. Yearly fluctuation of U.S. and European IPOs from 2008 to 2018.

Figure 2 shows the full sample of 1450 IPOs, of which 1178 are U.S. and 272 European ones, divided on a yearly basis over the sample period of 2008-2018. The IPOs are unevenly distributed over the sample period, which illustrates the high cyclicality of the IPO markets.



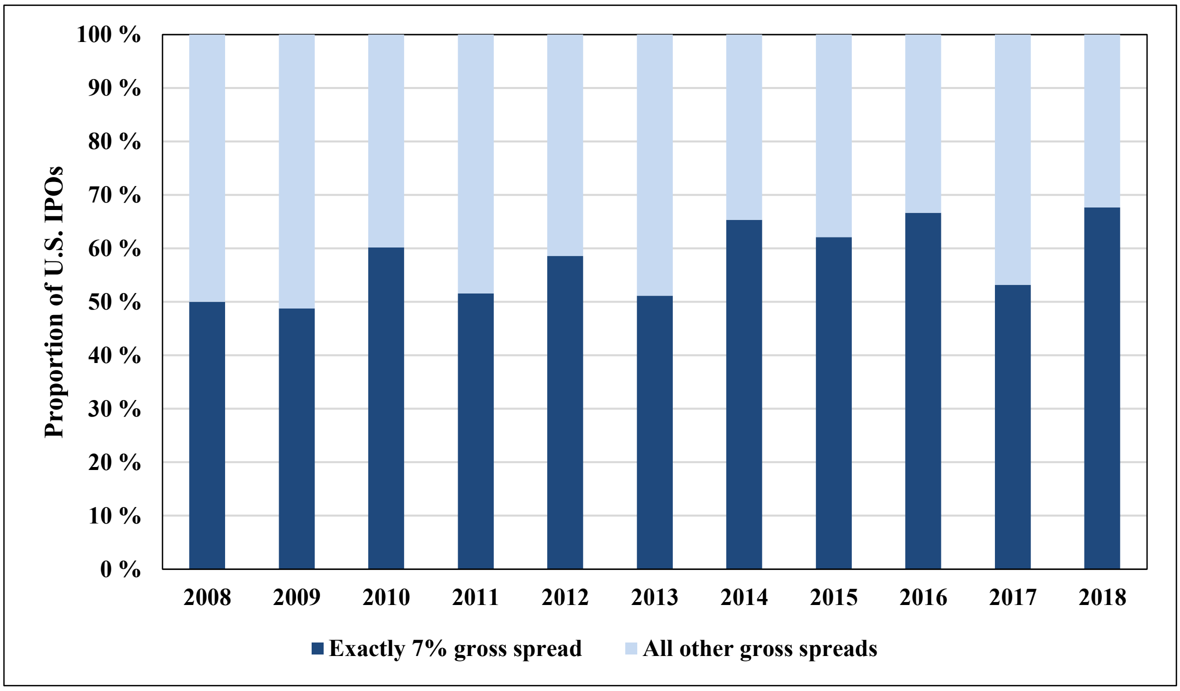
6.2. Clustering analysis

The clustering analysis shows that significant clustering of gross spreads at the seven percent level still persists in the U.S. IPO markets. More than half of U.S. IPOs had gross spreads of exactly seven percent during the sample period, with the proportion increasing slightly to the end of the period. Especially in the 'Small' size class, including issues from $25 million to $100 million U.S. dollars, the clustering of the gross spreads remains very strong. The proportion of 7% gross spreads in Small class mostly varies around the 80% level during the sample period, and no distinctive upward or downward trends can be detected. Furthermore, contradicting earlier results by Abrahamson, Jenkinson and Jones (2011), some clustering at the 7% level appears to be taking place in the gross spreads of European IPOs as well, especially in the Small size class. However, these clustering patterns of the European subsample can be explained by several outside factors affecting the results.

In the 'Full' sample, the median gross spreads of the U.S. and European IPOs were exactly seven percent in seven of the eleven years of the sample period, and 6.5% in the remaining three years. This was the result of the sample consisting almost 80% of U.S. IPOs. In the European subsample, the median gross spreads were nowhere close to seven percent, varying between 3-6% over the years, except in the 'Small' class, where the median gross spread was 6.75%, when including all years of the sample period. Focusing on the U.S. subsample, the gross spreads were gradually very close to 7% throughout the sample period. The median gross spreads in the U.S. subsample were 7.00% during all sample period years, save for 2008 and 2009, when the median gross spreads were 6.88% and 6.50%, respectively. Proportionally, more than half of the U.S. IPOs had gross spreads of exactly seven percent, which is shown in Figure 3. The number of U.S. IPOs with gross spreads of exactly seven percent varied between ca. 50% to 70% over the decade, increasing slightly to the end of the period. Out of the total 1178 U.S. IPOs, 696 (59%) had 7% spreads. Thus, in the whole U.S. sample and throughout the whole sample period, the clustering pattern is evident.

Figure 3. Yearly proportion of U.S. IPOs with exactly 7% gross spreads in 2008-2018.

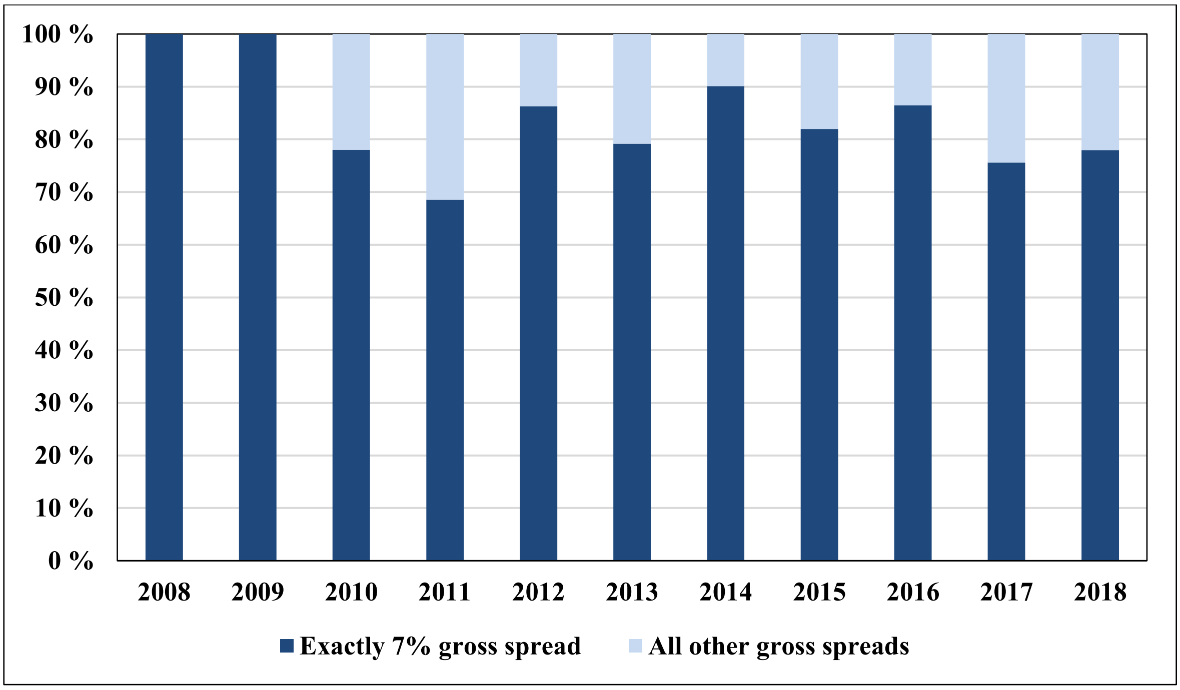
Figure 3 discloses the yearly proportion of IPOs with exactly 7% gross spreads, measured as a percentage of the total proceeds collected in the IPO, in the U.S. subsample. Of the 1178 U.S. IPOs in the subsample, 696 had exactly 7% gross spreads, which illustrates the significant clustering of U.S. IPO fees on the 7% level. This clustering is present throughout the whole sample period of 2008-2018.



In the U.S. IPO size range of $25 million to $100 million, in which clustering of the gross spreads had been found to be most severe before by Chen and Ritter (2000) and Abrahamson, Jenkinson and Jones (2011), clustering still remains very strong. This is illustrated in Figure 4, which shows the percentage of U.S. IPOs with exactly 7% gross spreads in the size range from $25 to $100 million in total proceeds of the IPO. As discovered by Abrahamson, Jenkinson and Jones (2011), the proportion of 7% spreads in this size range increased throughout their sample period of 1998-2007, reaching over 95% in 2007. Continuing from their sample period, I found that in 2008 and 2009 every U.S. IPO with total proceeds from $25 to $100 million had a 7.00% gross spread. Even though this coincides with the financial crisis period, and low overall number of IPOs, this result is striking. Later on, the proportion of 7% gross spreads in the $25 to $100 million ‘Small’ class varies around the 80% level in the years 2010-2018 of my sample period. No distinctive upward or downward trends can be seen in this proportion during the sample period. However, it is clear that “the seven percent solution” originally publicised by Chen and Ritter (2000) still persists in 2008-2018.

Figure 4. The persistence of the "7% solution" in U.S. IPOs with total proceeds of $25 million - $100 million from 2008 to 2018.

