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IPOs in the EU Capital Markets Union

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IPOs in the EU Capital Markets Union

Abstract

This dissertation examines three research questions on initial public offerings (IPOs) in the EU Capital Markets Union. First, I[1] examine which private firms decided to go public during the COVID-19 IPO wave in order to disentangle rational and opportunistic motives. Using extensive private firm data, I find that firms listing during the IPO wave had lower ex-ante profitability. This effect is augmented for early movers. In ex-post analyses, I find that early movers are not underperforming matched private peers while showing higher sales growth. I attribute this to rational IPO motives and a first-mover advantage. I find evidence of opportunistic motives of hot issuers to be weak. Second, I analyse the effect of the Prospectus Regulation and the novel EU growth prospectus on SME listings. To this end, I hand-collect data on initial offerings at EU exchanges. Furthermore, I provide a framework of EU equity markets as well as methodological insights. I find that to some extent the EU growth prospectus was successful in de-burdening SME IPOs without compromising investor protection. However, I do not substantiate that it reduced fixed listing costs or boosted SME listings activity. Finally, I examine entrenchment motives of both EO and IPO underpricing, hypothesising that EO substitutes more costly underpricing. I empirically confirm that EO firms have lower underpricing. Furthermore, I find that EO has a direct negative effect on ownership concentration and weak evidence of EO firms achieving higher ownership dispersion at lower levels of underpricing.

[1] I use the term "I" in the abstract, introduction, and conclusion of this dissertation. It does not necessarily refer to me directly as the second essay is based on joint work with my co-author.

Börsengänge in der EU-Kapitalmarktunion

Kurzfassung

Diese Dissertation untersucht drei Forschungsfragen zu Börsengängen in der EU-Kapitalmarktunion. Zuerst wird analysiert, welche Unternehmen sich während der COVID-19 Börsenwelle für einen Börsengang entschieden haben, um rationale und opportunistische Motive zu unterscheiden. Es wird festgestellt, dass Erstemittenten der Börsenwelle eine geringere Ex-ante-Profitabilität aufwiesen. Dieser Effekt verstärkt sich für Vorreiter der Börsenwelle, welche jedoch nach dem Börsengang eine ähnliche Profitabilität wie vergleichbare private Unternehmen, und dabei ein höheres Umsatzwachstum aufweisen. Dies wird auf rationale Börsengangsmotive und einen Vorreitervorteil zurückgeführt. Opportunistische Motive anderer Erstemittenten der Börsenwelle werden nur in schwacher Ausprägung festgestellt. Zweitens werden die Auswirkungen der Prospektregulierung und des neuen EU-Wachstumsprospekts auf Börsennotierungen von kleinen und mittelständischen Unternehmen (KMUs) untersucht. Es werden umfangreiche Daten über Erstemissionen an EU-Börsen erhoben. Ein Rahmenwerk für EU-Aktienmärkte sowie methodische Erkenntnisse werden zur Verfügung gestellt. Es wird gezeigt, dass der EU-Wachstumsprospekt zu einem gewissen Grad erfolgreich zur Entlastung von KMU-Börsengängen beigetragen hat, ohne den Anlegerschutz zu beeinträchtigen. Es kann jedoch nicht nachgeweisen werden, dass er die fixen Emissionskosten gesenkt oder die Börsenzulassungsaktivitäten von KMUs verstärkt hat. Schließlich wird untersucht, ob Mitarbeiterbeteiligung das kostspieligere Underpricing hinsichtlich Verschanzungsmotiven ersetzt. Empirisch wird bestätigt, dass Firmen mit Mitarbeiterbeteiligung ein geringeres Underpricing aufweisen. Es wird außerdem festgestellt, dass Mitarbeiterbeteiligung eine direkte negative Auswirkung auf die Konzentration der Aktionärsstruktur hat und schwache Belege dafür vorliegen, dass eine höhere Streuung bei geringerem Underpricingniveau erreicht wird.

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Author: Victoria Treßel

First Author: Victoria Treßel

Victoria Treßel reviewed the literature, formulated the research question, developed the research design, collected the data, conducted all analyses, interpreted the results, and prepared and revised the manuscript.

Victoria Treßel

Chapter 2: The EU Prospectus Regulation and its Impact on SME Listings

Authors: Christoph Kaserer, Victoria Treßel

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Victoria Treßel reviewed the literature, collected the data, and conducted all analyses. Christoph Kaserer and Victoria Treßel were both jointly involved in formulating the research question, developing the research design, interpreting the results, and preparing and revising the manuscript.

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Chapter 3: The Employee Poison Pill: Evidence on the Entrenchment Effect of Employee Ownership from IPO Underpricing

Author: Victoria Treßel

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Victoria Treßel reviewed the literature, formulated the research question, developed the research design, collected the data, conducted all analyses, interpreted the results, and prepared and revised the manuscript.

Victoria Treßel

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Over time, I believe we should complement the new European rules for banks with a Capital Markets Union. To improve the financing of our economy, we should further develop and integrate capital markets. This would cut the cost of raising capital, notably for SMEs, and help reduce our very high dependence on bank funding. This would also increase the attractiveness of Europe as a place to invest.

Jean-Claude Juncker (2014)

0 Introduction

As a private firm matures and grows, it may eventually consider going public on a stock exchange. The resulting initial public offering (IPO) is usually a one-time event for the firm that will henceforth allow it to raise public equity capital, use its shares as currency in mergers and acquisitions (M&A), increase its visibility, and provide liquidity to its shareholders. Being public also has organisational implications; a listed firm is subject to extensive disclosure requirements, its ownership is democratised to include a broad base of investors, and its perceived future viability is observable in real-time.

Beyond the boundary of the firm itself, IPOs signify liquid equity capital markets that have wide-reaching implications for the economy. Firms' ability to diversify their sources of funding beyond bank loans increases their resilience during economic downturns (Langfield and Pagano, 2016; Levine et al., 2016). Flourishing capital markets facilitate efficient capital allocation (Wurgler, 2000), widen investment opportunities for both retail and institutional investors, and attract interna-

tional funds. Small and medium-sized enterprises (SMEs) gain improved access to capital required for innovation. Overall, well-functioning capital markets contribute to economic growth (e.g., Levine and Zervos, 1998; Miller, 1998).

Nevertheless, the IPO is an event that only a minority of firms will venture to undertake. While this has always been the case, both the number of IPOs and listed firms have been on the decline in the US and Europe, indicating a net negative trend in listings (e.g., Gao et al., 2013; Ritter et al., 2013). Policymakers and scholars alike are struggling to explain these trends and take effective measures to rejuvenate the markets. Recent legislation has aimed to ease the regulatory burden for SMEs, with varying degrees of success. Ironically, IPOs surged during the COVID-19 pandemic, when the global economy was otherwise in crisis, sparking a listings boom reminiscent of the dotcom era. This development, however, was not sustainable, and IPOs have returned to stagnant pre-pandemic levels.

In the EU, equity markets are an integral part of the Capital Markets Union (CMU), the European Commission's plan to create a single market for capital across member states. The CMU, as envisioned by former Commission President Jean-Claude Juncker in 2014, aims to address EU firms' overwhelming reliance on bank-based financing and provide liquidity for SMEs (Juncker, 2014). Despite two comprehensive CMU action plans (cp. European Commission, 2015, 2020) and a notable attempt to reduce listing costs within the Prospectus Regulation[1], the CMU is yet to be achieved and equity markets remain a source of concern. Aggravating the problem, a number of promising European firms occasionally decide to list abroad on more liquid US markets.[2]

Why have these comprehensive policy efforts had but limited success? One reason

[1]Council Regulation (EU) 2017/1129 of 14 June 2017 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing Directive 2003/71/EC. OJ L 168/12.

[2]Recent examples of this include the retailers Amer Sports and Birkenstock as well as the biotech firm BioNtech. An open editorial by Mairead McGuinness, the Commissioner of the Directorate-General for Financial Stability, Financial Services and Capital Markets Union (DG FISMA), describes the implications of such cases, see `https://www.ft.com/content/f1270cc3-eb3d-4e8b-a2d7-264aeab51c6d?shareType=nongift`, accessed on July 22nd, 2024.

is the fragmentation of capital markets in the EU, as recently lamented by European Central Bank (ECB) President Christine Lagarde, describing past CMU efforts as following a bottom-up approach focussed on local markets and calling instead for a "Kantian shift" to a top-down approach (Lagarde, 2023). For instance, although the provisions of the Prospectus Regulation are directly enforceable in member states, supervision of markets still occurs at the national level, subject to idiosyncrasies. The landscape of stock exchanges in Europe has seen considerable consolidation. Euronext, for instance, unites seven exchanges in seven countries; yet the listing rules differ by country.

Furthermore, EU equity markets are distinct from their US counterparts in their segmentation into regulated markets governed by public law and multilateral trading facilities (MTFs) governed by private law. MTFs are of particular importance to SMEs as they have looser listing and disclosure requirements (Vismara et al., 2012).

These peculiarities and fragmentation of EU equity markets along several dimensions makes them challenging for academics to study. Furthermore, data on MTF listings provided by reputable IPO databases is often incomplete. Interpreting legislation is laborious, especially on the national level. Even textual analyses are non-trivial to perform given the breadth of languages and formats employed.

While the number of studies examining EU equity markets is arguably limited given these difficulties, there are various general aspects of IPOs that warrant further research. This ranges from reasons for going public, through the underpricing puzzle, to causes and consequences of IPO waves like the one witnessed during the COVID-19 pandemic.[3]

In this dissertation, I study aspects of IPOs in the CMU, aiming to shed light on institutional distinctions that characterise EU equity markets and analyse time variance in the decision to conduct an IPO, the efficacy of regulatory de-burdening at stimulating SME listings, and the role of entrenchment considerations at the

[3]For a comprehensive discussion of IPO literature and its gaps, see Lowry et al. (2017).

IPO. While I focus on Europe, the analyses performed are not merely a replication of established findings in a different setting. Instead, my research questions and empirical designs are original and contribute to the IPO literature broadly. The insights I generate are potentially instructive for policymakers, and my methodologies offer guidelines for future research.

This dissertation consists of three essays that examine various aspects of IPOs. In the *first essay* (Chapter 1), I examine how private firms' decision to go public changes during an IPO wave, using evidence from ex-ante and ex-post selection indicators. I focus on the recent COVID-19 pandemic, which triggered an IPO boom as last seen during the dotcom bubble period. I leverage the European setting, where private firms are subject to extensive reporting requirements, making selection observable. The *second essay* (Chapter 2) provides a framework of EU equity markets and detailed descriptions of how the Prospectus Regulation enforced in 2019 changed the institutional setting. This is followed by analyses aiming to assess the efficacy of the reform in de-burdening the IPO process and boosting IPO activity. In the *third essay* (Chapter 3), I combine the entrenchment literatures of EO and IPO underpricing, respectively, and study their interrelation empirically.

0.1 Research questions and main findings

In each essay, I utilise distinct datasets and specific empirical designs to examine the corresponding research question. In the following, I outline the research question, data collection strategy, empirical approach, and main findings of each essay.

0.1.1 Timing or Biding Time? Evidence on Firm Selection from the COVID-19 IPO Wave

During the COVID-19 pandemic, while the economy was otherwise in a downturn, there was a surge in IPOs as last seen during the dotcom era. Such IPO *waves* or *hot*

markets are a stylised fact of equity markets, though there are competing views on the motives of firms going public during such times. On the one hand, the *windows of opportunity* hypothesis views IPO waves as period of inflated investor optimism that firms exploit by listing opportunistically (Ritter, 1984; Ibbotson et al., 1994; Lerner, 1994). On the other hand, the *rational view* contends that firms conduct their IPOs rationally once market conditions improve (Pástor and Veronesi, 2005).

I provide insights on the motives of firms listing during IPO waves by examining variation in the selection of private firms. While prior studies compare wave and non-wave issuers to each other, I argue that this approach is biased, as it assumes that all firms will eventually go public. Furthermore, the poor economic conditions present during the COVID-19 pandemic are likely to bias the performance of IPO wave issuers downwards. By comparing IPO wave issuers to private firms during the same periods of time, I approximate selection effects more closely.

To this end, I leverage the European setting, where private and public liability companies are subject to extensive reporting requirements that allow me to compare them. Private firm data is provided by Orbis and augmented with proprietary listings data. I separate my analyses into two main parts, examining selection based on ex-ante and ex-post evidence.

Ex-ante, I investigate how the decision to conduct an IPO changes based on firm characteristics known influence selection. I compare firms listing on and off the IPO wave to private firms with a realistic listing option using a multinomial logit regression. Surprisingly, I find little to no differences in firm characteristics between the groups of firms. In particular, I do not find IPO wave issues to be smaller, younger firms, indicative of adverse selection (Yung et al., 2008). The only characteristic that differs robustly across groups is profitability; firms selecting into various phases of the IPO wave are ex-ante significantly less profitable than those choosing to list during cold market phases. This relation is particularly pronounced for firms listing during the early stages of the wave *(early movers)*.

In order to attribute this finding to opportunism or rationality, I conduct further analyses on post-IPO performance. My identification relies on matching each IPO firm to its most similar private peer, approaching an ideal experiment where the IPO status is randomly assigned to private firms at various market phases. Proceeding with a differences-in-differences (DiD) analysis, I find that early movers are unlikely to be listing opportunistically, as they are not inferior to their matched controls in terms of profitability and even achieve higher post-IPO sales growth. Other hot market issuers underperform their private peers in terms of profitability without increased sales growth. This lack of sales outperformance is only weakly indicative of opportunistic motives, given that hot issuers are not in fact underperforming their private peers on this dimension.