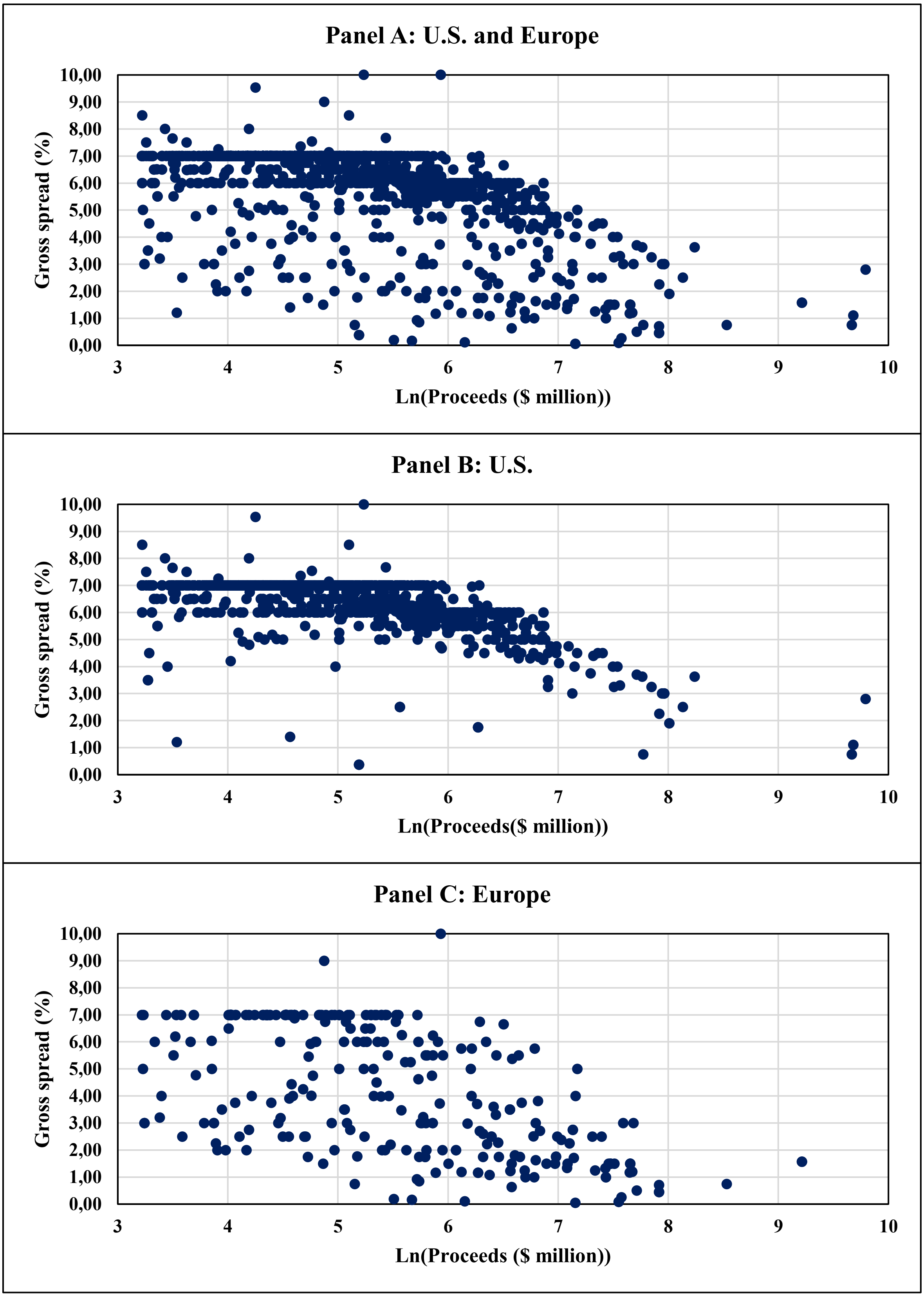
Figure 4 presents the yearly proportion of IPOs with exactly 7% gross spreads, measured as a percentage of the total proceeds collected in the IPO, in the 'Small' class of the U.S. subsample. 521 of the total 1178 U.S. IPOs fall in the proceeds class of $25 million - $100 million. Of these, 428 (82%) had exactly 7% gross spreads. The yearly proportion of 7% gross spreads varies around 80% level with the exceptions of 2008 and 2009, when every U.S. IPO in the $25 million - $100 million category had a gross spread of 7%.



The clustering of gross spreads on the 7% level is shown in more detail in Figure 5, where the gross spread (as a percentage of the total proceeds in the IPO) is plotted on vertical axis, with the total amount of proceeds in the IPO on the horizontal axis. Both the 'Full' sample (Panel A) and the U.S. subsample (Panel B) show significant clustering at the seven percent level. However, this clustering is more severe in the U.S. subsample, and compared with the Full sample, the dispersion of gross spreads is greater in the Full sample than in the U.S. subsample. The dispersion in the Full sample is caused by the inclusion of the European IPOs, whose gross spreads are more evenly dispersed over the percentage-based scale. The clustering in the Full sample results from the four to one ratio of U.S. versus European IPOs, which again heavily affects the results.

Figure 5. Clustering of U.S. and European IPO gross spreads in 2008-2018.

Figure 5 shows the clustering of U.S. and European gross spreads in 2008-2018. Panel A contains the full sample of 1450 IPOs, while Panel B consists of 1178 U.S. and Panel C of 272 European IPOs. The 'Gross spread' is measured as a percentage of the total IPO proceeds, and the 'Ln(Proceeds)' presents the total proceeds collected in the IPO in millions of U.S. dollars on a logarithmic scale.

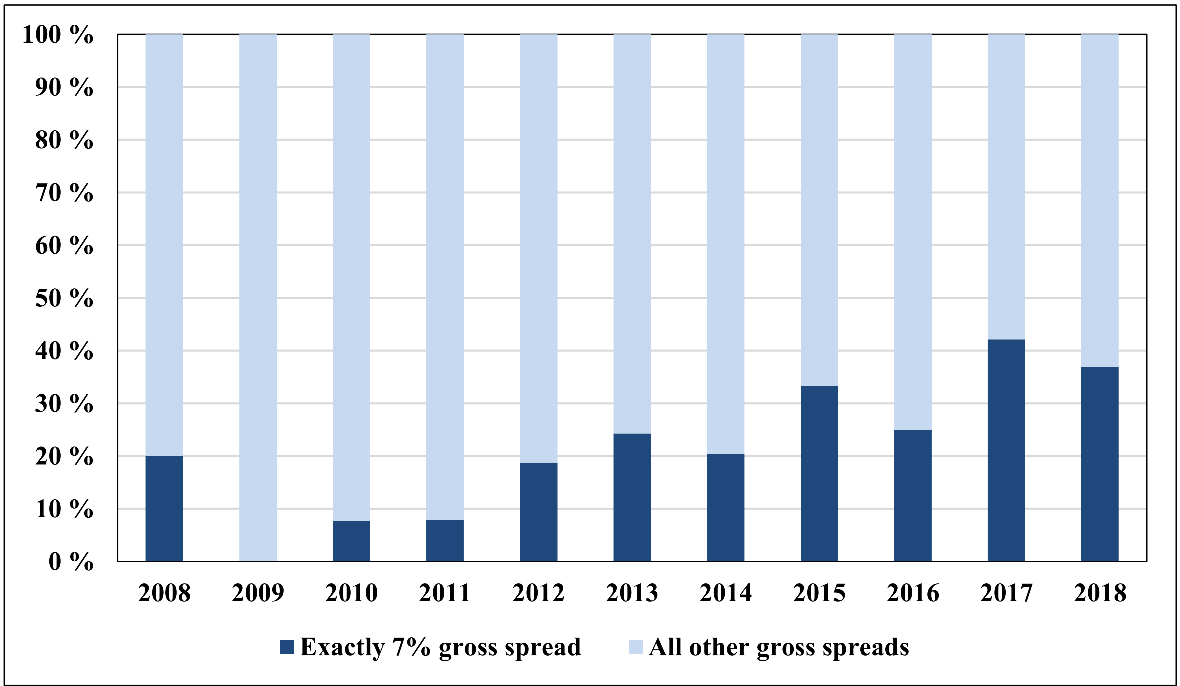


Interestingly, unlike before, even the European subsample in Figure 5 (Panel C) shows some clustering at the seven percent level. The earlier results of Abrahamson, Jenkinson and Jones (2011) showed some clustering of the gross spreads of European IPOs at certain integer levels, most significantly at three and four percent levels, but not very much at the seven percent level. Even though the density of the clustering found in my European sample is nowhere close to the corresponding density in the U.S. sample, it is still a surprising finding, since no studies before have indicated any clustering at the 7% level in European IPO gross spreads. If the clustering of European gross spreads found in my data could not be explained with any sampling or other issues, it would be an important discovery.

To better study the potential clustering of European gross spreads at the seven percent level detected in my sample, similar analysis to the one used with the clustering found in the U.S. subsample is conducted. Figure 6 shows the yearly proportion of IPOs in the European subsample with exactly 7% gross spreads. In the figure, the yearly proportion of 7% gross spreads varies greatly over the years, from 0 to round 40 percent. In 2009, the proportion was zero, albeit the total number of European IPOs in 2009 was only 5 in the sample, and in 2017, the proportion was 42%. However, it is undisputable that some clustering of European gross spreads at the 7% level appears to be taking place in my data during 2008-2018.

Figure 6. Yearly proportion of European IPOs with 7% gross spreads in 2008-2018.

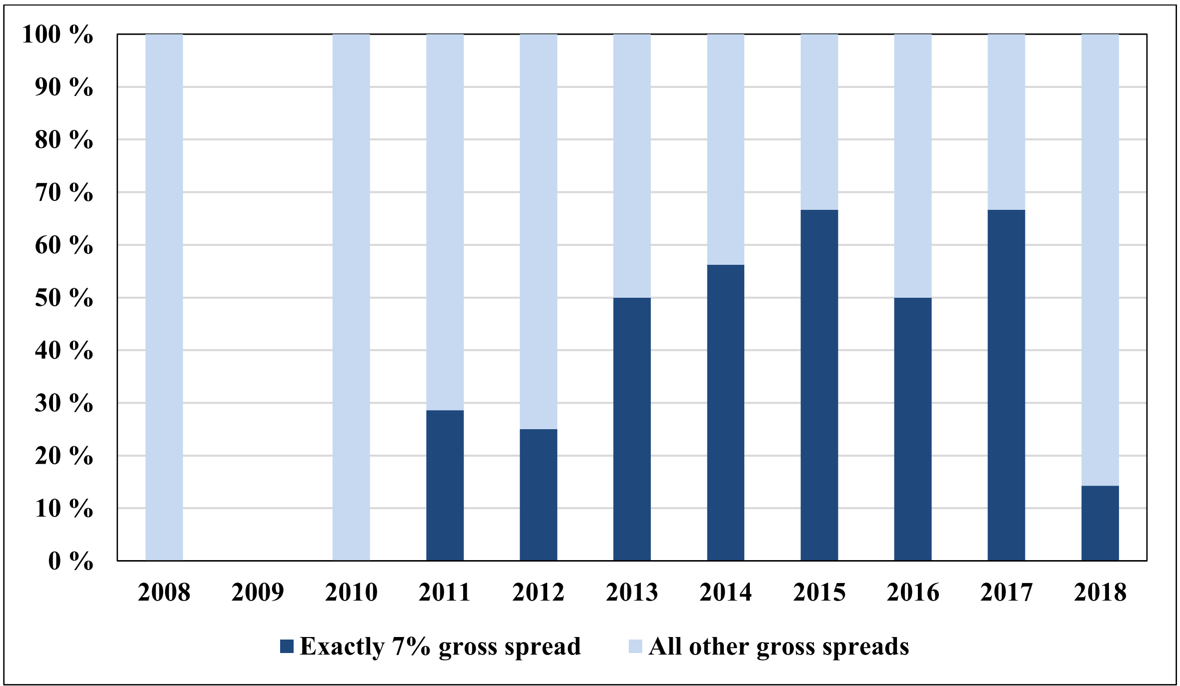
Figure 6 discloses the yearly proportion of IPOs with exactly 7% gross spreads, measured as a percentage of the total proceeds collected in the IPO, in the European subsample. Of the 272 European IPOs in the subsample, 60 had exactly 7% gross spreads. In 2009, no European IPOs had 7% gross spreads, while the total number of European IPOs in 2009 included in the sample was only 5.