Overall, my findings show that lower profitability firms are selecting into the IPO wave, particularly during the early stages. Ex-post, these early movers have similar levels of profitability as their matched private counterparts, supporting a mechanism proposed by Alti (2006) whereby lower profitability firms struggle to list during cold markets and therefore rationally time the market. Moreover, the finding that early movers have higher post-IPO sales than their private peers is consistent with rational motives suggested by Pástor and Veronesi (2005) as it is indicative of higher expected cashflows. In additional analyses, I find that early movers have superior market share growth, which could indicate a first-mover advantage that influences the results beyond selection (Chemmanur and He, 2011). Evidence of opportunism for other hot issuers is weak.

0.1.2 The EU Prospectus Regulation and its Impact on SME Listings

SMEs are frequently referred to as the "backbone" of the EU's economy, representing 99 % of all European businesses.[4] The decline in equity markets is particularly

[4] `https://single-market-economy.ec.europa.eu/smes_en`, accessed on July 22nd, 2024.

notable for SMEs, listings of which have halved since the financial crisis. This trend increases their vulnerability to economic shocks due to their reliance on bank financing—given that SMEs generate the majority of the EU's private sector employment, this latent risk has major implications (European Commission, 2018).

Regulators have sought to alleviate the disproportionate burden that listing costs represent for SMEs, both directly in the form of expenses and indirectly through the disclosure of proprietary information. In the US, the Jumpstart Our Business Startups (JOBS) Act[5] introduced measures to reduce these costs for smaller companies. The EU followed suit by adopting the Prospectus Regulation, which introduced the EU growth prospectus, a new "prospectus light" for SMEs.

These regulatory efforts correspond to the *regulatory overreach hypothesis*, which contends that the costs of regulatory compliance have contributed to the dearth of IPOs. However, prior studies examining the effects of (de-)regulation in the US have found this hypothesis to be inconsistent (Gao et al., 2013; Doidge et al., 2013, 2017). For Europe, on the other hand, the case is less clear (Cattaneo et al., 2015; Engelen et al., 2020).

The enactment of the EU growth prospectus provides a further experiment to examine the regulatory overreach hypothesis. In the *second essay*, I assess the effectiveness of the EU growth prospectus at boosting SME listings. Despite the pessimistic outlook given by prior work on (de-)regulation, EU equity markets are uniquely set up to cater to SMEs, and the EU growth prospectus addresses firms that are significantly smaller than those addressed by the JOBS Act, which may raise the marginal benefit of deregulation.

I identify 1,256 initial offerings at 8 EU stock exchanges over the period from 2016 to 2022, 113 of which used the EU growth prospectus. Moreover, I hand-collect detailed information on these initial offerings. To the best of my knowledge, this is the first paper to give a comprehensive overview of IPO activity in the EU including

[5]Jumpstart Our Business Startups of 5 April 2012. H.R.3606, 112th Congress.

initial offerings on exchange-regulated markets. I focus my analysis of the reform by asking four specific questions addressing its implementation and effectiveness.

First, which firm and issue characteristics have a positive impact on the propensity to use the EU growth prospectus? I classify all IPOs conducted on MTFs according to their fulfilment of the criteria determining eligibility to use the EU growth prospectus. I find that this new listings document seems to cater to the needs of SMEs as they are significantly more likely to use this vehicle when filing for an IPO. However, the likelihood of using the EU growth prospectus decreases with rising proceeds, indicating some degree of uncertainty.

Second, what is the impact of the reform on the informational content of prospectuses? Textual analyses of EU listings documents are complicated by a variety of factors, including appendices that inflate page and word counts, lack of machine readability, and the variety of languages used in the EU. I propose a methodology to overcome these difficulties. Similar to Hanley and Hoberg (2010), I manually reduce each document to its core content, which I convert to machine-readable format and translate to English. I find the EU growth prospectus to be significantly shorter than the full prospectus. Using the bag-of-words approach of Hanley and Hoberg (2010), I find that the degree of content similarity between EU growth prospectuses and full prospectuses is significantly higher relative to admission documents. This is in line with the goal of de-burdening and streamlining SME IPOs without jeopardising investor protection.

Third, is the EU growth prospectus associated with lower direct listing costs? I decompose flotation expenses into a fixed and variable cost component. My analysis shows that in terms of fixed costs EU growth prospectuses are equally as expensive as full prospectuses, but more expensive than admission documents. In terms of variable costs, EU growth prospectuses are significantly less expensive than full prospectuses, but more expensive than admission documents, though these differences are not particularly relevant in economic terms.

Fourth and finally, did the reform achieve its stated goal of raising SME listings? Using a within EU difference-in-differences analysis, I find a positive impact on SME IPOs after the introduction of the EU growth prospectus. However, the COVID-19 IPO wave occurring in the aftermath of the prospectus reform may bias this finding. Hence, I add a triple difference analysis by including US IPOs, finding no impact of the reform on SME IPOs in the EU.

My findings confirm the limited efficacy of such de-burdening efforts in European markets. At the same time, however, my analysis shows that IPO regulation can be simplified and made less burdensome without jeopardising investor protection.

0.1.3 The Employee Poison Pill: Evidence on the Entrenchment Effect of Employee Ownership from IPO Underpricing

Employee ownership (EO) can be adopted as a tool of managerial entrenchment when incumbent managers use employees as "natural allies" to serve as friendly investors without taking control (Chang, 1990; Hellwig, 1998; Pagano and Volpin, 2005). Such entrenchment considerations are already prevalent when a firm first formally ventures into separated ownership and control at its IPO (Field and Karpoff, 2002). IPO underpricing has been proposed to facilitate more dispersed post-IPO ownership (Booth and Chua, 1996), which Brennan and Franks (1997) attribute to managerial entrenchment motives within their *reduced monitoring hypothesis*.

EO and IPO underpricing are consequently both forms of entrenchment. However, IPO underpricing represents a cost to the firm in the form of money left 'on the table'. Therefore, the *third essay* empirically examines how EO affects IPO underpricing. I hypothesise that EO mitigates the need for entrenchment-related IPO underpricing, acting as a substitute.

I construct a sample of 928 European firms going public from 1993 to 2019 to

test this hypothesis, using data on EO from the European Federation of Share Ownership (EFES), augmented by IPO data from the Securities Data Company (SDC) Platinum's *New Issues* database, and hand-collected ownership data. 32.2 % of sample firms have pre-IPO broad-based EO.[6]

Using ordinary least squares (OLS) regression, I corroborate that EO firms experience 1.8 percentage points lower underpricing. This finding prevails in a battery of robustness tests related to firm size. Furthermore, I consider alternative explanations related to more fundamental differences between EO and non-EO firms, none of which overturn the baseline result.

I proceed to explore entrenchment motives as a mechanism for this result. The resulting post-IPO ownership of EO firms is non-trivial and can provide an indication as to how EO entrenches firms. On the one hand, given EO firms underprice less and therefore ration their shares to a lesser extent, they could incur more concentrated ownership. It would follow that there is no direct effect of EO on ownership, suggesting that blockholdings are less relevant to EO firms, potentially because the takeover deterrence of EO exceeds the takeover facilitation of blocks. However, blockholdings remain relevant in terms of monitoring, which would be inconsistent with the reduced monitoring hypothesis. On the other hand, if EO firms achieve more dispersed post-IPO ownership, EO must have a direct effect on ownership, suggesting that it is a substitute for IPO underpricing.

Using my hand-collected ownership data, I find evidence of such a direct effect of EO on ownership dispersion. EO firms are shown to have lower total blockholdings and a reduced size of the largest blockholding. These measures are relevant in terms of joint monitoring ability and monitoring incentive (Aruğaslan et al., 2004). Furthermore, smaller blockholdings impede takeovers.

I offer two channels to explain these findings. First, larger EO shareholdings could limit the number of shares available to outsiders. Second, EO's distinction as

[6] *Broad-based* EO is accessible to all employees, not just executives.

a strong takeover deterrent could signal reduced takeover likelihood to investors, resulting in institutional shareholders taking lower stakes in accordance with Anderson et al.'s (2017) *M&A anticipation hypothesis*.

I provide weak empirical evidence of a direct substitution of IPO underpricing with EO. While EO firms are shown to achieve more dispersed ownership at mean underpricing, this effect is not found to be robust at every level of underpricing. There is some indiciation that EO firms achieve more dispersed ownership at lower levels of underpricing, notably also when the firm is overpriced. At high levels of underpricing, however, EO and non-EO firms are indistinguishable in terms of ownership dispersion, suggesting a diminishing marginal effect of EO.

0.2 Contributions and policy implications

This dissertation contributes to an improved understanding of EU equity markets as well as to multiple strands of literature. Furthermore, it offers insights on IPOs that could be valuable to policymakers and reveals avenues for future research. I summarise these aspects in the following.

The *first essay* (Chapter 1) adds to the literature examining motives of firms listing during IPO waves (e.g., Ritter, 1984; Helwege and Liang, 2004; Pástor and Veronesi, 2005; Yung et al., 2008) by comparing wave and non-wave issuers to private firms instead of each other. In this manner, I am able to address whether wave issuers are underperforming or in fact outperforming relative to the counterfactual of having stayed private, turning selection into a feature of my analyses rather than a bias.

This is related to a second strand of literature examining dynamics within an IPO wave (Alti, 2005; Chemmanur and He, 2011; Çolak and Günay, 2011; Banerjee et al., 2016). My finding that early movers of an IPO wave are ex-ante less profitable but keep up with their private peers ex-post corroborates a mechanism proposed by Alti (2006), whereby lower profitability firms find it optimal to list once market conditions

improve, indicative of rational IPO motives suggested by Pástor and Veronesi (2005). I also find that a first-mover advantage could play a role (Chemmanur and He, 2011). In comparison, there is only weak evidence of firms listing opportunistically during the hot issues period. For policymakers, in particular, this suggests that the risk of adverse selection during IPO waves to the detriment of investors is less prevalent than some prior studies suggest.

This essay also contributes to a third strand of literature examining IPO motives more broadly (e.g., Pagano et al., 1998; Chemmanur and Fulghieri, 1999; Brau et al., 2003) as well as to IPO motives in Europe more specifically (e.g., Chemmanur et al., 2023; Hoque and Doukas, 2023). Fourth, I add to the signalling literature of underpricing (e.g., Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989; Banerjee et al., 2016), by extending the possibility of signalling to all phases of the IPO wave. However, I find evidence of selection to be weak. Finally, this essay extends the growing literature examining the effects of the COVID-19 pandemic on IPOs (e.g., Mazumder and Saha, 2021; Baig and Chen, 2022; Ke, 2022), by providing evidence of selection as well as a descriptive industry analysis showing that the wave attracted firms from different industries in Europe than it did in the US.

The *second essay* (Chapter 2) contributes to the literature discussing the role of (de-)regulation on reduced IPO activity observed since the early 2000s (e.g., Gao et al., 2013; Doidge et al., 2013, 2017). Specifically, this essay provides further evidence on the regulatory overreach hypothesis with a focus on SMEs. My findings confirm the limited efficacy of such efforts in European markets, highlighting the inability of the EU growth prospectus to reduce fixed listing costs or boost IPO activity.

Nevertheless, the European Commission is continuing its efforts to revive IPO markets through precisely this mechanism of deregulation, as evidenced by the Listing Act package which was agreed with the Parliament at the beginning of 2024.[7]

[7] `https://www.consilium.europa.eu/en/press/press-releases/2024/02/01/listings-on-european-stock-exchanges-council-and-parliament-agree-new-act/`, accessed on

The Listing Act Regulation will introduce an EU growth issuance document to replace the EU growth prospectus, introducing further simplifications and content reductions.[8] These initiatives certainly have benefits, though given that this new document will continue to compete with the existing, even simpler admission document, it is doubtful whether it will induce a larger number of SMEs to list. However, the proposal includes promising measures to reduce legal fragmentation across member states.

Insights into the institutional setup of European markets are the second major contribution of the *second essay*. Research on IPOs in the EU has been limited, which can be attributed both to limited data availability and peculiarities of EU markets. I extend the work of Vismara et al. (2012) on the unique structure of EU IPO markets into regulated and exchange-regulated markets by providing further details on listing types, listing documents, and regulatory thresholds. My ambition is for these detailed institutional explanations and methodology to encourage further research on EU IPOs that will provide a more extensive foundation for future policy initiatives.

The *third essay* (Chapter 3) adds to the literature examining EO as an entrenchment mechanism. Several studies examine defensive EO adopted as a *responsive* takeover defense to an immediate threat (e.g., Chang, 1990; Gordon and Pound, 1990; Chaplinsky and Niehaus, 1994; Dhillon and Ramírez, 1994; Beatty, 1995). In contrast, by examining EO at the IPO, when takeover threats are unlikely to be imminent, I provide evidence of EO related to *anticipatory* entrenchment (Dann and DeAngelo, 1988; Chang, 1990). Furthermore, while prior studies focus on established public firms, I examine how EO impacts a private firm's initial venture into separated ownership and control, thereby utilising IPOs as a new avenue.

July 22nd, 2024.

[8] Interestingly, the Listing Act Regulation seeks to replace the full prospectus with the EU growth prospectus. In Chapter 2, the EU growth prospectus was not found to compromise investor protection. In this regard, the Listing Act Regulation reaffirms this finding and broadens deburdening provisions beyond SMEs.

Second, I contribute to the literature on entrenchment theory of IPO underpricing, extending Brennan and Franks's (1997) reduced monitoring hypothesis to include entrenchment motives more generally (Shleifer and Vishny, 1986; Boulton et al., 2010). Past research on entrenchment attempts at the IPO uses dual-class shares structures as the main explanatory variable (e.g., Smart and Zutter, 2003; Boulton et al., 2010). EO works in a similar but not identical manner, given that EO does not fully neutralise the monitoring ability of blockholders as dual-class shares do. Combined with my result that EO firms underprice less, the direct effect I find EO to exhibit on ownership suggests that EO and underpricing could be substitutes for achieving dispersed ownership and that both takeover and monitoring concerns are relevant at the IPO. This is closely related to a third strand of literature relating perceived takeover likelihood at the IPO to resulting underpricing and ownership dispersion (e.g. Boulton et al., 2010; Anderson et al., 2017). From Anderson et al.'s (2017) *M&A anticipation hypothesis*, I derive a potential channel for a direct effect of EO on ownership, whereby EO's distinction as a strong takeover deterrent signals reduced takeover likelihood to investors, who take lower stakes accordingly.