Out of the size classes of the European subsample, the median gross spread is closest to seven percent in the IPOs of the 'Small' class of $25-100 million U.S. dollars in total proceeds collected. Again, this is the same range in which the greatest clustering was found, both in previous studies (by Chen and Ritter (2000) and by Abrahamson, Jenkinson and Jones (2011)) and in my sample. To investigate further, the yearly proportions of 7% gross spreads in European issues in the Small class is shown in Figure 7. The results greatly vary; in 2008 and 2010, the proportion of 7% gross spreads is zero, while in 2015 and 2017, it is 67% of the years' issues. Thus, in the Small class, significant clustering at the 7% level is taking place in the European subsample.

Figure 7. Yearly proportion of European IPOs with 7% gross spreads with total proceeds of $25 million - $100 million from 2008 to 2018.

Figure 7 presents the yearly proportion of IPOs with exactly 7% gross spreads, measured as a percentage of the total proceeds collected in the IPO, in the 'Small' class of the European subsample. 70 of the total 272 European IPOs fall in the proceeds class of $25 million - $100 million. Of these, 32 (46%) had exactly 7% gross spreads. The yearly proportion of 7% gross spreads greatly varies over the years, from 0% to 67%. In 2009, no European IPOs in the $25 million - $100 million category were included in my data.



However, the clustering patterns found in the European subsample, especially in the 'Small' size class, can be explained by several factors that I was able to find behind this interesting result. First, clustering at other integer-based levels can also be found to be happening in the European subsample, although not as significantly as at the 7% level. Second, by looking at the secondary exchanges on which the companies' stocks issued in the IPO of the Small class are listed, it can be quickly seen that the secondary exchanges, in almost all 7% gross spread cases of the European small class, are in fact U.S. exchanges, unlike the primary exchanges (and the domicile nations) that are European. Thus, it can be deduced that these 7% gross spread IPOs in the Small class of the European subsample are actually European companies seeking secondary listing in the U.S., and thus are facing U.S. level of fees, which happens to cluster around the 7% level in their size class. In a sense, this makes them 'U.S.' IPOs instead of 'European' ones, but not in the classification based on the 'domicile nation' or 'primary exchange' variables in the raw data obtained from the Securities and Data Company (SDC) Platinum database.

Third, during the data filtering process that was used to form the final 'Full' sample, 984 European IPOs were sorted out due to missing gross spread data, almost exclusively from the 'Small' and 'Medium' size classes. As gross spread information is required to be presented in the prospectuses of U.S. IPOs by the U.S. Securities and Exchange Commission (SEC), it is readily available for U.S. issues. However, the same requirement does not exist in Europe, a problem that was already encountered by Abrahamson, Jenkinson and Jones in 2011. Thus, many 'genuine' European IPOs were sorted out in the data filtering process, but the secondary listings, as described above, remained in the European subsample. This links to the fourth factor: as noted earlier, the IPOs of the European subsample are more evenly spread over the size classes, unlike in the U.S. subsample, where almost 90% of the IPOs are included in the two lowest size classes (as seen in Table 1). As many of the smaller European IPOs were sorted out during the data filtering process, the proportion of the secondary U.S. listings of European companies facing the higher 'U.S. fees' greatly increased in the two lower size classes of the European subsample, especially in the Small class.

6.3. Regression analysis

The regression analysis confirms the expectations that the 'size effect' of decreasing gross spreads with increasing issue size can be observed during the sample period from 2008 to 2018. The 'technology effect' of technology companies facing slightly higher gross spreads than their similarly sized peers, as noted by Abrahamson, Jenkinson and Jones (2011), is also observable in the sample. In privatisations carried out via IPOs, the gross spreads are lower than in otherwise similar IPOs. Book-builder syndicates result in higher fees than in IPOs with a single underwriter. Companies controlled by founder managers are not found to be accomplishing public listings with lower fees relative to their peers. To some extent, the regression results for unicorn companies seem to be misleading, but in the end not conflicting to earlier results of the figurative analysis. The regressions results are also consistent over years, and in the European subsample, over different national IPO markets.

The regression results of the ordinary least squares (OLS) regressions are presented in Table 2. Again, to make a comparison, the 'Full' sample was divided to U.S. and European subsamples, and further according to the issue size, measured by total amount of proceeds collected in the IPOs, the size classes being similar as before, as in Table 1. The gross spread, measured as a percentage of the total amount of proceeds collected in the IPO, was used as the dependent variable. The independent variables were the total amount of proceeds collected in the IPOs in logarithmic form ('lnProceeds') and dummy variables for high-tech offerings ('Technology'), privatisations ('Privatisation') and book-builder syndicates ('Syndicate'). In addition, for the IPOs of companies under the control of founder-managers, the 'F-M' dummy was used, and for technology-based 'founder-manager' companies, the dummy 'F-M-T' was used. A dummy variable for 'unicorn' companies ('Unicorn') was also established. Moreover, year dummies for the years in the sample period of 2008-2018 and country dummies for the most prominent European markets ('U.K.', 'Germany', 'Netherlands', 'Russia' and 'France') were also included. The significance of the results was evaluated by calculating the robust t-statistics of the coefficients.

As expected, the results confirm that the size effect of gross spreads decreasing as the issue size increases is still present during my sample period of 2008-2018. The coefficients of the proceeds variable ('lnProceeds') were negative throughout the results obtained by regressions with different samples, with only one conflicting result, as the European Unicorn size class had a positive proceeds coefficient. This was most likely an outlier due to low number of observations, only 10. The coefficients were also highly statistically significant when all size classes are included (the 'All Proceeds' column), in the U.S., European and 'Full' sample. These results support the theory on how the economies of scale harnessed by the underwriters are also reflected in pricing as the IPO size increases. It is also, not surprisingly, very well in line with the earlier results of studies by Chen and Ritter (2000) and Abrahamson, Jenkinson and Jones (2011).

In the case of technology companies ('Technology'), according to the results, it seems that the 'tables have not turned around', and technology companies going public still pay slightly higher gross spreads than their otherwise similar peers. For the technology companies, the coefficients for the Technology dummy were all slightly positive, except in the 'Large' $500-1000 million issue size class, where they were negative in both U.S. and European subsamples and the 'Full' sample. These results were also in line with Abrahamson, Jenkinson and Jones (2011), who found a similar positive 'technology effect' on the gross spreads, but contradictory to the hypothesis setting. Overall, the coefficients indeed are largely slightly positive, and statistically significant when all size classes are included, in all three 'main samples' (i.e. the U.S. and the European subsamples, and the combined Full sample). Highly statistically significant, (slightly) positive results can also be found in the 'Small' ($25-100 million) and 'Medium' ($100-500 million) size classes of the combined U.S. and European sample, and in the European Small class. The negative values found in the Large class lacked statistical significance.

In the 'privatisation' IPOs ('Privatisation'), where there is a public party (e.g. a government) selling its equity in order to privatise a business, the gross spreads charged by the underwriters are lower than in otherwise similar IPOs. The result is consistent with Abrahamson, Jenkinson and Jones (2011), who also found the privatisations to experience lower gross spreads, though the explanatory power is weaker. Abrahamson, Jenkinson and Jones (2011) offer no explanation for the phenomenon, but it could be theorised that the government is a strong counterparty in negotiations with the underwriters, resulting in lower gross spreads. This theory is supported by Torstila (2001), who suggests that the underwriters value the follow-up possibilities included in a privatisation when negotiating about their fees. One good example of this is the IPOs of the Turk Telekomunikasyon AS, where the Turkish government privatised the company through two IPOs and paid only a tiny 0.09% gross spread to the underwriters (as seen in the Appendix 4), a number significantly lower than even in the other 'Huge' class IPOs. The privatisation results are only relevant for European issues, since no U.S. privatisations took place in 2008-2018.

According to the regression results, using multiple book-builders results in higher fees. Throughout the sample, the coefficients for book-builder syndicates ('Syndicate') are slightly positive, with only exceptions found in the Huge class of European subsample and the 'Full' sample, albeit with no explanatory power. Including all size classes, the coefficients for syndicates are slightly positive in all main samples. This is somewhat contradictory to earlier results by Abrahamson, Jenkinson and Jones (2011), who found the underwriter syndicates to have very slightly positive, or more importantly, strongly negative effect on the gross spreads. Especially for the European sample, their results were negative with high explanatory power. Thus, it seems that even though underwriter syndicates used to result in lower fees in Europe, this does not hold during my sample period of 2008-2018.