Policy-wise, while EO is not currently part of the CMU action plan, the mid-term review of the first CMU action plan noted EO schemes as a tool of raising retail investor engagement (European Commission, 2017) and the EU Parliament adopted a resolution calling for EO incentivisation (European Parliament, 2020). My study reemphasises the duality of EO that warrants further research. Regarding entrenchment motives at the IPO, the Listing Act Directive seeks to allow dual-class share structures across EU member states. Despite the varied evidence on the effect of dual-class shares on IPO underpricing, this legislative change could provide a further viable research avenue.

There is a tide in the affairs of men.
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat,
And we must take the current when it serves,
Or lose our ventures.

Brutus in *Julius Caesar*, Shakespeare

1

Timing or Biding Time? Evidence on Firm Selection from the COVID-19 IPO Wave

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Abstract

I examine how private firms' decision to conduct an IPO changes during an IPO wave, comparing firms listing early during the wave (*early movers*) to those listing during the regular hot market period (*hot issuers*). Using an extensive sample of European private firms and focussing on the COVID-19 pandemic, I conduct analyses on ex-ante selection evidenced by firm characteristics, finding that firms listing during the IPO wave had lower ex-ante profitability. This effect is augmented for early movers. To examine ex-post selection, I identify the closest matching private firm for each IPO firm and use a differences-in-differences analysis. I find that early movers of an IPO wave are not underperforming their matched private control group while showing higher sales growth, potentially indicating rational IPO motives via higher expected cashflows. Hot issuers, on the other hand, are found to underperform their peers in terms of profitability without increased growth. The results do not indicate differences in selection via signalling. Analyses of market share growth suggest that early movers may be benefitting from a first-mover advantage beyond selection.

1.1 Introduction

The COVID-19 pandemic induced adverse economic consequences on various fronts. Surprisingly, for IPOs, it triggered a wave as last seen during the dotcom bubble, resulting in a surge of listings and underpricing (Mazumder and Saha, 2021; Baig and Chen, 2022). This marked a rejuvenation of IPO markets, whose decline has long puzzled practitioners and scholars alike (Gao et al., 2013; Ritter et al., 2013; Doidge et al., 2018; Ewens and Farre-Mensa, 2020). Globally, the number of IPOs rose by more than 60 % from 2020 to 2021, with particularly high growth in Europe.[1]

Such periods of high IPO activity, often called *waves* or *hot markets*, are a stylised fact of equity markets and a well-established phenomenon in literature (Ibbotson and Jaffe, 1975; Ritter, 1984; Ibbotson et al., 1994). However, there are competing views on the reasons for their occurrence. On the one hand, the *windows of opportunity* hypothesis views hot markets as period of inflated investor optimism that firms exploit by listing opportunistically (Ritter, 1984; Ibbotson et al., 1994; Lerner, 1994). They are therefore expected to be characterised by lower quality firms adversely selecting into listing (Yung et al., 2008). Empirically, there has been some confirmation of firms from overvalued industries being more likely to list and subsequently decline in profitability (Pagano et al., 1998; Alti, 2006).

On the other hand, Pástor and Veronesi (2005) propose a mechanism whereby firms conduct their IPOs rationally once market conditions improve. Indeed, when Helwege and Liang (2004) directly compare the post-IPO performance of hot and cold issuers, the minor differences they find suggests that the hot markets puzzle may not adequately be explained by opportunism. Furthermore, issuer quality may be heterogeneous along different phases of an IPO wave. Firms with better prospects may go public early, obtaining higher valuations that catalyse the onset of the IPO wave (Alti, 2005; Chemmanur and He, 2011; Banerjee et al., 2016).

[1] `https://www.ey.com/en_nl/news/2021/12/global-ipo-market-has-record-breaking-2021-prepare-for-headwinds-in-2022`, accessed on July 22nd, 2024.

In this paper, I seek to approach the question of why firms list during IPO waves by examining the selection mechanism of private firms. Prior studies compare hot and cold issuers directly, which fails to address the underlying issue of selection. This is particularly relevant to the COVID-19 pandemic, as poor economic conditions are likely to bias the performance of IPO wave issuers downwards. By comparing IPO wave issuers to private firms throughout the same time period, I approximate selection effects more closely. This also allows for the option that even though firms issuing during the wave may perform more poorly than cold issuers, they are actually outperforming their private peer group at the time of the pandemic. To this end, I leverage the European setting, where private and public limited liability firms are subject to extensive reporting requirements that allow me to compare them. I define three main market phases during which firms can list based on previous studies: the rising cycle during which the market begins to heat up (Çolak and Günay, 2011), the hot market phase (Helwege and Liang, 2004), and the cold market phase. During these phases, early movers, hot issuers, and cold issuers list, respectively. I separate my analyses into two main parts, examining selection based on ex-ante and ex-post evidence.

In the ex-ante analyses, I investigate how the choice to conduct an IPO changes based on firm characteristics previously found to impact this decision. I compare firms listing on and off the wave to private firms with a realistic listing option using a multinomial logit regression. Surprisingly, I find little to no differences in characteristics determining firms' choice to list during different market phases. The characteristic which differs most robustly across the groups is profitability, measured by ROA. Firms selecting into both the rising cycle and hot issues period are ex-ante significantly less profitable than those choosing to list during cold markets. This is most pronounced for early movers of the rising cycle. The stronger negative association of ROA with listing likelihood for both early movers and hot issuers differs significantly from the effect observed for cold issuers.

These findings largely support those of Helwege and Liang (2004), who conclude that hot and cold issuers are not qualitatively different. However, it is also indicative of a mechanism proposed by Alti (2006), whereby less profitable firms that struggle to place their shares during cold markets find it optimal to list once market conditions improve. In terms of ex-ante selection, evidence of opportunism is weak at best.

As differences indicating selection may become evident ex-post, I conduct further analyses on post-IPO performance. In an ideal experiment, the IPO status would be randomly assigned to private firms at various market phases. To approach this identification, I exploit my extensive sample of private firms, proceeding with a matching strategy to identify the closest matching private firm for each IPO firm, two years prior to the IPO. In the resulting sample, IPO firms and their matched private controls do not differ along observable dimensions. I proceed with a differences-in-differences (DiD) analysis, regressing on various financial and performance indicators.

I find that early movers are unlikely to be listing opportunistically, as they are not inferior to their matched controls in terms of profitability and even achieve higher post-IPO increases in sales. This supports the view that firms with better prospects lead IPO waves (Alti, 2005; Chemmanur and He, 2011). Hot issuers, on the other hand, underperform their matched controls in terms of profitability while not showing particular increases in sales. The relative difference is in turn significantly different from what is observed for both early movers and cold issuers. This is more in line with the windows of opportunity hypothesis.

Within each phase of the wave, issuers could signal their quality using underpricing as a credible signal (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989; Banerjee et al., 2016). To examine this mechanism, I further sub-divide both the early mover and hot issuer categories based on high underpricing and repeat the DiD analyses. Evidence of post-IPO outperformance of high underpricing issuers

is weak. In the hot market phase in particular, high underpricing issuers do not differ from other issuer types. Firms may be underpricing for reasons specific to the COVID-19 pandemic. Given the data availability for this study, it is unclear whether the findings on signalling generalise.

The ex-post results could be driven by a first-mover advantage, whereby early movers are able to grab more market share than late movers (Chemmanur and He, 2011). To explore this channel, I conduct a DiD analysis of market share growth around the IPO. Early issuers are confirmed to have higher growth rates than hot issuers. This suggests that the ex-post performance achieved by early movers need not be related exclusively to selection of firms with better prospects.

Overall, the ex-ante findings show that lower profitability firms are selecting into issuing during IPO waves, particularly during the rising cycle. Ex-post, while these early movers do not improve their profitability, their performance is not found to be significantly worse than that of their matched private control group. This supports Alti's (2006) theory of low profitability firms timing the market. Given that these firms are also found to have higher post-IPO sales than their peer group, it could be in line with the rational motives suggested by Pástor and Veronesi (2005) as it is indicative of higher expected cashflows of early movers. On the other hand, the findings on market share growth suggest the existence of a first-mover advantage as proposed by Chemmanur and He (2011). To identify the channel more conclusively would, however, require longer post-IPO operating data, which is not yet available given the recency of the COVID-19 pandemic. Hot issuers, on the other hand, underperform their private peers in terms of profitability without increased growth. This lends some support to opportunistic motives of such firms, though again, a longer operating history would be beneficial.

To the best of my knowledge, this is the first study examining selection in different market phases by directly comparing IPO firms to private firms. The insights generated from this approach contribute to various strands of literature.

First, I add to the literature examining motives of firms listing during IPO waves. Helwege and Liang (2004) use univariate analyses to compare hot and cold issuers directly, finding few differences. Return wise, hot issuers have been found to underperform cold issuers in the long run (Ritter, 1991; Yung et al., 2008). By comparing hot and cold issuers to private firms instead of each other, I am able to address whether hot issuers are underperforming or in fact outperforming relative to the counterfactual decision of having stayed private by examining operating variables. I argue that this comparison is more informative at providing insights into competing views on whether hot issuers are simply taking advantage of windows of opportunity as suggested by Ritter (1984) or whether they may be acting rationally in line with Pástor and Veronesi's (2005) theory.

This, in turn, also allows me to provide evidence on whether and how selection varies at earlier stages of an IPO wave, adding to a second strand of literature that examines dynamics within an IPO wave. According to Alti's (2005) theory, IPO waves are triggered by firms that have superior future prospects and obtain higher valuations when they list in advance of the wave. Similarly, Chemmanur and He (2011) contend that firms going public earlier in a wave have a first-mover advantage allowing them to increase their market share and achieve higher post-IPO profitability. In Banerjee et al.'s (2016) model, higher growth firms go public early. These models contrast with that of Çolak and Günay (2011), according to which higher-quality firms strategically wait to go public until they learn more about the state of the economy from firms listing earlier. Both these studies compare IPO firms at various stages of a wave, implicitly assuming that all firms will eventually go public. My approach of comparing IPO firms to private firms offers a new angle that is potentially instructive for these contrasting theories.

Third, I contribute to studies examining ex-ante IPO motives (e.g., Pagano et al., 1998; Chemmanur and Fulghieri, 1999; Brau et al., 2003). I closely follow the approach of Pagano et al. (1998) and, by differentiating various issuer types, provide

insights into variations in selection. Specifically, I examine IPO motives in the European setting, adding to studies focussed on these markets (e.g., Chemmanur et al., 2023; Hoque and Doukas, 2023).

Fourth, still using staying private as the counterfactual, I examine whether issuers are able to differentiate themselves during various market phases by underpricing. This is motivated by Banerjee et al. (2016), who propose that underpricing allows early movers to signal their quality. Using the signalling literature of underpricing (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989), I extend this reasoning to all phases of the IPO wave. This allows me to examine further nuances of selection that may be at play.

Finally, I add to the growing literature examining the effects of the COVID-19 pandemic on IPOs. Baig and Chen (2022) provide evidence that despite the surge in IPOs witnessed during the pandemic, increases in uncertainty resulted in adverse consequences such as higher underpricing and post-IPO return volatility. Mazumder and Saha (2021) corroborate the presence of higher underpricing, though they find it to be inversely related to fear of the pandemic. For U.S. firms, Ke (2022) finds increasing cost of equity, which could also impact IPO markets. I follow the call of Baig and Chen (2022) to provide further evidence on the performance of COVID-19 hot issuers, focussing on operating performance.

The remainder of this paper is structured as follows. In Section 1.2, I review related literature and derive expectations as to ex-ante and ex-post selection. Section 1.3 outlines the data collection process and defines the various market phases of the COVID-19 IPO wave. Section 1.4 presents analyses on how ex-ante IPO determinants change in hot markets, while Section 1.5 examines ex-post evidence of selection and signalling. Section 1.6 concludes.

1.2 Related literature and empirical predictions

1.2.1 Motives of IPO wave issuers

There are competing views on IPO wave issuance motives. The first such view treats waves as windows of opportunity during which lower quality firms go public opportunistically (cp. Ritter, 1991). In the theoretical model of Yung et al. (2008), IPO waves are defined by time variation in adverse selection where marginal issuers are of lower quality. According to this model, wave issuers are thus smaller, riskier, growth companies, which Yung et al. (2008) empirically verify by examining post-IPO performance of hot issuers compared to cold issuers. I expect selection of this kind to also be evident in ex-ante firm characteristics, which should vary for hot issuers in the theorised manner.

Alti (2006) offers a similar hot issues mechanism, whereby favourable conditions of hot markets induce less profitable firms to go public, which they may struggle to do in cold markets. By comparing ROA of hot and cold issuers in the year of the IPO and beyond, this conjecture is empirically validated. However, the finding is partially distorted by the fact that hot issuers also raise higher proceeds, resulting in a larger asset base that dilutes ROA as a profitability measure. By examining ex-ante profitability, I seek to investigate this theory from another angle.

The industry market-to-book ratio has often been found to be a main predictor of a firm's IPO decision, which Pagano et al. (1998) attribute to the windows of opportunity hypothesis given the decline in operating profitability observed following the IPO. However, it may also indicate a non-uniform change in market conditions across different industries during a hot market. In their seminal paper on hot issuers, Helwege and Liang (2004) find only minor differences in the characteristics and post-IPO performance of hot and cold issuers, concluding that hot issuers are not acting opportunistically.