For the companies with powerful founder-managers retaining the control through voting rights, the results are not supportive of the hypothesis. In the U.S. subsample, in 'Small', 'Huge' and 'Unicorn' classes, very slightly negative coefficients of the founder-manager dummies ('F-M' and 'F-M-T') can be found, but in 'Medium', 'Large' and 'All proceeds' classes, they are very slightly positive or not available. Statistically, there is no explanatory power. In the European subsample, coefficients are in most cases not available, or lack explanatory power. However, the negative coefficient of the F-M dummy in the European 'Unicorn' class stands out with very high statistical significance, but this is explained by very low number of observations and inclusion of two outliers, the IPOs of MegaFon (see Appendix 3). In the 'Full' sample, the founder-manager dummies have very slightly positive or negative coefficients with no or weak explanatory power, depending on the size class. To conclude, it seems that the results do not support the idea that founder-managers with controlling rights could be able to exercise their negotiation power towards underwriters, resulting in lower gross spreads. The results do not change, whether the company controlled by the founder-manager(s) is a technology company or not.

As for unicorn companies, the regression results are somewhat misleading. To better examine the gross spreads faced by the unicorn companies, the 'Unicorn' dummy variable was introduced to the main sample level. It receives positive and statistically highly significant results in all three main samples, indicating that the unicorn companies would pay lower fees to the underwriters. However, this is only half true. Looking back at Table 1, the unicorn companies are indeed paying low fees, but not lower than their control group, the 'Huge' class, who are paying slightly lower fees than the 'Unicorns'. What separates the Unicorns from the Huge class, is the fact that all unicorn companies are also technology companies, something that all companies of the Huge class are not. Thus, it can be reasoned that the unicorn companies indeed pay lower fees due to their strong exposure to the size effect, but simultaneously, also slightly higher fees than their similarly sized peers due to their exposure to the technology effect

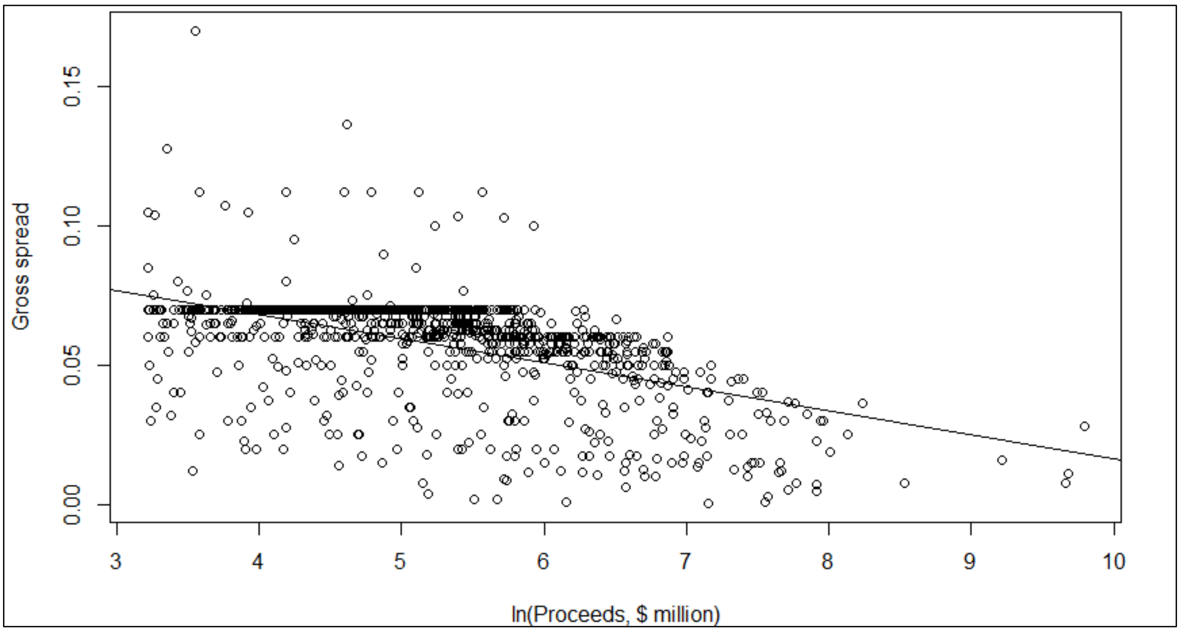
The year and country dummies are acting properly as time and market controls. First, the year dummies seem to have some explanatory power at the main sample level in the European and 'Full' samples, but any consistent patterns disappear when the samples are divided into size classes. In the U.S. subsample, no explanatory power can be found. The yearly results in 'Small' and 'Medium' classes of the European subsample, and thus, the results of the Full sample affected by the European results, are again caused by low number of observations, including some outliers. Looking at the 'All proceeds' column of the Full sample, the coefficients of year dummies are negative with similar magnitude. Since the purpose of the year dummies is to act as time controls, being negative on similar levels over the years, they confirm that the other control variables are consistent over time. However, the year dummy coefficients suggest a mild increase in the European gross spreads over the sample period of 2008-2018, which is in line with earlier results shown in Table 1.

Second, the country dummies initially also seem to have explanatory power over the gross spread, when observing the significance of the country coefficient values in the 'Full' sample. However, this significance disappears in the European subsample, when the U.S. observations are excluded. This is especially true for the British ('U.K.') and German ('Germany') markets, even though the dummy values suggest lower fees for both countries. As the country dummies naturally do not exist in the U.S. sample, it can be deduced that they do not have real explanatory power either in the Full sample. Thus, the European results are not biased by IPOs of any single market.

The constants ('Constant'), i.e. the intercepts of the regressions, could be interpreted as the 'average' level of gross spreads in the sample, but this proves to be somewhat misleading. It is often difficult to interpret the constant, and the same stands for my results; the constants are higher than the average fees presented in Table 1. However, this is explained by the distribution of the data. The gross spreads are decreasing as the issue size ('lnProceeds') increases. Thus, the 'size effect' causes the regression trendline, if drawn over the data, to be downward sloping. This is demonstrated in Figure 8, which includes all observations of the 'Full' sample. It also means that the constant will be inevitably higher than the calculated average level of fees. Thus, the interpretation of the constants as the 'average' level of fees is somewhat incorrect. Possibly for the same reason, Abrahamson, Jenkinson and Jones (2011) present no interpretation of the constants.

Figure 8. Regression trendline in the Full sample.

Figure 8 shows the clustering of IPO gross spreads, containing the full sample of 1450 IPOs. 'Gross spread' is a percentage of the total IPO proceeds, and 'ln(Proceeds)' is the total IPO proceeds (in $ million) on a logarithmic scale.



The adjusted[8] r-squared ('R^2') values, i.e. the overall fits of the regressions, do not reveal anything particularly interesting. Generally, the r-squared values are not directly comparable between different regression models. A r-squared of 5% could be high in some applications (e.g. in regression models predicting returns), but low in others (e.g. regression models used for factor-based asset pricing). In my sample, the r-squared values of the regressions vary between 2% in the U.S. Small class to 86% in the U.S. Unicorn class, with the values becoming heavily inflated as the number of observations in the class decreases. Similar variation also appears in the r-squared values of the earlier regression results by Abrahamson, Jenkinson and Jones (2011). As with the constants, Abrahamson, Jenkinson and Jones (2011) do not comment on the r-squared values of their regression results.

[8] According to the example of Theil (1961), the adjusted r-squared ($\bar{R}^2$) values of my regressions are calculated as follows, with a penalty for the number of regressors as the R^2 always increases if more independent variables are added to the regression model:

$$\bar{R}^2 = 1 - \left[\frac{n-1}{n-k-1}(1-R^2)\right]$$

in which 'n' = number of observations in the (sub)sample, 'k' = number of independent variables, excluding the constant and 'R2' = non-adjusted r-squared = 1 – Sum of squared residuals / Sum of squares.

Table 2. Determinants of gross spreads in U.S. and European IPOs from 2008 to 2018.

Table 2 presents the determinants of gross spreads obtained by running OLS regressions on the sample data of 1450 IPOs (the result of filtering process described in Section 4 “4.2. Data filtering process”), from the period of 2008-2018, categorised based on the IPO size. The dependent variable is gross spread (as a percentage multiplier of the total amount of proceeds collected in the IPO). The independent variables are the natural logarithm of proceeds (total amount of proceeds collected in the IPOs), plus dummy variables for technology offerings, privatisations, book-builder syndicates, offerings of companies controlled by founder-managers, offerings of technology companies controlled by founder-managers and offerings of ‘unicorn’ companies. Year dummies for the years 2008-2018 and country dummies for the most important European markets (U.K., Germany, Netherlands, Russia and France) are also included. Significance is based on Student’s (1908) t-statistics (*** = 0.1% ; ** = 1% ; * = 5%).

		U.S.					
		≥$25 Million >$100 Million	≥$100 Million >$500 Million	≥$500 Million >$1000 Million	>$1000 Million	Unicorns >$1000 Million	All Proceeds
Control Variables	Constant	0.074 ***	0.103 ***	0.135 ***	0.103 ***	0.146	0.096 ***
	lnProceeds	- 0.001	- 0.007 ***	- 0.011 *	- 0.009 **	- 0.010	- 0.007 ***
	Technology	0.001	0.003 ***	- 0.006 *	0.007	-	0.002 **
	Privatisation	-	-	-	-	-	-
	Syndicate	0.001	0.001	0.004	-	-	0.004 ***
	F-M	- 0.001	0.003	0.000	- 0.010	- 0.018	0.002
	F-M-T	- 0.005	0.000	0.007	-	-	0.000
	Unicorn	-	-	-	-	-	- 0.014 ***
Year Dummies	2009	0.000	- 0.002	- 0.007	- 0.006	- 0.029	- 0.001
	2010	0.000	0.000	- 0.009	- 0.012	-	- 0.001
	2011	- 0.003	- 0.001	- 0.008	- 0.005	- 0.025	- 0.002
	2012	0.000	- 0.003	- 0.009	- 0.001	- 0.018	- 0.002
	2013	0.002	- 0.001	- 0.006	- 0.004	- 0.033	- 0.001
	2014	- 0.001	- 0.003	- 0.010	- 0.008	- 0.027	- 0.003
	2015	- 0.002	- 0.003	- 0.006	0.002	- 0.015	- 0.003
	2016	- 0.003	- 0.003	- 0.009	0.004	-	- 0.004
	2017	0.000	- 0.004	- 0.019 *	- 0.004	- 0.019	- 0.004
	2018	- 0.004	- 0.002	- 0.010	- 0.006	- 0.027	- 0.003
Country Dummies	U.K.	-	-	-	-	-	-
	Germany	-	-	-	-	-	-
	Netherlands	-	-	-	-	-	-
	Russia	-	-	-	-	-	-
	France	-	-	-	-	-	-
Adjusted R^2		0.017	0.201	0.137	0.420	0.861	0.366
Observations		501	557	87	33	12	1178