The notion of market timing need not indicate that IPO waves consist primarily of such opportunistic, lower quality firms, as implied by the windows of opportunity hypothesis. Pástor and Veronesi (2005) instead propose a model where firms conduct IPOs rationally once market conditions improve in terms of expected discount rates, cash flows, or uncertainty. In contrast to the expectations derived previously, such rational anticipation of optimal conditions would diminish the observable differences in ex-ante characteristics determining the IPO likelihood during hot as compared to cold markets. Indeed, if firms wait for optimal market conditions, they may well be more established and larger.

Nevertheless, issuers need not be homogeneous within an IPO wave. Alti (2005) argues that firms going public earlier in the wave produce information that makes the valuation of followers easier, triggering a wave. In Banerjee et al.'s (2016) model, high-growth firms go public early. Çolak and Günay (2011), on the other hand, argue that firm quality is lower in the early stages of a hot market with higher quality firms delaying their IPO strategically to learn about the state of the economy. In contrast, Chemmanur and He (2011) contend that firms with higher productivity incur an opportunity cost by delaying their IPO, as going public early would allow these firms to seize higher market shares that their superior profitability allows them to capitalise on. I examine whether such differences in quality are observable in ex-ante firm characteristics at earlier stages of a wave and if these observed effects differ significantly from firms issuing during the hot market period.

1.2.2 Performance of IPO wave issuers

In general, IPO firms have been found to fare poorly in terms of ex-post performance, with deteriorating profitability (e.g., Jain and Kini, 1994; Mikkelson et al., 1997; Pagano et al., 1998) and underperformance of long-term returns (e.g., Ritter, 1991; Loughran and Ritter, 1995; Brav and Gompers, 1997). Following the windows of opportunity hypothesis, these effects are expected to be augmented for hot IPO

firms. In terms of returns, Ritter (1991) finds post-IPO underperformance to indeed be concentrated in hot market issuers. In direct comparison to cold issuers, hot issuers have been confirmed to have worse long-run returns (Helwege and Liang, 2004) and higher cross-sectional return variance (Yung et al., 2008).

For operating performance of hot IPOs, previous findings have been less clear. When comparing the industry-adjusted performance of hot and cold issuers, Helwege and Liang (2004) note that differences are too minor to suggest opportunism of hot issuers. Alti (2006), on the other hand, finds hot issuers have persistently lower post-IPO profitability. Furthermore, Yung et al. (2008) show that hot issuers are significantly more likely to delist than cold issuers, indicating lower survivability.

Again, in terms of within-IPO wave dynamics, firms listing earlier or later in the wave may differ. In Chemmanur and He's (2011) model, IPO waves occur in industries with an increased probability of a profitability shock. Therefore, going public early confers a first-mover advantage to issuing firms and results in higher post-IPO productivity and profitability. Expanding on this idea and returning to the notion that IPO firms can signal their quality by underpricing, Banerjee et al. (2016) focus on the ex-post performance of early movers with high underpricing (so-called *leaders*) as opposed to other IPO firms. For such leaders, the classic post-IPO profitability drop is found to be reversed, while they experience higher sales growth for multiple years after the IPO.

When examining post-IPO performance, distinguishing IPO firms further using underpricing can provide further insight. According to the signalling literature of underpricing (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989), only higher quality firms can credibly signal their type by underpricing, as their higher expected cashflows allow them to raise higher proceeds at seasoned offerings. Given that only firms themselves know their type and investors are unable to observe it, qualitative differences are expected to be undetectable in terms of ex-ante firm characteristics but may well reveal themselves ex-post.

Overall, prior findings suggest that hot issuers have worse post-IPO operating performance than cold issuers. However, the implicit assumption when directly comparing these two groups is that the examined firms inevitably go public and differ mainly in terms of their timing. I argue that the better and more interesting counterfactual would be to compare firms listing during different market phases to their private counterparts, asking the question of how hot issuers would have fared compared to having stayed private. By distinguishing early movers from other hot issuers, I am able to address dynamics of listing at different stages of a wave.

Setting up the question of post-IPO performance as described could also provide further insights into selection into listing during an IPO wave, particularly regarding the opportunistic versus rational nature of such selection. Given the differential economic state present during IPO wave, comparing IPO firms to private firms using financial performance indicators relating to the same time period may also be more instructive than comparing early movers, hot, and cold issuers at varying time periods.

1.3 Data

1.3.1 Sample construction

This study aims to compare IPO timing decisions to the counterfactual of having stayed private. I therefore exploit the extensive reporting requirements that private and public limited liability firms are subject to within the European Economic Area. Financial data on European firms is provided by Bureau van Dijk's Orbis database with remarkable coverage.

Listings data is obtained from a hand-collected database containing the universe of listings on European exchanges with an SME growth market segment, complete

with full listing details obtained from listing documents.[2,3] The determination of various market phases outlined in Section 1.3.2 is based on these exchanges.

Though Orbis also contains information on if and when a given firm went public, listing details such as offering price or shares issued are not included and listing dates are often inaccurate. Orbis is therefore matched to the listings database. Furthermore, where a firm listed on an exchange outside of the database, the listing details are hand-collected. This allows for the full verification of IPO dates contained in Orbis and augmentation with underpricing data.

I retain only initial listings by operating companies, therefore SPACs, REITs, closed-end funds, (de-)mergers, relistings, and secondary listings are excluded. The resulting sample covers Belgium, Bulgaria, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Poland, Spain, Sweden, and the United Kingdom. The sample begins in 2016, given that this is the first year for which data could reliably be collected from exchange documents and websites. It ends after 2022 to allow for an adequate post-IPO operating history. The sample consists of a total of 1,588,150 firms, 1,329 of which list during the sample period.

In order to examine ex-ante determinants of the decision to go public, I follow Chemmanur et al. (2023) and consider those firms with at least €1 million in total assets in one of the sample years from 2016 to 2022. This ensures that only firms that would realistically go public are included, as regulated European stock exchanges typically impose size requirements. Furthermore, I only consider operating, non-financial firms. I require non-missing financial information covering a period of at least 12 months and eliminate duplicate entries by giving preference to annual reports and consolidated accounts. I exclude firms with negative total assets, tangible assets, equity, or sales in any of the sample years (Kalemli-Ozcan

[2]Exchanges with an SME growth market segment and initial listings during the period of consideration are: Aquis Stock Exchange, Bolsas y Mercados Españoles, Bulgarian Stock Exchange, Deutsche Börse, Euronext, London Stock Exchange, NASDAQ Nordic, Nordic Growth Market, Spotlight Stock Market, and Warsaw Stock Exchange.

[3]Though SDC Platinum is a typical choice for obtaining IPO data, its coverage of European listings is limited, particularly for those on exchange-regulated markets.

et al., 2022).

Firm financials and ratios are calculated from the Orbis data. Orbis also provides information on patent applications from PATSTAT. I match my entire sample to PitchBook to determine the presence of VC in each year. All continuous variables are winsorised at the 1st and 99th percentiles.

1.3.2 Defining the COVID-19 rising cycle and hot issues period

COVID-19 was officially declared a pandemic by the World Health Organisation (WHO) in March 2020.[4] Though the ensuing uncertainty initially caused a decline in stock markets, recovery was swift and culminated in the apparent rejuvenation of the IPO market beginning in the second half of 2020.

In order to accurately define the time period rendering the IPO market "hot", I follow Helwege and Liang (2004) and use the three-month centred moving average of the number of initial listings, determined using European listings from 2016 to 2022.[5] A month is considered hot if its number of IPOs falls into the upper quartile, i.e. if there are more than 28.9 IPOs. The COVID-19 hot issues period is then defined by at least three consecutive hot months, which occurs from January 2021 to January 2022. Subfigure 1.1a illustrates this period.

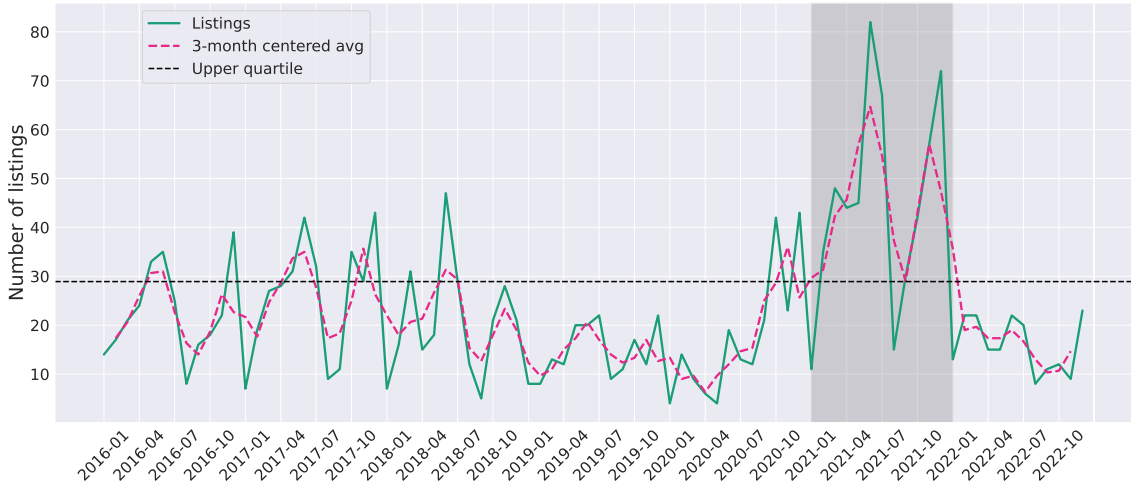
Next, I identify the period during which the market began to heat up, known as the rising cycle, following Çolak and Günay (2011). To this end, I use the four-quarter moving average of the number of IPOs. A rising cycle occurs when there are at least three consecutive quarters of increases in this moving average. The COVID-19 rising cycle thus occurs from the third quarter of 2020 to the fourth quarter of 2021 (see Subfigure 1.1b). Here, Banerjee et al. (2016) define early movers as those

[4] `https://www.who.int/europe/emergencies/situations/covid-19`, accessed on July 22nd, 2024.

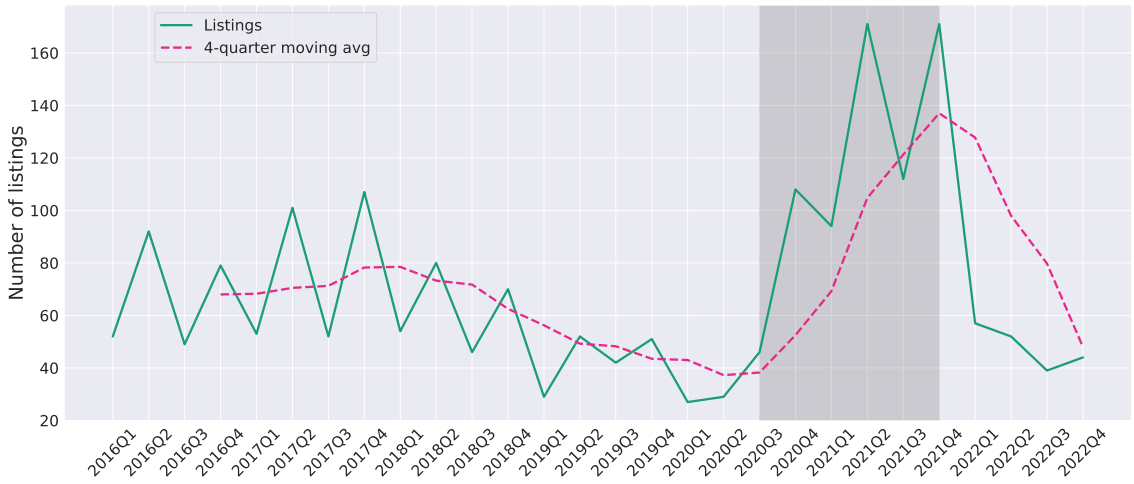
[5] Listings comprise the initial inclusion of a company's shares on a stock exchange via IPOs, private placements, and direct listings, while excluding SPACs, relistings, or secondary listings. A detailed description of the data is given in Section 1.3.1.

Figure 1.1: Number of initial listings, hot issues period, and rising cycle during COVID-19
This figure shows the number of initial listings in European sample exchanges from 2016 to 2022. Subfigure 1.1a depicts the monthly number of listings and their three-month centred moving average. The COVID-19 hot issues period (shaded) is defined by at least three consecutive hot months, i.e. those months with centred moving average listings in the upper quartile (exceeding 28.9). Subfigure 1.1b shows the quarterly number of listings and their four-quarter moving average. The COVID-19 rising cycle (shaded) is the period of three consecutive quarters of increases in the moving average.

(a) COVID-19 hot issues period



(b) COVID-19 rising cycle



issuers listing within the first two quarters of the rising cycle (i.e. during the third and fourth quarters of 2020).

In order to empirically examine selection and outcomes depending on the timing of an IPO, I combine the hot market model with the rising cycle model to create mutually exclusive issuer base categories as follows:

$$\text{Issuer type} = \begin{cases} Early\ mover, & \text{if } [\text{07-2020,12-2020}]\,, \\ Hot\ issuer, & \text{if } [\text{01-2021,01-2022}]\,, \\ Cold\ issuer, & \text{if } [\text{01-2016,02-2020}]\,. \end{cases}$$

In order to avoid conflating pre-pandemic (before March 2020) and post-pandemic (from March 2020 until the onset of the rising cycle and after January 2022) listings within the cold issuer category and introducing potential bias, this category is limited to the pre-pandemic period. When repeating all analyses in unreported robustness tests using both pre-pandemic and post-pandemic issuers as cold issuers, results remained qualitatively unchanged.

1.3.3 Industries during the wave

Examining US listings, Baig and Chen (2022) find an increase in listings during the second half of 2020 (during which early movers of the COVID-19 wave would list) concentrated in healthcare and high-technology industries. The retail industry also experienced an upsurge related to increasing demand for e-commerce following lockdown.[6] Positive shocks to certain industries render the COVID-19 IPO wave well-suited for examining both early movers and hot issuers. If Chemmanur and He's (2011) model applies, differences between early movers and hot issuers are likely to be observable.

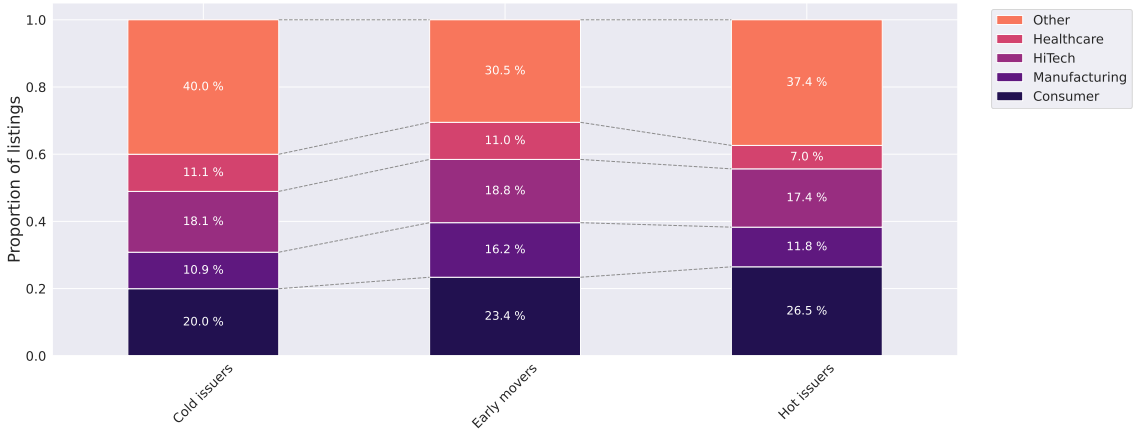
In the following, I descriptively analyse the industry composition of sample listings throughout various market phases in order to provide an overview of trends and dynamics. Figure 1.2 shows the industry composition of cold issuers, early movers, and hot issuers by Fama-French 5 industry, giving an abstract and intuitive overview following Baig and Chen (2022).

In terms of proportions of total listings (Subfigure 1.2a), the consumer and man-

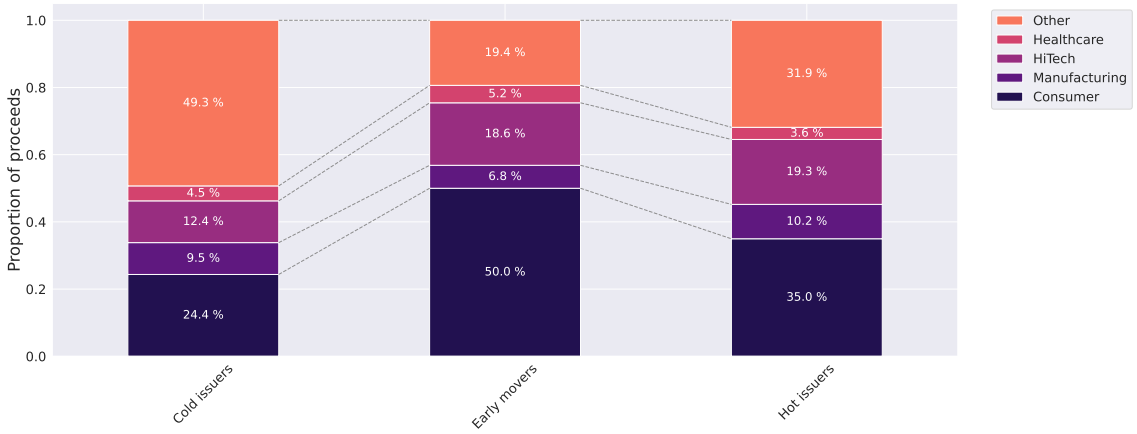
[6] `https://www.ft.com/content/171ea5f4-b3f4-4e76-bb13-2480879d1bd0`, accessed on July 22nd, 2024.

Figure 1.2: Listings by Fama-French 5 industry and market phase
This figure shows listing statistics by Fama-French 5 industry and market phase. Subfigures 1.2a and 1.2b depict the proportion of total listings and total proceeds made up by each industry, respectively. Subfigure 1.2c shows the average proceeds (in millions of 2015 €) obtained within each industry.

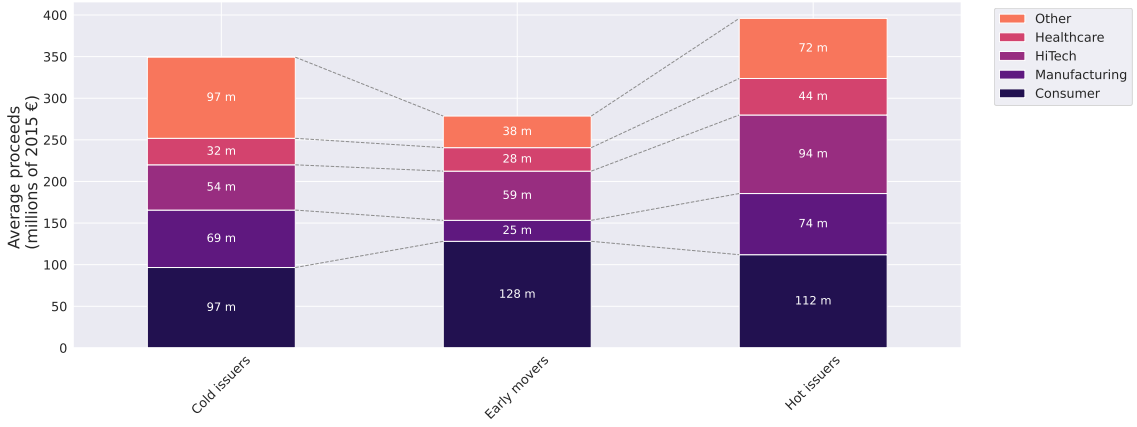
(a) Proportion of listings



(b) Proportion of proceeds



(c) Average proceeds



ufacturing industries comprise larger portions of early movers than cold issuers. Healthcare and high-technology, found by Baig and Chen (2022) to dominate the period coinciding with early movers' time period, stay similar. Healthcare listings decline for hot issuers, while the share of consumer industry listings increases further.

Interestingly, Subfigure 1.2b shows that half of proceeds raised by early mover listings were in the consumer industry. Despite not having shown an increased share in the number of listings, the high-technology industry obtains 18.6 % of early mover proceeds, an increase from 12.4 % observed for cold issuers. For hot issuers, while not as pronounced as for early movers, the consumer industry still dominates the share of proceeds. High-technology proceeds remain high. The healthcare industry constitutes the smallest portion of proceeds for all issuer categories.

These trends can be further analysed by examining average proceeds obtained per listing (Subfigure 1.2c). Overall, average proceeds were lowest for early movers, possibly indicative of higher uncertainty during the corresponding market phase. Hot issuers obtain the highest average proceeds. For early movers, consumer and high-technology industries increase average proceeds from the cold issues period. During the hot issues phase, average proceeds are higher than during the other two periods. Compared to cold issuers, the high-technology industry has the largest relative increase, with average proceeds increasing by nearly 75 %.

On the level of Fama-French 5 industries, the consumer and high-technology industries increase most during the IPO wave in Europe. The healthcare sector does not appear to expand, contrasting with trends observed in the US.

While informative, these insights provide an abstract indication based on the coarse Fama-French 5 industries framework. Therefore, I next examine industry trends on the more granular level of Fama-French 49 industries and focus on non-financial industries. For each market phase, I determine the top three industries in terms of the proportion of listings and proceeds, respectively. This results in a set of seven industries, an overview of which is depicted by Figure 1.3. Notably,

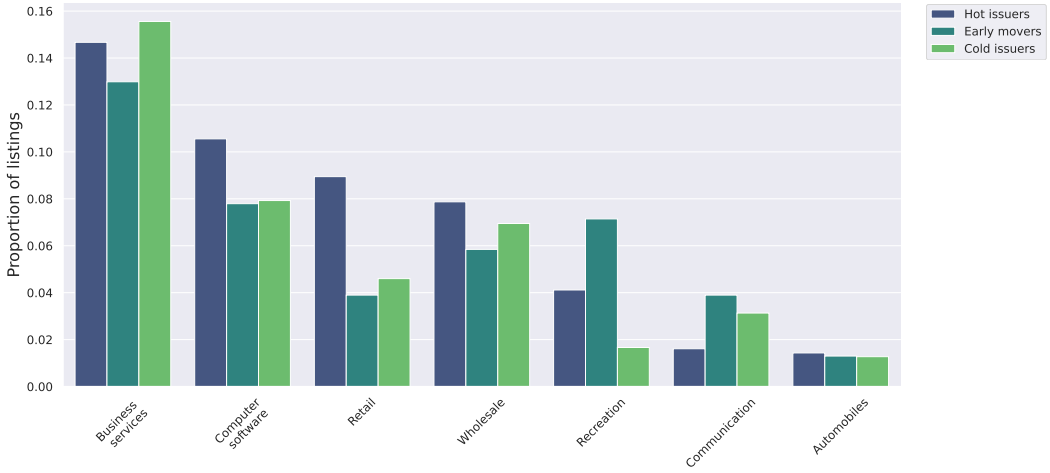
no healthcare-related industry is part of this set. Overall, the similar industry composition observed for the three issuer categories are in line with Helwege and Liang's (2004) finding of listings being concentrated in similar sets of industries across market phases.

Subfigure 1.3a shows that listings in all three issuer categories are most frequently from the business services industry. In terms of the proportion of proceeds (Subfigure 1.3b), business services come second to retail for early movers and hot issuers, with business services consistently raising approximately 10 % across issuer types. For early movers and hot issuers, proceeds are dominated by the retail industry. Despite ranking fourth in terms of listings for early movers, the retail industry constitutes 43 % of proceeds. Average proceeds (Subfigure 1.3c) confirm that fewer issuers obtained relatively high proceeds. Among them are two e-commerce retail companies, Allegro.eu listing in Warsaw and THG in London, raising approximately €1.9 billion in gross proceeds each. Given that early movers list after many European states had an initial multi-week lockdown, the depth of proceeds observed for such retail issuers is indicative of the anticipation of further lockdowns inducing demand shocks that could culminate in productivity shocks. Other industries that play a more important role compared to the cold issues period, such as computer software, communication, and recreation, similarly fit this narrative.

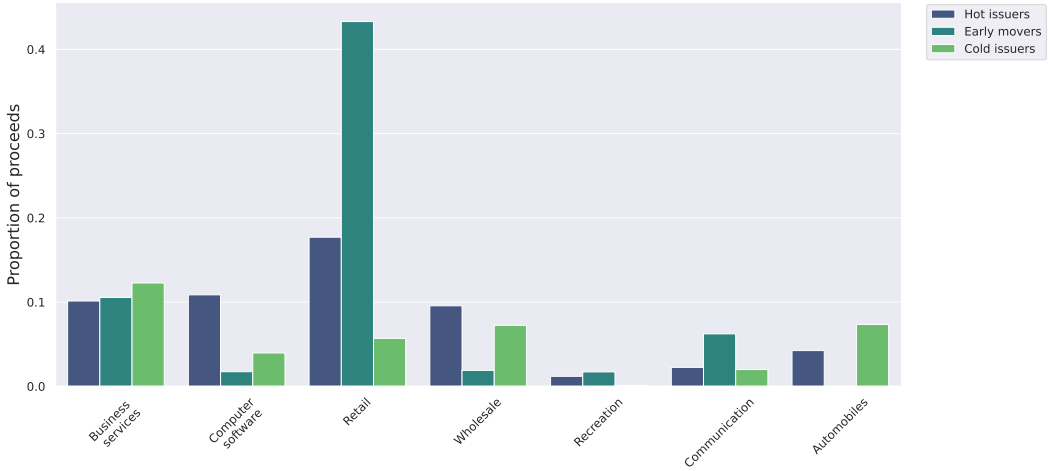
The high average proceeds of retail issuers in the early market could further be indicative of Alti's (2005) theory of IPO waves, whereby firms with superior future products obtain high valuations ahead of the wave, inducing more firms to list. This is supported by the high number of retail listings during the subsequent hot market, which earn lower average proceeds than early retail listings.

Figure 1.3: Listings by Fama-French 49 industry and market phase
This figure shows listing statistics by Fama-French 49 industry and market phase. Subfigures 1.3a and 1.3b depict the proportion of total listings and total proceeds made up by each industry, respectively. Subfigure 1.3c shows the average proceeds (in millions of 2015 €) obtained within each industry.