Table 2. Determinants of gross spreads in U.S. and European IPOs from 2008 to 2018. (CONTINUED)

Table 2 presents the determinants of gross spreads obtained by running OLS regressions on the sample data of 1450 IPOs (the result of filtering process described in Section 4 “4.1. Data filtering process”), from the period of 2008-2018, categorised based on the IPO size. The dependent variable is gross spread (as a percentage multiplier of the total amount of proceeds collected in the IPO). The independent variables are the natural logarithm of proceeds (total amount of proceeds collected in the IPOs), plus dummy variables for technology offerings, privatisations, book-builder syndicates, offerings of companies controlled by founder-managers, offerings of technology companies controlled by founder-managers and offerings of ‘unicorn’ companies. Year dummies for the years 2008-2018 and country dummies for the most important European markets (U.K., Germany, Netherlands, Russia and France) are also included. Significance is based on Student’s (1908) t-statistics (*** = 0.1% ; ** = 1% ; * = 5%).

		Europe					
		≥$25 Million >$100 Million	≥$100 Million >$500 Million	≥$500 Million >$1000 Million	>$1000 Million	Unicorns >$1000 Million	All Proceeds
	Constant	0.075 ***	0.142 ***	0.342 **	0.050	- 0.142 ***	0.103 ***
Control Variables	lnProceeds	- 0.004	- 0.015 **	- 0.046 *	- 0.005	0.024 ***	- 0.010 ***
	Technology	0.019 ***	0.010 *	- 0.011	0.004	-	0.014 ***
	Privatisation	-	- 0.044 *	- 0.020	- 0.010	- 0.035 ***	- 0.020 ***
	Syndicate	0.016 ***	0.008	- 0.020	0.004	-	0.015 ***
	F-M	-	-	-	0.020	- 0.016 ***	0.008
	F-M-T	-	-	-	-	-	-
	Unicorn	-	-	-	-	-	- 0.018 *
Year Dummies	2009	-	0.004	-	0.005	-	- 0.005
	2010	- 0.043 **	- 0.022 *	0.017	0.000	- 0.019 ***	- 0.018 **
	2011	- 0.021 *	- 0.016	- 0.010	0.006	0.039 ***	- 0.018 **
	2012	- 0.028 *	- 0.009	-	- 0.015	- 0.007 ***	- 0.017 *
	2013	- 0.020 *	- 0.019	- 0.002	- 0.001	-	- 0.018 **
	2014	- 0.029 **	- 0.019	0.010	- 0.005	- 0.019 ***	- 0.020 ***
	2015	- 0.027 *	- 0.027 **	0.006	- 0.012	-	- 0.022 ***
	2016	- 0.032 **	- 0.036 **	0.010 *	- 0.014	-	- 0.026 ***
	2017	- 0.014	- 0.014	0.020	0.016	-	- 0.011 .
	2018	- 0.035 **	- 0.018	0.046	-	-	- 0.019 **
Country Dummies	U.K.	- 0.003	- 0.006	0.002	0.013	-	- 0.004
	Germany	- 0.000	- 0.005	0.003	0.012	-	- 0.005
	Netherlands	0.009	0.000	0.027	0.009	-	0.003
	Russia	-	0.002	0.006	- 0.008	-	- 0.006
	France	- 0.002	0.013	-	0.002	-	0.001
Adjusted R^2		0.654	0.263	0.393	0.264	n.m.	0.511
Observations		70	116	44	42	10	272

Table 2. Determinants of gross spreads in U.S. and European IPOs from 2008 to 2018. (CONTINUED)

Table 2 presents the determinants of gross spreads obtained by running OLS regressions on the sample data of 1450 IPOs (the result of filtering process described in Section 4 “4.2. Data filtering process”), from the period of 2008-2018, categorised based on the IPO size. The dependent variable is gross spread (as a percentage multiplier of the total amount of proceeds collected in the IPO). The independent variables are the natural logarithm of proceeds (total amount of proceeds collected in the IPOs), plus dummy variables for technology offerings, privatisations, book-builder syndicates, offerings of companies controlled by founder-managers, offerings of technology companies controlled by founder-managers and offerings of ‘unicorn’ companies. Year dummies for the years 2008-2018 and country dummies for the most important European markets (U.K., Germany, Netherlands, Russia and France) are also included. Significance is based on Student’s (1908) t-statistics (*** = 0.1% ; ** = 1% ; * = 5%).

		U.S. and Europe					
		≥$25 Million >$100 Million	≥$100 Million >$500 Million	≥$500 Million >$1000 Million	>$1000 Million	Unicorns >$1000 Million	All Proceeds
Control Variables	Constant	0.074 ***	0.113 ***	0.115 *	0.076 ***	0.047	0.103 ***
	lnProceeds	- 0.002	- 0.010 ***	- 0.010	- 0.008 **	- 0.002	- 0.009 ***
	Technology	0.004 ***	0.004 ***	- 0.003	0.005	-	0.004 ***
	Privatisation	-	- 0.052 ***	- 0.034 ***	- 0.018 **	- 0.033 *	- 0.034 ***
	Syndicate	0.006 ***	0.008 ***	- 0.003	0.015 *	-	0.009 ***
	F-M	0.001	0.005	0.004	- 0.001	- 0.002	0.005 *
	F-M-T	- 0.008	- 0.001	0.003	-	-	- 0.002
	Unicorn	-	-	-	-	-	- 0.011 ***
Year Dummies	2009	0.000	- 0.005	0.008	- 0.000	0.006	- 0.002
	2010	- 0.001	- 0.006	0.002	- 0.013	- 0.019	- 0.005 *
	2011	- 0.004	- 0.006 *	- 0.001	- 0.007	0.008	- 0.008 ***
	2012	- 0.002	- 0.006 *	0.009	- 0.007	- 0.018	- 0.006 *
	2013	0.001	- 0.007 *	0.005	- 0.004	0.001	- 0.006 *
	2014	- 0.002	- 0.009 **	0.005	- 0.003	- 0.004	- 0.008 ***
	2015	- 0.002	- 0.011 ***	0.005	0.002	- 0.005	- 0.008 ***
	2016	- 0.005	- 0.010 **	0.003	0.005	-	- 0.010 ***
	2017	0.001	- 0.009 **	- 0.003	- 0.005	- 0.002	- 0.007 **
	2018	- 0.006	- 0.007 *	0.011	- 0.000	0.010	- 0.007 **
Country Dummies	U.K.	- 0.020 ***	- 0.017 ***	- 0.012 *	- 0.010	-	- 0.017 ***
	Germany	- 0.014 ***	- 0.018 ***	- 0.019 **	- 0.019 **	-	- 0.018 ***
	Netherlands	0.000	- 0.007	0.012	- 0.010	-	- 0.006 *
	Russia	-	- 0.003	- 0.022 **	- 0.010	-	- 0.019 ***
	France	- 0.008	0.005	-	- 0.014	-	- 0.006
Adjusted R^2		0.246	0.331	0.298	0.414	0.593	0.526
Observations		571	673	131	75	23	1450

7. DISCUSSION

To begin with, the hypotheses set in Section 3 can now be evaluated against the results of the analysis described in Section 6. Table 3 below draws a comparison between the hypotheses and the results. Assessing the success and accuracy of the hypothesis setting, the outcome is mixed. In the cases of Hypothesis 1 and Hypothesis 2, the findings support the hypotheses. As for Hypothesis 3, the evidence points to the opposite direction. Lastly, for Hypothesis 4 and Hypothesis 5, the results are somewhat conflicting, depending e.g. on the size classification of the IPOs. Thus, it can be concluded that the accuracy of the hypothesis setting was only moderate.

Table 3. Hypotheses and Findings.

Table 1 presents the hypotheses 1-5 set in Section 3 ('Hypotheses') and the corresponding results found relative to these hypotheses ('Findings').

Hypotheses	Findings
H1: U.S. IPOs will have higher gross spreads (will be more expensive) than European ones	The U.S. IPOs are greatly costlier than European ones from the issuers' perspective
H2: IPOs with larger market capitalisations will have smaller gross spreads	Underwriters require smaller gross spreads for IPOs with larger market capitalisations
H3: Technology IPOs will have smaller gross spreads than otherwise similar IPOs	Technology companies face slightly higher gross spreads than their non-tech peers
H4: IPOs of companies controlled by founder-managers will have smaller gross spreads than otherwise similar IPOs	The 'founder-manager'-flagged IPOs cannot be associated with lower gross spreads than their control group
H5: IPOs of "Unicorn" companies will have the smallest gross spreads	The 'Unicorns' face slightly higher gross spreads than their similarly sized peers

The U.S. and European median gross spreads (presented in Table 1) clearly show that the U.S. gross spreads for similar issues are way above the European ones. Controlling for size, the U.S. spreads are higher in every class, with the difference increasing as the issue size increases. Controlling for time, U.S. spreads are again significantly higher every year during the sample period. Thus, hypothesis one is supported by the results, proving that U.S. IPOs have higher gross spreads than European ones, making them more expensive from the companies' perspective. Moreover, in the case of hypothesis two, based on the pattern that the median IPO gross spreads decrease as the issue size increases (which can be clearly observed from Table 1), and the regression coefficients of the total amount of proceeds in logarithmic form (the coefficient of variable 'lnProceeds' as seen in Table 2), it can be stated that IPOs with larger market capitalisations indeed experience smaller gross spreads. Thus, hypothesis two is also supported by the results.

For the next three hypotheses, the results are less obvious. According to the results of regression analysis, technology companies face slightly higher fees than their peers, except in the $500 million to $1000 million U.S. dollars ('Large') category, where results point to the opposite direction. The results are more in line with Abrahamson, Jenkinson and Jones (2011), who also found a slightly positive effect, on the contrary to what was expected in the hypothesis setting. The evidence speaks against hypothesis three as technology IPOs do not have smaller gross spreads than otherwise similar IPOs, and they actually have slightly higher gross spreads. This can be clearly seen from the highly statistically significant positive coefficients of the U.S. and European subsamples and the combined 'Full' sample (the 'All proceeds' columns in Table 2). Thus, hypothesis three is not supported by the evidence.

The findings compared with hypothesis three are somewhat ambiguous. First, looking at the coefficients of the 'F-M' dummy, the companies with founder-managers retaining the effective control seem to experience slightly lower or higher fees, depending on the issue size, and the results lack statistical significance. Second, looking at the coefficients of the 'F-M-T' dummy, the negotiation power of founder-managers appears to very slightly mitigate the positive 'technology effect' driving up the fees, but these results also lack statistical significance. Considering the coefficients of both dummy variables, it cannot be confirmed that controlling founder-managers have a lowering effect on the gross spreads charged from their companies by the underwriters. Thus, hypothesis four is ultimately not supported by the results.

Lastly, in the case of hypothesis five, the results are again mixed. In the U.S. subsample, the unicorn companies seeking public listing face slightly lower fees relative to their closest control group, the companies of the 'Huge' class. In the European subsample, this relation turns around, and the unicorn companies end up paying slightly higher (on average level) or equal (on median level) fees relative to the companies of the 'Huge' class. However, in the 'Full' sample, the relation resembles the European subsample, and the unicorn companies are charged slightly higher fees, on both average and median terms, by the underwriters compared with the 'Huge'-classed companies. Furthermore, the negative statistically significant) coefficients of the 'Unicorn' dummy variable found in Table 2 suggest that the unicorn companies are paying lower fees relative to their peers. However, by using the ‘Huge’ class as a size control, it can be deduced that the negative coefficients result from the unicorn companies’ exposure to the ‘size effect’, and that their exposure to the technology effect in turn works against this negative relation. This is also well in line with the results of the technology companies, and by combining the size and technology effects, the result is slightly higher median and average fees than in the ‘Huge’ class. Thus, hypothesis five is also ultimately not supported by the results.

The clustering patterns found in earlier studies by Chen and Ritter (2000), and Abrahamson, Jenkinson and Jones (2011) are still present during my sample period, and significant clustering of gross spreads at the seven percent level persists in the U.S. subsample. Over half of U.S. IPOs had exactly 7% gross spreads in 2008-2018, and the proportion of 7% gross spreads increased slightly in the course of the period. Especially the gross spreads of the issues in the $25 to $100 million ‘Small’ class were strongly clustered, with the proportion of 7% gross spreads mostly varying around 80% level in this size class during the sample period. However, no distinctive upward or downward trends were detectable. Additionally, I found that some clustering at the 7% level appeared to be occurring in the gross spreads of issues included in the European subsample. This surprising finding concerned particularly the Small size class of the European subsample and conflicted with the results of the 2011 study by Abrahamson, Jenkinson and Jones. However, this clustering found in the European subsample could be explained by several factors that were affecting the results, for example by the secondary listings of European companies on U.S. exchanges.

8. CONCLUSIONS

I analysed the gross spreads of U.S. and European initial public offerings during the sample period of 2008 to 2018. Through data selection and filtering, a raw sample of 4515 IPOs was condensed into a final sample of 1450 IPOs. Most of the observations were from the U.S., nearly 80%, which significantly affects my results. The combined U.S. and European sample was divided into U.S. and European subsamples to mitigate this bias. These three main samples were then further classified based on the amount of proceeds in the issues, resulting in four main classes plus an additional 'unicorn' class of huge offerings by technology companies. After the subsampling and classification, the data was analysed figuratively, visually and with regression analysis, producing time and country-consistent results. Finally, the obtained results were reviewed respect to the hypotheses set earlier on, that were based on existing literature over the subject.

By looking at the results of my analysis of the gross spreads in U.S. and European IPOs in 2008-2018, it can be concluded that the "seven percent solution" still persists to this day. Originally found by Chen and Ritter (2000) and confirmed by Abrahamson, Jenkinson and Jones (2011), it concerns the phenomenon of U.S. gross spreads clustering around the 7.00% level. It is present in the U.S. issues, especially in the 'Small' $25 million to $100 million of total proceeds class, but in other size classes as well. Even though not as extremely frequent as before, the proportion of exactly 7% gross spreads remains very high, on average over 80% in 2008-2018 in the Small issues. The European IPO fees also remain mostly much cheaper than the U.S. fees during my sample period of 2008-2018, even after controlling for issue size and time. However, a specific "three percent wedge", as documented by Abrahamson, Jenkinson and Jones (2011), no longer exists between the U.S. and European issues.

Based on the regression results, I conclude that technology companies face slightly higher gross spreads than their otherwise similar non-technology-based peers, which corresponds to the earlier result of Abrahamson, Jenkinson and Jones (2011). This effect is also present with the so-called 'unicorns', technology companies with valuations over $1000 million, who pay lower fees to the underwriters due to their huge size, but eventually slightly higher than their peers due to their exposure to the 'technology effect'. Even the founder-managers of technology companies retaining the control over the companies seem not be able to avoid paying this 'technology premium'. Generally, the founder-managers do not achieve the same success they had with previous investors in the negotiations with the underwriters of the IPOs over the level of the gross spread.

Moreover, I determine that in privatisations, the gross spreads demanded by the underwriters are lower when compared with otherwise similar issues, which is consistent with the results of Abrahamson, Jenkinson and Jones (2011). However, my results are not as statistically significant. Also, justified by my results, using multiple book-builders (underwriters) mostly results in higher gross spreads. The coefficients for book-builder syndicates are slightly positive in all main samples, contradicting earlier results of Abrahamson, Jenkinson and Jones (2011), who found very slightly positive or strongly negative coefficients for multiple book-builders. Thus, it can be concluded that although multiple book-builders used to result in lower gross spreads in European issues, this no longer holds true during my sample period of 2008-2018. Furthermore, based on the coefficients of the country and year dummies, I demonstrate that the results of my regression analysis are consistent over time and different national markets in Europe, even though a slight increase in the general levels of European gross spreads can be detected to occur over the sample period.

My study is limited to the analysis of the gross spreads in the U.S. and Europe, and how different issue characteristics affect them. However, it does not focus on the reasons explaining the clustering of the gross spreads around certain integer-based levels. Moreover, my results are somewhat burdened by the possible bias resulting from the exclusion of a large amount of especially smaller and medium-sized European issues, for which gross spread data was not available. Additionally, some inaccuracy might result from the hand collection of the founder-manager sample. Also, only non-book-built IPOs and all issues smaller than $25 million U.S. dollars were excluded from the analysis in order to preserve comparability of my results with earlier studies, mainly with Abrahamson, Jenkinson and Jones (2011), and Chen and Ritter (2000). Finally, in comparison to other size classes, the 'Huge' and 'Unicorn' classes include a low number of observations, which must be considered when evaluating the results of these classes.

Suggested topics for future research include, for example, researching if the explanations for the clustering of gross spreads have changed relative to the studies by Chen and Ritter (2000), Hansen (2001), Torstila (2003) and Abrahamson, Jenkinson and Jones (2011). Also, further analysis of the significant negotiation power of the founder-managers affecting other areas of their companies' businesses and the special characteristics of the 'unicorn' companies would be interesting research topics.

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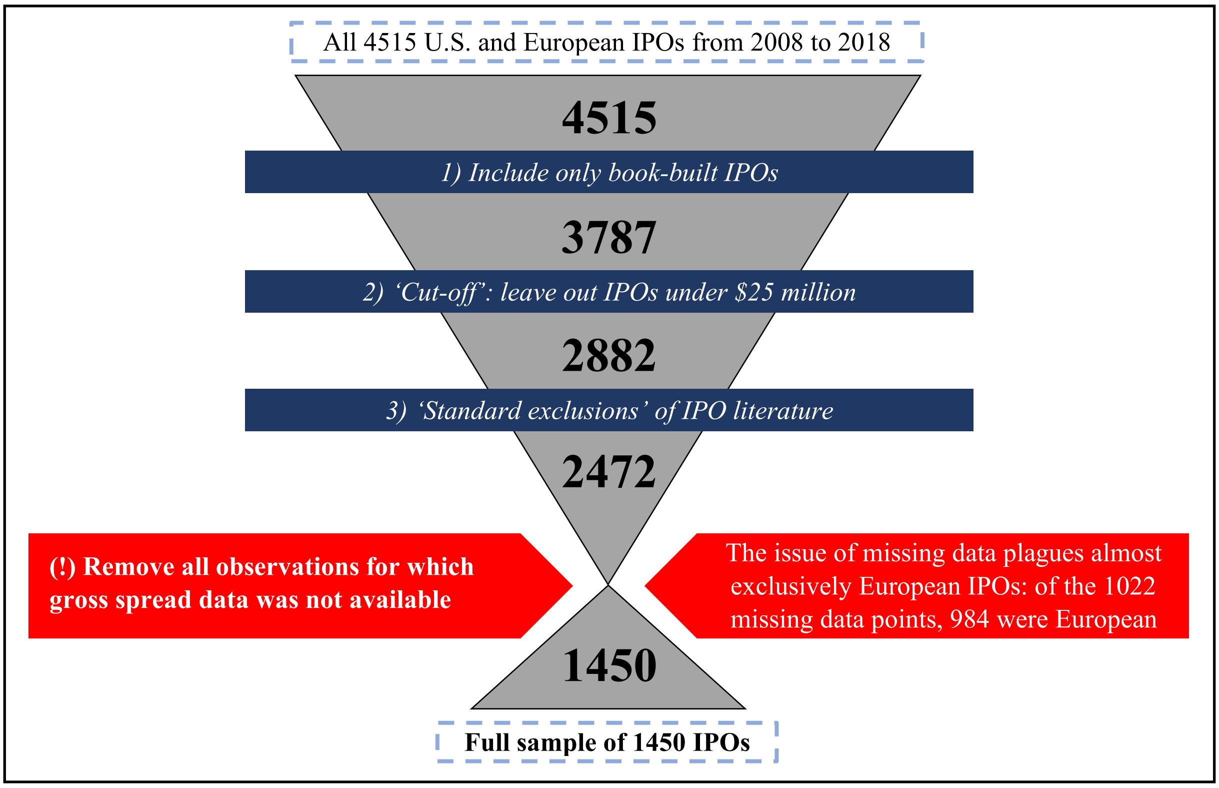
APPENDIX