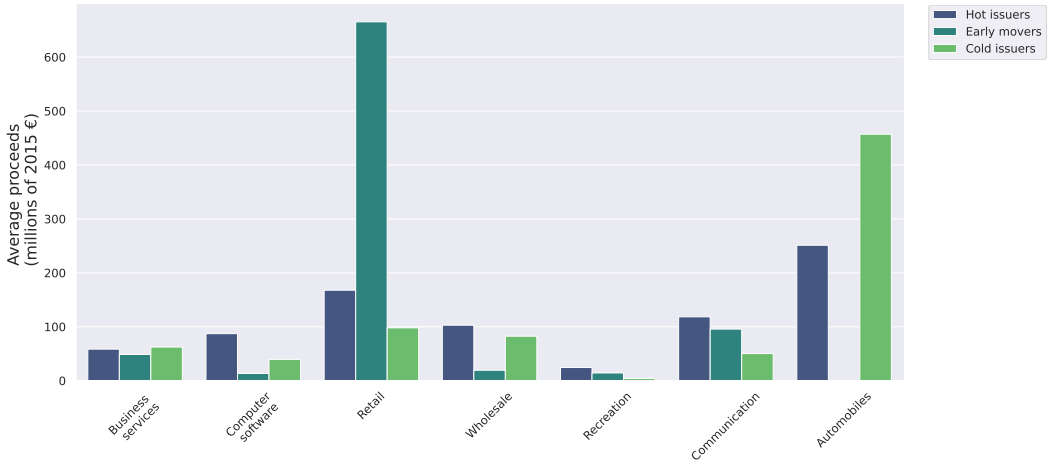
(a) Proportion of listings



(b) Proportion of proceeds



(c) Average proceeds



1.4 Do ex-ante IPO determinants change during IPO waves?

Prior studies have in common that they focus on comparing early movers, hot, and cold issuers in the year of the IPO and some years after listing. They do not, however, examine how selection into conducting an IPO changes during a hot market from the perspective of a private firm. I contend that examining selection for different types of issuers can produce valuable insights on the theories surrounding issuers' timing on or off an IPO wave. Thus, I leverage the European setting to examine how a private firm's choice to go public changes during a hot market period, as evidenced by its ex-ante characteristics. This approach allows me to explore competing views on IPO wave issuance motives.

For this purpose, I implement a similar empirical approach to Pagano et al. (1998) and model the choice of conducting an IPO versus staying private based on ex-ante firm characteristics known to influencing this decision. In order to gauge how selection changes in various market phases, I use a multinomial logistic regression model of the following form:

$$\begin{aligned} Pr(status_{i,t} = m)_{i,j,k,t} = \beta_0 + \beta_1 Total\ assets_{i,t-1} + \beta_2 Age_{i,t-1} + \beta_3 Leverage_{i,t-1} \\ + \beta_4 ROA_{i,t-1} + \beta_5 VC_{i,t-1} + \beta_6 Tangibility_{i,t-1} + \beta_7 Patent\ filer_{i,t-1} \\ + \beta_8 Sales\ growth_{i,t-1} + \eta_j + \phi_k + \epsilon_{i,j,k,t}. \end{aligned} \tag{1.1}$$

Here, I pool all private firms i in each sample year t and retain IPO firms until they list. In each year, a firm's *status* indicates whether it became an early mover, hot issuer, or cold issuer, as defined in Section 1.3.2, each compared to the base outcome of staying private. I apply industry fixed effects η for each NACE Rev. 2 Section j and country fixed effects ϕ for each country k. Standard errors are

clustered on the firm level.

The explanatory variables are ex-ante IPO determinants operationalising underlying constructs frequently derived in the literature. Firm size and maturity impact the listing decision in the presence of adverse selection, given that older and larger firms are expected to have longer operating histories reducing this friction and making them relatively more likely to list (Pagano et al., 1998; Chemmanur and Fulghieri, 1999). Furthermore, these constructs are interesting to examine in the context of IPO waves, given Yung et al.'s (2008) model predicting variation in adverse selection resulting in smaller and younger marginal IPO firms. I measure size as the logarithm of total assets (in millions) and proxy maturity using age, defined as the years since establishment.

By going public, firms may seek to optimise their capital structures (Alti, 2006) or reduce reliance on debt funding (Pagano et al., 1998). Therefore, I include leverage, defined as loans and long-term debt over total assets, as an explanatory variable. Profitability may impact a firm's need for financing and is measured by return on assets (ROA). This construct is especially relevant to IPO waves, given the expectation of lower quality issuers (Yung et al., 2008) or the possibility of favourable market conditions enabling listings of firms with lower profitability (Alti, 2006).

Given that IPOs are a frequent exit mechanism for VC investors, I include a dummy indicating the presence of a VC investor prior to the IPO. The effect of VC presence on IPO likelihood during hot markets is ambiguous. On the one hand, assuming hot markets are windows of opportunity, the association may be positive (Lerner, 1994). On the other hand, hot markets characteristically have higher underpricing, which may deter VC investors from exiting.

Tangibility, the ratio of fixed to total assets, is a proxy for information asymmetry, as firms with fewer tangible assets may be harder to value. Given an IPO wave, such firms may be more inclined to attempt an IPO, reminiscent of the dotcom period.

I include a patent indicator to proxy for a firm's innovativeness, which may also

reflect its future potential to compete and capital requirements playing a role in the IPO decision. Orbis includes information on patent applications. As patent filings are highly skewed, I construct a dummy variable equal to one if a firm filed for at least one patent within the three years leading up to the IPO.

Firms may be more likely to list following periods of growth, which could be related to the need for cash or indicate a firm's product market viability (Pagano et al., 1998; Chemmanur et al., 2018). Ex-ante growth profiles of firms listing during and off the wave, as well as within the wave itself, are likely to differ. I therefore include annual sales growth in the model. As consecutive years of sales are not available for the full sample, I examine sales growth separately in a separate panel.

Table 1.1: Ex-ante firm characteristics by firm type
This table presents mean and median values for various firm characteristics. Firms are categorised as private until the year they list, at which point they are classified as cold issuers, early movers, or hot issuers in accordance with Section 1.3.2. The number of observations refers to firm-years. For a definition of variables, see Table A.1.

		Privates	Cold issuers	Early movers	Hot issuers
	N - firm-years	8,347,072	688	100	377
Log of total assets	*Mean*	1.098	2.467	2.363	2.513
	Median	0.800	2.377	2.225	2.304
Log of firm age	*Mean*	2.798	2.090	2.112	2.083
	Median	2.899	2.080	2.138	1.971
Leverage	*Mean*	0.257	0.325	0.329	0.325
	Median	0.098	0.275	0.286	0.287
ROA	*Mean*	0.050	-0.025	-0.064	-0.043
	Median	0.025	0.007	-0.028	-0.003
VC indicator	*Mean*	0.005	0.205	0.210	0.236
	Median	0.000	0.000	0.000	0.000
Tangibility	*Mean*	0.258	0.089	0.090	0.086
	Median	0.108	0.008	0.005	0.014
Patent indicator	*Mean*	0.024	0.265	0.270	0.196
	Median	0.000	0.000	0.000	0.000
	N - firm-years	6,517,857	514	76	284
Sales growth	*Mean*	0.248	0.781	0.860	0.767
	Median	0.020	0.205	0.271	0.155

Table 1.1 presents summary statistics for private firms and IPO firms by issuer type. In general, IPO firms appear to be larger and younger than private firms and are more highly leveraged. The difference in age is particularly notable; while private firms have a (geometric) mean age of 15.4 years ($= e^{2.798} - 1$), cold issuers average at 7.1 years ($= e^{2.090} - 1$). Furthermore, IPO firms are not only less profitable,

but unprofitable, evidenced by negative ROA. IPO firms are less tangible and more commonly have VC investors and patents. They also have higher sales growth.

Within the different IPO firm types, the most noticeable distinctions are within ROA and sales growth. Early movers and hot issuers are both less profitable than cold issuers at the mean, with early movers also being noticeably less profitable at the median. In terms of sales growth, IPO firms show higher mean and median values than private firms, with early movers having the highest mean and median. Hot issuers are less likely to be patent filers than the other issuer types. In terms of size, age, and leverage, the various issuer types appear similar. Overall, other than in terms of profitability, neither early movers nor hot issuers appear to differ much from cold issuers, in line with the general finding of Helwege and Liang (2004).

I formalise these initial indications with a multivariate analysis. Table 1.2 shows the results of a multinomial logit analysis, which I conduct both with (Panel A) and without (Panel B) sales growth, owing to the fact that sales are not available for multiple consecutive prior years for all firms. I note that the direction of all coefficients remains the same in both models. The relative difference to the base outcome of staying private is similar for most variables across the groups, with no differences in direction. While it appears that VC presence is a relatively stronger predictor of becoming a hot issuer compared to the other issuer types (compared to staying private), this difference is not significant as indicated by a Wald test. The magnitudes of most coefficients is similar across issuer types.

Hot issuers are, however, less likely to be patent filers, and this relative difference is in turn significantly different from the other issuer types. This indicates that hot issuers are less innovative.

The second variable with a robustly significant difference between each issuer type is ROA. When comparing early movers to cold issuers, this difference is highly significant in Panel B, showing that less profitable firms are especially likely to choose to list as early movers rather than stay private. Less profitable firms also

Table 1.2: Ex-ante IPO determinants by market phase
This table presents multinomial logit estimates of firms' decisions to list either during a cold market phase (*Cold issuer*), the first two quarters of the rising cycle (*Early mover*), or the hot issues period (*Hot issuer*) compared to the base outcome of staying private. Issuer types are defined in Section 1.3.2. The regressors are ex-ante firm characteristic variables. The analysis is conducted for all observations in Panel A and repeated for firms with available sales growth data in Panel B. Descriptive statistics for each panel are shown in Table A.2. Reported coefficients are log-odds. The intercept term is included in the analyses, but not reported. All analyses apply industry and country fixed effects. Huber/White robust standard errors clustered by firm are presented in parentheses. The three right-hand side columns report the statistical significance of the Wald test of the difference between the indicated model coefficients. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables, see Table A.1.

	Panel A			Difference		
	(I)	(II)	(III)	(I)-(II)	(I)-(III)	(II)-(III)
	Cold issuer	Early mover	Hot issuer			
Log of total assets	0.521***	0.523***	0.555***			
	(0.025)	(0.060)	(0.033)			
Log of firm age	-1.131***	-0.971***	-1.030***			
	(0.048)	(0.116)	(0.068)			
Leverage	1.067***	1.103***	1.036***			
	(0.110)	(0.263)	(0.140)			
ROA	-2.312***	-4.959***	-3.497***	**	*	
	(0.338)	(0.983)	(0.518)			
VC indicator	1.828***	1.758***	2.072***			
	(0.141)	(0.396)	(0.192)			
Tangibility	-2.398***	-2.736***	-2.578***			
	(0.238)	(0.619)	(0.286)			
Patent indicator	1.396***	1.318***	0.887***		**	
	(0.113)	(0.307)	(0.172)			
Industry FE	Yes	Yes	Yes			
Country FE	Yes	Yes	Yes			
N	8,348,237	8,348,237	8,348,237			
Pseudo-R^2	0.226	0.226	0.226			

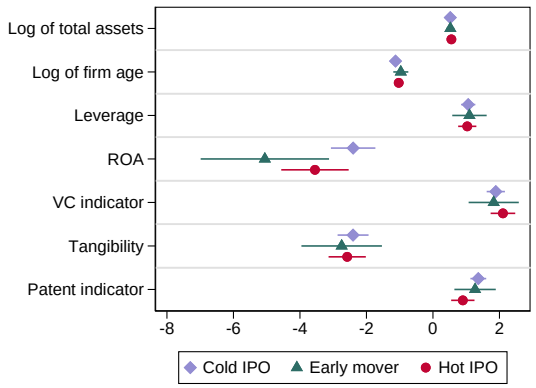
	Panel B			Difference		
	(IV)	(V)	(VI)	(IV)-(V)	(IV)-(VI)	(V)-(VI)
	Cold issuer	Early mover	Hot issuer			
Log of total assets	0.578***	0.528***	0.618***			
	(0.029)	(0.068)	(0.039)			
Log of firm age	-1.148***	-0.857***	-1.112***	*		
	(0.067)	(0.151)	(0.090)			
Leverage	1.364***	1.316***	1.352***			
	(0.131)	(0.286)	(0.161)			
ROA	-1.702***	-5.202***	-2.579***	***		**
	(0.407)	(1.155)	(0.621)			
VC indicator	1.967***	1.643***	2.204***			
	(0.163)	(0.458)	(0.229)			
Tangibility	-2.429***	-2.576***	-3.001***			
	(0.275)	(0.737)	(0.321)			
Patent indicator	1.413***	1.629***	0.846***		**	**
	(0.129)	(0.336)	(0.194)			
Sales growth	0.050***	0.070**	0.041*			
	(0.018)	(0.034)	(0.024)			
Industry FE	Yes	Yes	Yes			
Country FE	Yes	Yes	Yes			
N	6,518,731	6,518,731	6,518,731			
Pseudo-R^2	0.229	0.229	0.229			

have a higher relative likelihood of becoming early movers compared to the relative likelihood of becoming a hot issuer.

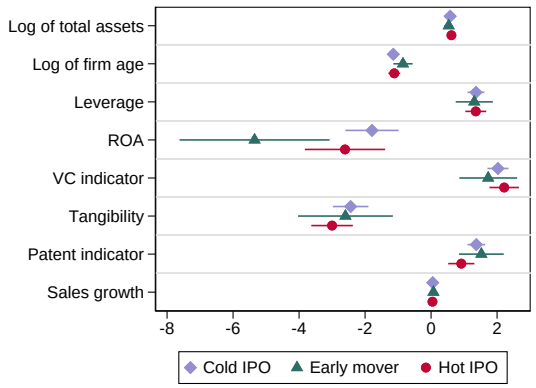
To illustrate these findings more clearly, Figure 1.4 plots the coefficients and their confidence intervals for each panel. Apart from ROA, the coefficients predicting going public are virtually identical for each issuer type. The clearest difference is visible between early movers and cold issuers, with the former having a particularly low ROA coefficient. The ROA confidence interval of hot issuers has considerable overlap with that of cold issuers, especially in Panel B.

Figure 1.4: Coefficients of ex-ante IPO determinants
This figure visualises the coefficients obtained in the analysis of ex-ante determinants of listing during various market phases as shown by Table 1.2. The coefficients are shown for each issuer type, based on whether a firm listed during a cold market phase *(Cold issuer)*, the first two quarters of the rising cycle *(Early mover)*, or the hot issues period *(Hot issuer)* compared to the base outcome of staying private. Issuer types are defined in Section 1.3.2. The obtained confidence interval is depicted for each coefficient. Subfigure 1.4a is based on the analysis conducted for Panel A, which includes all observations. Subfigure 1.4b is based on the analysis conducted for Panel B, which includes all firms with available sales growth data.