List of Appendices

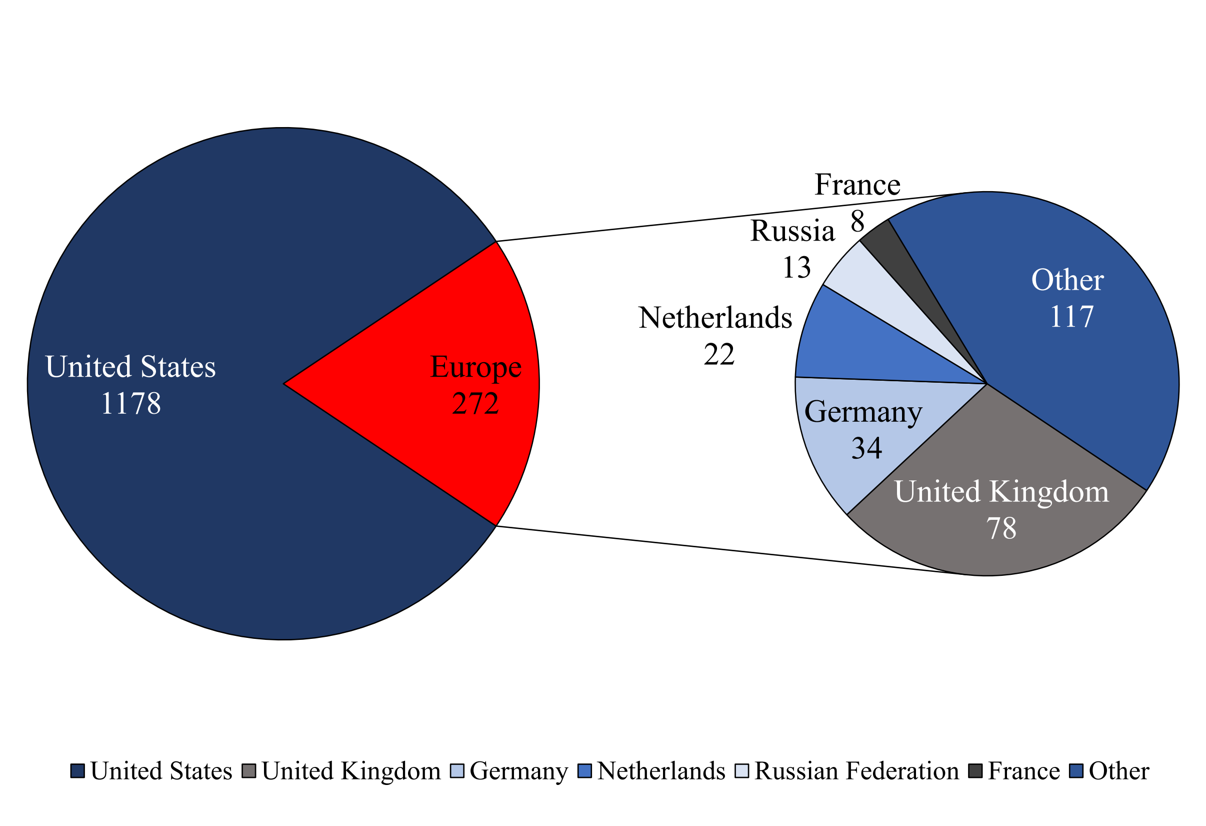
A1. Data filtering process.

Appendix 1 describes the data filtering process applied to the raw data obtained from the Securities and Data Company (SDC) Platinum database in detail. Only book-built IPOs were included to preserve direct comparability to earlier results, mainly to Abrahamson, Jenkinson and Jones (2011). Similarly to both Chen and Ritter (2000) and Abrahamson, Jenkinson and Jones (2011)), small IPOs under $25 million are excluded and some standard exclusions are also made, including e.g. SPACs and REITs.



A2. National distribution of IPOs based on domicile nations.

Appendix 2 presents the national distribution of the 1450 IPOs included in the full sample, based on their domicile nations. The domicile nations of the IPOs are defined according to the 'Nation' variable in the SDC Platinum database. The left pie chart divides the sample into U.S. and European categories. In the right pie chart, the European IPOs are further categorised based on the domicile nations inside Europe. The 'Other' category of the right pie chart includes the (European) IPOs of companies that are not domiciled in the following European nations of United Kingdom, Germany, Netherlands, Russian Federation or France.



A3. IPOs with founder-manager flagging.

Appendix 3 presents the 84 IPOs with Founder-Manager flagging (companies under the effective control of founder-managers), by providing additional information about the IPOs included. 'Issuer' lists the companies going public, 'Business Description' the main businesses of the companies (according to SDC), 'Nation' the domicile nations of the companies, 'Exchange' the exchanges on which the issues are listed, 'Gross spread' the gross spreads (as a percentage of the total amount of proceeds), 'Proceeds' the total amount of proceeds collected in the IPOs. Moreover, dummy values for 'unicorn' and technology companies controlled by founder-managers are provided for the listed IPOs.

Year	Issuer	Business Description	Nation	Exchange	Gross spread, %	Proceeds ($ Million)	F-M-T	Unicorn
2008	Visa Inc	Provide electronic payment services	U.S.	NYSE	2.80	17864	1	1
2009	Hyatt Hotels Corp	Own and operate hotels	U.S.	NYSE	5.12	950	0	0
2010	Ironwood Pharmaceuticals	Manufacture and develop pharmaceutical products	U.S.	NASDQ	7.00	188	1	0
2010	Tesla Motors Inc	Manufacture electric automobiles	U.S.	NASDQ	6.50	226	0	0
2010	Ameresco Inc	Provide energy management services	U.S.	NYSE	7.00	87	0	0
2011	LinkedIn Corp	Provide online networking services	U.S.	NYSE	7.00	353	1	0
2011	Yandex NV	Provide internet services	Russia	NASDQ	5.00	1304	1	1
2011	Zillow Inc	Provide online re-information services	U.S.	NASDQ	7.00	69	1	0
2011	Groupon Inc	Provide online marketing services	U.S.	NASDQ	6.00	700	1	0
2011	Angie's List Inc	Provide online reviews services	U.S.	NASDQ	7.00	114	1	0
2011	Jive Software Inc	Develop social business software	U.S.	NASDQ	7.00	161	1	0
2011	Michael Kors Holdings Ltd	Manufacture, wholesale of men's, women's clothing	U.S.	NYSE	5.00	944	0	0
2011	Zynga Inc	Provide online social gaming services	U.S.	NASDQ	3.25	1000	1	1
2012	Yelp Inc	Provide internet search engine services	U.S.	NYSE	7.00	107	1	0
2012	Demandware Inc	Develop internet software	U.S.	NYSE	7.00	88	1	0
2012	Annie's Inc	Natural and organic food	U.S.	NYSE	7.00	95	0	0
2012	Tilly's Inc	Retailer of apparels	U.S.	NYSE	7.00	124	0	0
2012	Facebook Inc	Internet service provider	U.S.	NASDQ	1.10	16007	1	1
2012	ServiceNow Inc	Develop internet software	U.S.	NYSE	7.00	210	1	0
2012	Globus Medical Inc	Manufacture medical devices and instruments	U.S.	NYSE	7.00	100	1	0
2012	Workday Inc	Provide software solutions services	U.S.	NYSE	6.00	637	1	0
2012	MegaFon	Cellular Communications	Russia	MICEX	1.00	1691	1	1
2012	MegaFon	Cellular Communications	Russia	LONDN	1.00	1691	1	1

Data Source: Securities and Data Company (SDC) Platinum database.

A3. IPOs with founder-manager flagging. (CONTINUED)

Appendix 3 presents the 84 IPOs with Founder-Manager flagging (companies under the effective control of founder-managers), by providing additional information about the IPOs included. ‘Issuer’ lists the companies going public, ‘Business Description’ the main businesses of the companies (according to SDC), ‘Nation’ the domicile nations of the companies, ‘Exchange’ the exchanges on which the issues are listed, ‘Gross spread’ the gross spreads (as a percentage of the total amount of proceeds), ‘Proceeds’ the total amount of proceeds collected in the IPOs. Moreover, dummy values for ‘unicorn’ and technology companies controlled by founder-managers are provided for the listed IPOs.

Year	Issuer	Business Description	Nation	Exchange	Gross spread, %	Proceeds ($ Million)	F-M-T	Unicorn
2013	William Lyon Homes Inc	Construction company	U.S.	NYSE	7.00	218	0	0
2013	Tableau Software Inc	Develop pre-packaged software	U.S.	NYSE	7.00	254	1	0
2013	Noodles & Co	Own and operate restaurants	U.S.	NASDQ	7.00	96	0	0
2013	NRG Yield Inc	Own and operate renewable energy	U.S.	NYSE	5.50	431	0	0
2013	Ringcentral Inc	Develop communication software	U.S.	NYSE	7.00	98	1	0
2013	RE/MAX Holdings Inc	Provide real estate brokerage services	U.S.	NYSE	10.34	220	0	0
2013	Veeva Systems Inc	Develop CRM content management software	U.S.	NYSE	11.20	261	1	0
2013	AMC Ent. Holdings Inc	Motion picture theatres	U.S.	NYSE	5.25	332	0	0
2014	EP Energy Corp	Oil and natural gas exploration and production	U.S.	NYSE	4.50	704	0	0
2014	Castlight Health Inc	Develop health care software	U.S.	NYSE	7.00	178	1	0
2014	Phibro Animal Health Corp	Pharmaceutical preparation manufacturing	U.S.	NASDQ	6.75	191	1	0
2014	Moelis & Co	Investment advice	U.S.	NYSE	7.00	163	0	0
2014	GoPro Inc	Photographic equipment manufacturing	U.S.	NASDQ	6.00	427	0	0
2014	Townsquare Media Inc	Own and operate radio stations	U.S.	NYSE	7.00	92	1	0
2014	Medley Management Inc	Investment advice	U.S.	NYSE	7.00	108	0	0
2014	Wayfair Inc	Electronic shopping	U.S.	NYSE	6.00	319	1	0
2014	Workiva Inc	Software publishers	U.S.	NYSE	7.00	101	1	0
2015	Box Inc	Software publishers	U.S.	NYSE	7.00	175	1	0
2015	Inovalon Holdings Inc	Data processing, hosting and related services	U.S.	NASDQ	5.93	600	1	0
2015	Fitbit Inc	Electronic equipment manufacturing	U.S.	NYSE	6.00	732	1	0
2015	MINDBODY Inc	Software publishers	U.S.	NYSE	7.00	100	1	0
2015	AppFolio Inc	Software publishers	U.S.	NASDQ	7.00	74	1	0
2015	Live Oak Bancshares Inc	Commercial banking	U.S.	NASDQ	5.18	82	0	0

Data Source: Securities and Data Company (SDC) Platinum database.

A3. IPOs with founder-manager flagging. (CONTINUED)

Appendix 3 presents the 84 IPOs with Founder-Manager flagging (companies under the effective control of founder-managers), by providing additional information about the IPOs included. 'Issuer' lists the companies going public, 'Business Description' the main businesses of the companies (according to SDC), 'Nation' the domicile nations of the companies, 'Exchange' the exchanges on which the issues are listed, 'Gross spread' the gross spreads (as a percentage of the total amount of proceeds), 'Proceeds' the total amount of proceeds collected in the IPOs. Moreover, dummy values for 'unicorn' and technology companies controlled by founder-managers are provided for the listed IPOs.

Year	Issuer	Business Description	Nation	Exchange	Gross spread, %	Proceeds ($ Million)	F-M-T	Unicorn
2015	Houlihan Lokey Inc	Investment banking and securities dealing	U.S.	NYSE	6.75	221	0	0
2015	Pure Storage Inc	Manufacture data storage equipment	U.S.	NYSE	6.00	425	1	0
2015	First Data Corp	Financial transactions processing	U.S.	NYSE	3.25	2560	1	1
2015	Square Inc	Data processing, hosting and related services	U.S.	NYSE	5.50	243	1	0
2015	Match Group Inc	Custom computer programming services	U.S.	NASDQ	5.50	400	1	0
2015	Duluth Holdings Inc	Clothing accessories stores	U.S.	NASDQ	7.00	80	0	0
2016	SecureWorks Corp	Other computer related services	U.S.	NASDQ	7.00	112	1	0
2016	Reata Pharmaceuticals Inc	Pharmaceutical preparation manufacturing	U.S.	NASDQ	7.00	61	1	0
2016	Twilio Inc	Software publishers	U.S.	NYSE	7.00	150	1	0
2016	The Trade Desk Inc	Marketing consulting services	U.S.	NASDQ	7.00	84	0	0
2016	Apptio Inc	Software publishers	U.S.	NASDQ	1.40	96	1	0
2016	Nutanix Inc	Software publishers	U.S.	NASDQ	7.00	238	1	0
2017	Laureate Education Inc	Own and operate universities	U.S.	NASDQ	5.00	490	0	0
2017	Hamilton Lane Inc	Investment advice	U.S.	NASDQ	7.00	190	0	0
2017	Snap Inc	Software reproducing	U.S.	NYSE	2.50	3400	1	1
2017	Alteryx Inc	Develop internet software	U.S.	NYSE	7.54	117	1	0
2017	Schneider National Inc	Provide truckload and intermodal services	U.S.	NYSE	5.75	550	0	0
2017	Okta Inc	Software publishers	U.S.	NASDQ	7.00	187	1	0
2017	Carvana Co	New car dealers	U.S.	NYSE	7.00	225	0	0
2017	Appian Corp	Develop business process management software	U.S.	NASDQ	7.00	75	1	0
2017	Altice USA Inc	Wired telecommunications carriers	U.S.	NYSE	3.30	1918	1	1

Data Source: Securities and Data Company (SDC) Platinum database.

A3. IPOs with founder-manager flagging. (CONTINUED)

Appendix 3 presents the 84 IPOs with Founder-Manager flagging (companies under the effective control of founder-managers), by providing additional information about the IPOs included. 'Issuer' lists the companies going public, 'Business Description' the main businesses of the companies (according to SDC), 'Nation' the domicile nations of the companies, 'Exchange' the exchanges on which the issues are listed, 'Gross spread' the gross spreads (as a percentage of the total amount of proceeds), 'Proceeds' the total amount of proceeds collected in the IPOs. Moreover, dummy values for 'unicorn' and technology companies controlled by founder-managers are provided for the listed IPOs.

Year	Issuer	Business Description	Nation	Exchange	Gross spread, %	Proceeds ($ Million)	F-M-T	Unicorn
2017	Blue Apron Holdings Inc	Mail-order houses	U.S.	NYSE	5.50	300	1	0
2017	Roku Inc	Cable and other subscription programming	U.S.	NASDQ	7.00	219	1	0
2017	Switch Inc	Custom computer programming services	U.S.	NYSE	5.50	531	1	0
2017	Cargurus Inc	Data processing, hosting and related services	U.S.	NASDQ	7.00	150	1	0
2017	MongoDB	Software reproducing	U.S.	NASDQ	7.00	192	1	0
2017	Altair Engineering Inc	Develop engineering software	U.S.	NASDQ	7.00	156	1	0
2017	Stitch Fix Inc	Mail-order houses	U.S.	NASDQ	5.17	120	0	0
2017	Newmark Group Inc	Offices of real estate agents and brokers	U.S.	NASDQ	5.50	280	0	0
2018	Victory Capital Holdings Inc	Investment advice	U.S.	NASDQ	6.00	152	0	0
2018	Dropbox Inc	Provide information retrieval services	U.S.	NASDQ	4.45	756	1	0
2018	Zuora Inc	Provide relationship business management solutions	U.S.	NYSE	7.00	154	1	0
2018	Pivotal Software Inc	Develop software	U.S.	NYSE	5.50	555	1	0
2018	Smartsheet Inc	Develop work management software	U.S.	NYSE	7.00	175	1	0
2018	Construction Partners Inc	Provide road and highway construction services	U.S.	NASDQ	7.00	135	0	0
2018	Pluralsight LLC	Provide online training services	U.S.	NASDQ	7.00	311	1	0
2018	GreenSky Inc	Software publishers	U.S.	NASDQ	5.00	874	1	0
2018	US Xpress Enterprises Inc	Trucking services	U.S.	NYSE	6.25	289	0	0

Data Source: Securities and Data Company (SDC) Platinum database.

A4. IPOs with unicorn flagging.

Appendix 4 presents the 23 IPOs with Unicorn flagging (Total IPO proceeds collected {≥ \$1000 Million} and Technology dummy value = 1), by providing additional information about the IPOs included. 'Issuer' lists the companies going public, 'High Tech Industry' the (hi-tech) industries of the companies (according to SDC), 'Nation' the domicile nations of the companies, 'Exchange' the exchanges on which the issues are listed, 'G.s.' the gross spreads as a percentage of the total amount of proceeds collected in the IPOs, 'Proc.' the total amount of proceeds collected in the IPOs. Moreover, the dummy values for privatisations ('Priv.) and offerings of (technology) companies controlled by founder-managers ('FMT') are provided for listed IPOs.

Year	Issuer	High Tech Industry	Nation	Exchange	G.s. ,%	Proc., $ Million	Priv.	FMT
2008	Visa Inc	Electronic payment services	U.S.	NYSE	2.80	17864	0	1
2008	Turk Telekom. AS	Telecommunication services	Turkey	ISTBL	0.09	1901	1	0
2008	Turk Telekom. AS	Telecommunication services	Turkey	ISTBL	0.09	1901	1	0
2009	Verisk Analytics Inc	Data processing services	U.S.	NASDQ	4.00	1876	0	0
2010	Amadeus IT Holding SA	Other computer services	Spain	MADRD	1.50	1732	0	0
2011	HCA Holdings Inc	Healthcare technology services	U.S.	NYSE	3.63	3786	0	0
2011	Nielsen Holdings NV	Data processing services	U.S.	NYSE	4.50	1643	0	0
2011	Yandex NV	Internet services & software	Russia	NASDQ	5.00	1304	0	1
2011	Zynga Inc	Other software (incl. Games)	U.S.	NASDQ	3.25	1000	0	1
2012	Facebook Inc	Internet services & software	U.S.	NASDQ	1.10	16007	0	1
2012	MegaFon	Cellular communication	Russia	MICEX	1.00	1691	0	0
2012	MegaFon	Cellular communication	Russia	LONDN	1.00	1691	0	0
2012	Telefonica Deutschland	Telecommunication services	Germany	FRANK	2.50	1626	0	0
2012	Ziggo NV	Internet services & software	Netherlands	EUROA	1.50	1064	0	0
2013	Zoetis Inc	Pharmaceuticals research	U.S.	NYSE	3.70	2239	0	0
2013	Twitter Inc	Internet services & software	U.S.	NYSE	3.25	1820	0	0
2014	Altice Sa	Telecommunication services	Luxembourg	EUROA	1.50	1760	0	1
2014	IMS Health Holdings Inc	Internet services & software	U.S.	NYSE	4.50	1300	0	0
2015	First Data Corp	Data processing services	U.S.	NYSE	3.25	2560	0	1
2015	Scout24 AG	Internet services & software	Germany	FRANK	2.38	1127	0	0
2017	Snap Inc	Applications software	U.S.	NYSE	2.50	3400	0	1
2017	Altice USA Inc	Telecommunication services	U.S.	NYSE	3.3	1918	0	1
2018	Elanco Animal Health Inc	Pharmaceuticals research	U.S.	NYSE	4.40	1510	0	0

Data source: Securities and Data Company (SDC) Platinum database.