(a) Panel A



(b) Panel B



This analysis of ex-ante firm characteristics reinforces the findings of Helwege and Liang (2004), who find few differences between hot and cold issuers, concluding that these firms are not qualitatively different. However, it also provides empirical support for the mechanism proposed by Alti (2006), whereby less profitable firms find it optimal to go public once market conditions improve. This is corroborated during both the rising cycle and the hot issues period, though the relative effect is

stronger for early movers of the rising cycle. This is particularly interesting given the economic downturn triggered by the COVID-19 pandemic, which likely had a negative impact on profitability observed just before the IPO for hot issuers, while the pre-IPO financials observed for early movers preceded such a downturn. I note that the association to being less profitable need not indicate lower quality firms, but may be in line with rational motives as proposed by Pástor and Veronesi (2005).

Overall, the results show that in terms of selection as evidenced by ex-ante firm characteristics, there are minor differences between issuers at different points in time along the wave as well as off the wave. In terms of ex-ante characteristics, there is no evidence of quality differentials as proposed by Çolak and Günay (2011) and Banerjee et al. (2016). The most robust evidence of difference is found for profitability, in line with Alti's (2006) theory. Lower profitability need not indicate lower firm quality. Whether lower profitability firms list rationally or opportunistically may become clearer when looking at post-IPO outcomes. I do not find evidence to support Yung et al.'s (2008) model of hot markets attracting smaller, younger firms. While IPO wave issuers may differ from cold issuers in this manner, when compared to private firms, there does not seem to be selection of this kind. Furthermore, the results do not indicate that such firms would list opportunistically, in line with the windows of opportunity hypothesis.

1.5 How do IPO wave issuers perform ex-post relative to their private peers?

Though the previous section established that ex-ante differences determining the selection of private firms into listing at various market phases are minor, such differences may well only become evident post-IPO, therefore I focus my subsequent analysis here. In particular, I do not discount the possibility of variations in ex-ante unobservable firm quality that firms could potentially signal through underpricing.

Table 1.3: Univariate comparison of IPO firms and matched private control firms
This table provides mean and median statistics for various firm characteristics of IPO firms and matched private control firms. Variables are measured in the matching year, two years prior to the IPO. Matched private control firms are identified based on an exact match of industry and country. Within these constraints, the nearest neighbour of each IPO firm is determined based on total assets, sales, age, leverage, profitability, and VC involvement using the Mahalanobis distance metric, without replacement. Test statistics determining equivalence of sample means and medians are computed using t-tests and Wilcoxon rank tests, respectively, applying Huber/White robust standard errors. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table A.1.

	IPO firms		Private firms		Difference			
	Mean	Median	Mean	Median	Mean	t-stat	Median	t-stat
Total assets (millions)	45.563	9.545	40.353	8.536	5.211	1.566	1.007	0.729
Log of total assets	2.621	2.356	2.515	2.255	0.107	1.297	0.100	0.779
Firm age	10.963	7.492	12.364	9.677	-1.401**	-2.400	-2.330***	-4.932
Log of firm age	2.144	2.139	2.316	2.368	-0.171***	-4.371	-0.213***	-4.234
Leverage	0.337	0.312	0.315	0.281	0.022	1.480	0.031	0.945
ROA	-0.023	0.012	-0.018	0.014	-0.006	-0.656	-0.002	-0.368
ROS	-0.942	0.011	-0.776	0.014	-0.166	-1.318	-0.002	-0.522
VC indicator	0.207	0.000	0.200	0.000	0.006	0.313	0.000	.
Tangibility	0.096	0.014	0.097	0.013	-0.001	-0.150	0.001	0.144
Log of patents filed	6.246	0.000	5.966	0.000	0.281	0.141	0.000	.
Sales (millions)	46.414	7.874	42.249	7.051	4.165	1.087	0.793	0.536
N - firms	784		784					

In an ideal experiment examining post-IPO outcomes, the IPO status would be randomly assigned to private firms at different points in time. In order to approach this identification, I proceed with a matching strategy. For each IPO firm in my sample, I identify the closest matching private firm two years prior to the IPO. 792 IPO firms have sufficient data available two years prior to the IPO as well as available post-IPO financials and are thus considered for matching.[7] I focus on the variables determining IPO likelihood examined in the previous section. Hence, I require that a matched control operates in the same industry and country.[8] Within these constraints, I find the nearest neighbour of each IPO firm in terms of total assets, sales, age, leverage, profitability, tangibility and VC involvement using the Mahalanobis distance metric, without replacement (Rubin, 1980). Where available,

[7]Though matching two years prior to the IPO means some IPO firms are lost, I argue that this is more appropriate than matching one year pre-IPO because the COVID-19 rising cycle and hot issues period last more than a year together, and firms deciding to list later on may have already made strategic adjustments in anticipation of listing.

[8]I consider private firms that have financial data available for at least two further consecutive years from the matching year in order to enable comparisons in at least the first post-IPO year.

I also match on lead sales growth. I am able to find a matched private firm for all 792 IPO firms. To ensure matching adequacy, I retain all matches with a distance metric not exceeding the 99$^{\text{th}}$ percentile, concluding with 784 matched IPO firms.

Table 1.3 presents mean and median summary statistics for various firm characteristics. Along these observable dimensions, there are no notable differences between IPO firms and their matched private controls two years prior to the IPO. This is confirmed by t-tests of mean differences and Wilcoxon rank tests of median differences. The exception is age, though this difference is economically small.

In order to examine post-IPO performance more closely and compare differentials between the issuer types and their respective matched private controls, I use a DiD regression framework of the following form:

$$\begin{aligned} Y_{i,j,k,m,t} = \beta_0 + \beta_1 Issuer\ type_i + \beta_2 Post_t + \beta_3 Issuer\ type_i \times Post_t \\ + \eta_j + \phi_k + \omega_m + \tau_t + \epsilon_{i,j,k,m,t}, \end{aligned} \tag{1.2}$$

The treatment variable *Issuer type* denotes firm i's status as either a cold issuer, early mover, hot issuer, or private firm (cp. Section 1.3.2). In further analyses, I further differentiate these groups in terms of their underpricing (see Section 1.5.2). *Post* is a dummy variable indicating if year t is after a listed firm's IPO, with the same relative timeline carrying over to matched private controls. The interaction term of these two variables is the DiD-estimator, capturing the marginal change in the examined outcome variable Y of IPO firms after they go public relative to their matched private counterparts. I apply industry fixed effects η for each NACE Rev. 2 Section j, country fixed effects ϕ for each country k, and time fixed effects τ for each financial year t. In addition, in order to only compare each issuer type to its matched controls for each market phase, I include issuer type fixed effects ω for each issuer type m.[9] Standard errors are clustered on the firm level.

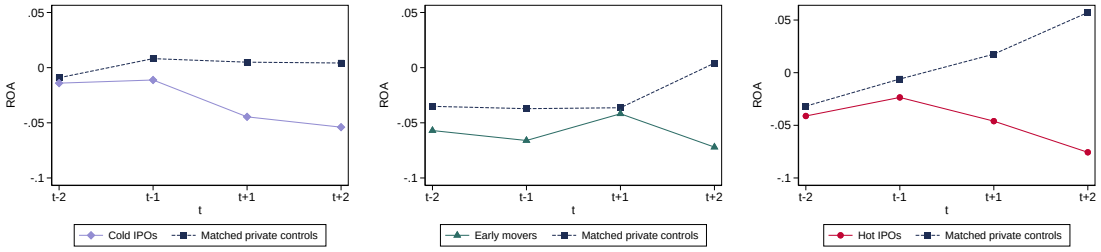
[9]The issuer type of each private firm is determined by its matched IPO firm.

1.5.1 Selection

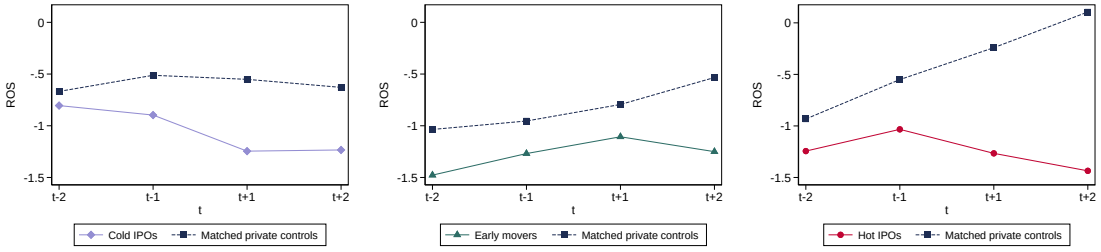
I begin by examining how selection into each of the different issuer types influences post-IPO performance. I focus on profitability, growth, and leverage.

Figure 1.5: Performance over time by market phase
This figure presents the mean of various operating performance and financial variables over time for IPO firms and their matched private control firms, from two years prior to the IPO (t-2) to two years after the IPO (t+2). IPO firms are differentiated by the market phase during which they list, i.e. during a cold market phase (*Cold issuer*), the first two quarters of the rising cycle (*Early mover*), or the hot issues period (*Hot issuer*). Issuer types are defined in Section 1.3.2. The issuer type and relative time period of each IPO firm is applied analogously to its matched private control firm. For a definition of variables see Table A.1.

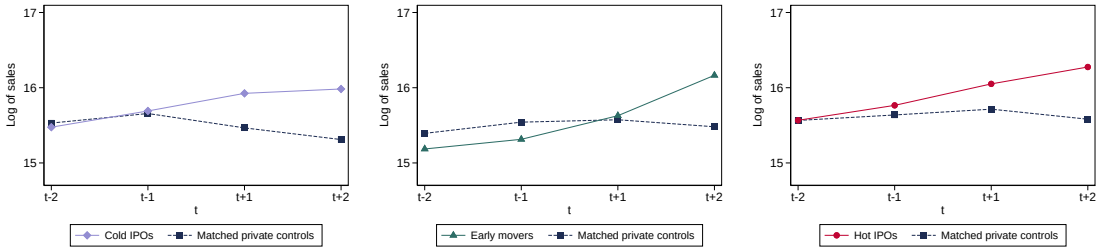
(a) ROA



(b) ROS



(c) Log of sales



(d) Leverage

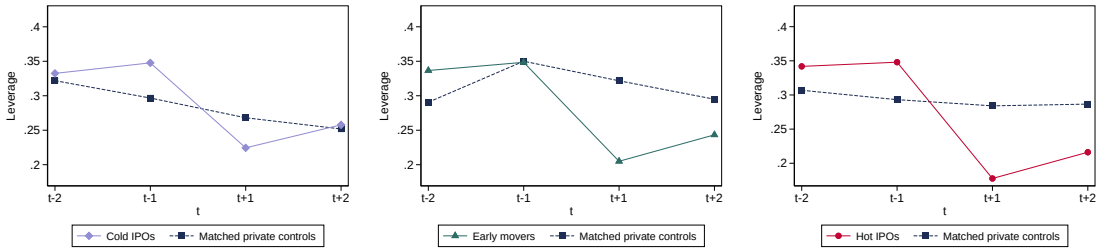


Figure 1.5 examines the development of the means of these variables for IPO firms and their matched private controls over time, from two years prior to the IPO (t-2, the matching year) to two years after the IPO (t+2). Prior to the IPO, IPO firms move mostly in parallel to private firms, with changes induced by the IPO.

Examining profitability in terms of ROA (see Subfigure 1.5a), cold issuers visibly corroborate the presence of a post-IPO drop, in line with expectations. This trend is similar for hot issuers. Early movers are the only issuer type who improve on their profitability in the first post-IPO year, albeit slightly. In the second post-IPO year, however, their profitability clearly declines, though it is not as clearly below pre-IPO ROA as for cold and hot issuers, respectively. Overall, the ROA of early movers stays relatively constant over the observed time period. It is also notable that out of all groups, early movers start out the least profitable, in line with the ex-ante results. Matched private firms improve or at least retain their profitability, while IPO firms decline. After the IPO, the profitability of hot issuers declines, while that of their control group improves. This could suggest adverse selection.

Typically, firms going public during hot markets will issue more primary shares and raise higher proceeds (Alti, 2006). Examining profitability in terms of ROA could therefore lead to distortions given that net income is diluted over a larger asset base. As an alternative measure of profitability that is also available for private firms, I therefore also examine return on sales (ROS, see Subfigure 1.5b). While the difference between cold issuers and their control group remains highly similar to the difference observed for ROA, early movers and hot issuers do slightly better in terms of ROS, underlining the merit of using an alternative profitability measure. Again, all IPO firms are clearly underperforming their matched private counterparts. The decline in profitability for hot and cold issuers remains present, though it is steeper for cold issuers. Early movers make small improvements in their profitability. Overall, these graphical comparisons do not suggest that going public, regardless of the market phase, gives firms an operating performance advantage relative to their

private peers. Instead, at least in the first two years after listing, IPO firms appear to be left behind by their private peers.

Looking next at sales (see Subfigure 1.5c), IPO firms achieve higher amounts and rates of change than private firms. This trajectory appears to begin prior to the IPO and continues into the post-IPO period. In the first post-IPO year, compared to cold issuers, neither early nor hot issuers appear to have noticeably different trajectories that would suggest they are more likely to be growth firms. In the second year, however, growth accelerates slightly for early movers. Both cold and hot issuers develop similarly to their private peers, with hot issuers being similar in level. While early movers and hot issuers grow, their control groups remain constant.

Finally, I examine changes in leverage in Subfigure 1.5d. While not a performance variable, capital structure changes achieved at the IPO could differ between issuers of different market phases, potentially revealing IPO motives (Alti, 2006). Hot or early issuers could be over-levered firms listing to exploit higher obtainable proceeds. All issuer types have L-shaped leverage development. The higher proceeds typically obtained by hot issuers are evident for both early movers and hot issuers, as their leverage ratios decrease more sharply than that of cold issuers. In the second post-IPO year, similar to the findings of Alti (2006), IPO firms raise their leverage ratios, returning to leverage ratios closer to their matched private peers.

Table 1.4 presents the results of the DiD analysis. In column I, I use ROA as the outcome variable. Both hot and cold issuers have worse post-IPO performance than their respective matched private counterparts, at high significance. Hot issuers have the highest relative difference of -5.7 percentage points. Early movers have the lowest difference to their matched private controls, at marginal significance.

Due to the potential dilution of ROA by higher proceeds obtained during rising cycles or hot markets, I next examine ROS as an alternative performance measure in column II. For hot and cold issuers, the observed effect remains similar, with both issuer types worsening their ROS post-IPO. The DiD coefficient for early movers

Table 1.4: Post-IPO performance by market phase
This table presents differences-in-differences (DiD) regression estimates of IPO firms' post-IPO performance compared to a matched sample of private control firms. IPO firms are differentiated by the market phase during which they list, i.e. during a cold market phase (*Cold issuer*), the first two quarters of the rising cycle (*Early mover*), or the hot issues period (*Hot issuer*). Issuer types are defined in Section 1.3.2. The issuer type of each IPO firm is applied analogously to its matched private control firm. The intercept term is included in the analyses, but not reported. All regressions apply industry, country, and year fixed effects. In addition, issuer type fixed effects indicating the cold market phase, rising cycle, and hot issues period are used in order to compare IPO firms only to privates matched for the according time period. Huber/White robust standard errors clustered by firm are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table A.1. Descriptive statistics are shown by Panel C of Table A.2.

	(I)	(II)	(III)	(IV)
	ROA	ROS	Log of sales	Leverage
Rising cycle				
Early mover × Post	-0.030*	-0.219	0.610***	-0.092***
	(0.017)	(0.287)	(0.236)	(0.028)
Early mover	-0.014	-0.279	-0.225	0.010
	(0.022)	(0.386)	(0.376)	(0.042)
Hot market				
Hot issuer × Post	-0.057***	-0.685***	0.245	-0.135***
	(0.011)	(0.174)	(0.163)	(0.018)
Hot issuer	-0.013	-0.341	0.141	0.045*
	(0.015)	(0.245)	(0.235)	(0.024)
Cold market				
Cold issuer × Post	-0.041***	-0.367***	0.573***	-0.053***
	(0.006)	(0.108)	(0.104)	(0.013)
Cold issuer	-0.011	-0.237*	-0.008	0.034**
	(0.009)	(0.122)	(0.147)	(0.017)
Post	0.021***	0.316***	0.162	-0.037***
	(0.007)	(0.106)	(0.118)	(0.012)
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Issuer type FE	Yes	Yes	Yes	Yes
N	6,014	5,972	6,012	6,014
Adj. R^2	0.131	0.104	0.191	0.120

does not suggest that they differ from private firms. These findings do not suggest opportunism of early movers, though there is some evidence of opportunism by hot issuers.

In column III, the (log of) sales is used to ascertain performance in terms of growth. Early movers and cold issuers outperform their control groups in the post period, hot issuers do not. Recalling Subfigure 1.5c, hot issuers grew very similarly to their peer group. Therefore, they cannot be said to underperform in terms of

growth.

Synthesising the findings obtained so far, early movers do not appear to be inferior in terms of profitability and have higher post-IPO growth than their matched control group as evidenced by sales. This does not fit the windows of opportunity hypothesis. Evidence of opportunism by hot issuers is mixed. On the one hand, they perform more poorly than their matched private controls in terms of both ROA and ROS. On the other hand, while they have the weakest post-IPO increase in sales relative to the peer group, they are not underperforming.

In terms of leverage adjustments shown in column IV, both hot and cold issuers lower their leverage by more than cold issuers. However, given the similar time dynamics shown by Subfigure 1.5d, capital structure motives are unlikely to be a driving force in listing during rising cycles or hot markets.

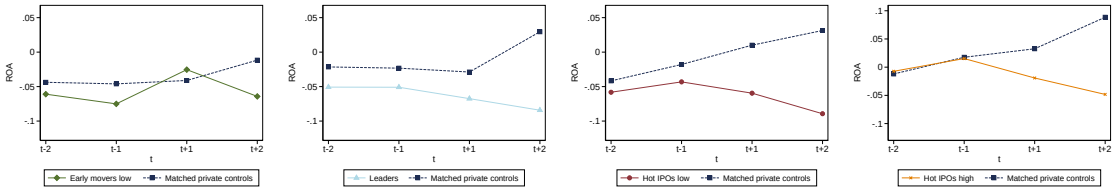
1.5.2 Signalling

Within the rising cycle, Banerjee et al. (2016) differentiate another issuer category based on underpricing. They define *leaders* as those early movers with underpricing in the top tercile. Given that the previous analyses did not suggest early movers to be of worse overall quality in terms of ex-post performance than hot issuers, I argue that such a signalling mechanism need not be at play exclusively during the rising cycle. Therefore, in order to further examine differences between issuers potentially signalling their quality by underpricing in this manner, I apply Banerjee et al.'s (2016) to the full IPO wave and further sub-divide both the early mover and hot issuer categories based on high underpricing as defined by the upper tercile. This allows me to examine signalling mechanisms in both the rising cycle and the hot issues period. These resulting categories remain mutually exclusive.

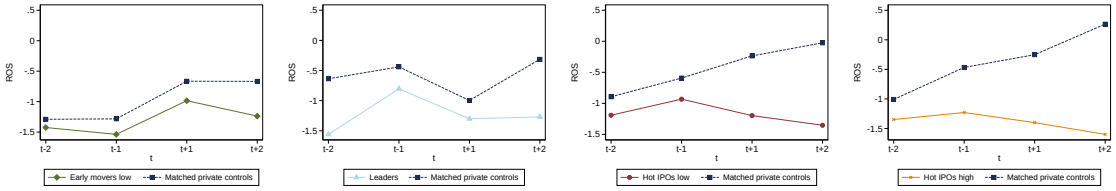
Reexamining selection on these more granular levels to account for signalling, Figure 1.6 visualises the time dynamics of performance variables for each issuer type and their matched control group. Within the rising cycle, leaders (early movers with

Figure 1.6: Performance over time by market phase and signalling
This figure presents the mean of various operating performance and financial variables over time for IPO firms and their matched private control firms, from two years prior to the IPO (t-2) to two years after the IPO (t+2). IPO firms are differentiated by the market phase during which they list as well as via underpricing. During the first two quarters of the rising cycle, a firm with underpricing in the top tercile is classified as a *Leader* and *Early mover low* otherwise. During the hot issues period, a firm with underpricing in the top tercile is classified as a *Hot issuer high* and *Hot issuer low* otherwise. During a cold market phase, a firm is classified as a *Cold issuer*. The issuer type and relative time period of each IPO firm is applied analogously to its matched private control firm. For a definition of variables see Table A.1.

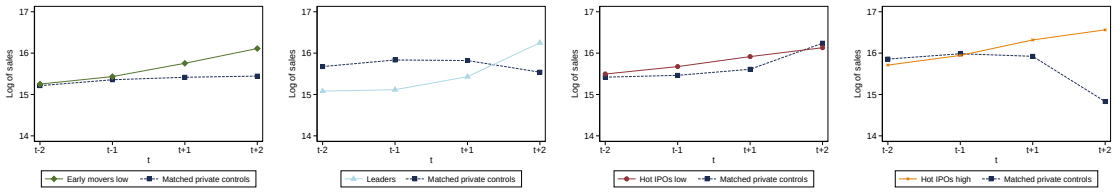
(a) ROA



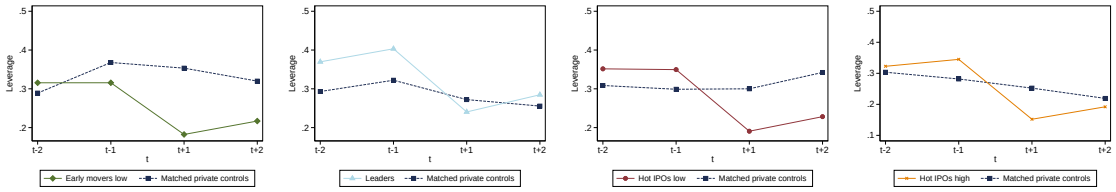
(b) ROS



(c) Log of sales



(d) Leverage



high underpricing) do not appear to have superior profitability than early movers with low underpricing in terms of ROA or ROS (see Subfigures 1.6a and 1.6b). They increase their sales slightly more noticeably. For leverage, leaders appear to be highly levered.

Within the hot market, hot issuers with high underpricing differentiate themselves by having the highest profitability in terms of ROA prior to the IPO. Post-IPO, how-

ever, they too become more unprofitable, while their peer group becomes profitable. Low underpricing hot issuers deviate from their peer group in a very similar manner. In terms of ROS, differences between high and low hot issuers are minor. Highly underpriced hot issuers outgrow their peer group in terms of sales. Overall, across both the rising cycle and the hot market, the evidence of post-IPO outperformance induced by underpricing is weak at best.

I explore signalling further using a DiD analysis in Table 1.5. For ROA, early movers are the only issuer type not to underperform their matched peers. Contrary to expectations as per signalling theory, leaders and hot issuers with high underpricing have the most pronounced negative DiD coefficients. For leaders, however, this changes when examining profitability in terms of ROS. Nevertheless, the higher underpricing signal of leaders does not set them apart from other early movers performance-wise. These results do not suggest that underpricing signals superior profitability in the aftermarket.

For growth assessed by sales in column III, while leaders obtain the highest DiD coefficient, it is not significant. In the hot market, high underpricing firms achieve positive post-IPO sales growth, while low underpricing firms do not differ from their peers.

For leverage in column IV, all issuers follow a similar relative post-IPO trend, which is more pronounced in the hot market period.

Based on the comparison with matched private controls, these results do not suggest that firms are successfully able to signal superior post-IPO performance by underpricing. In contrast to Banerjee et al. (2016), leaders in particular are not shown to achieve higher profitability. As proposed by Derrien (2005), underpricing need not be a signalling mechanism, supported by evidence that overvalued firms can be underpriced and underperform in the long run. Furthermore, firms may be underpricing for reasons specific to the COVID-19 pandemic, such as government responses, the severity of the crisis, or sentiment (Mazumder and Saha, 2021; Baig

Table 1.5: Post-IPO performance by market phase and signalling
This table presents differences-in-differences (DiD) regression estimates of IPO firms' post-IPO performance compared to a matched sample of private control firms. IPO firms are differentiated by the market phase during which they list as well as via underpricing. During the first two quarters of the rising cycle, a firm with underpricing in the top tercile is classified as a *Leader* and *Early mover low* otherwise. During the hot issues period, a firm with underpricing in the top tercile is classified as a *Hot issuer high* and *Hot issuer low* otherwise. During a cold market phase, a firm is classified as a *Cold issuer*. The issuer type of each IPO firm is applied analogously to its matched private control firm. The intercept term is included in the analyses, but not reported. All regressions apply industry, country, and year fixed effects. In addition, issuer type fixed effects indicating the cold market phase, rising cycle, and hot issues period are used in order to compare IPO firms only to privates matched for the according time period. Huber/White robust standard errors clustered by firm are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table A.1. Descriptive statistics are shown by Panel C of Table A.2.

	(I)	(II)	(III)	(IV)
	ROA	ROS	Log of sales	Leverage
Rising cycle				
Early mover low × Post	-0.008	0.015	0.588***	-0.095***
	(0.022)	(0.370)	(0.206)	(0.033)
Early mover low	-0.016	-0.313	-0.005	-0.028
	(0.029)	(0.538)	(0.502)	(0.053)
Leader × Post	-0.065***	-0.600	0.666	-0.088*
	(0.023)	(0.390)	(0.483)	(0.047)
Leader	-0.012	-0.221	-0.596	0.071
	(0.032)	(0.485)	(0.546)	(0.066)
Hot market				
Hot issuer low × Post	-0.051***	-0.691***	0.190	-0.129***
	(0.013)	(0.203)	(0.179)	(0.021)
Hot issuer low	-0.019	-0.239	0.179	0.040
	(0.017)	(0.286)	(0.271)	(0.029)
Hot issuer high × Post	-0.065***	-0.663***	0.372**	-0.149***
	(0.017)	(0.256)	(0.175)	(0.026)
Hot issuer high	0.001	-0.539	0.066	0.054
	(0.027)	(0.436)	(0.445)	(0.044)
Cold market				
Cold issuer × Post	-0.041***	-0.367***	0.573***	-0.053***
	(0.006)	(0.108)	(0.104)	(0.013)
Cold issuer	-0.011	-0.237*	-0.008	0.034**
	(0.009)	(0.122)	(0.147)	(0.017)
Post	0.021***	0.316***	0.163	-0.037***
	(0.007)	(0.106)	(0.118)	(0.012)
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Issuer type FE	Yes	Yes	Yes	Yes
N	6,014	5,972	6,012	6,014
Adj. R^2	0.136	0.104	0.191	0.121

and Chen, 2022). To examine signalling more conclusively, the inclusion of other IPO wave periods other than COVID-19 would be required. This represents a limitation of the presented analyses given data availability.

The ex-ante analyses conducted in Section 1.4 suggested that lower profitability firms select into the rising cycle as early movers. While they do not improve on their profitability ex-post, they also do not underperform their private peers, as shown by Tables 1.4 and 1.5. This does not suggest opportunistic motives or lower quality of early movers, contrasting with Çolak and Günay (2011). Instead, the results are partially in line with Alti's (2006) theory, whereby lower profitability firms benefit from timing the market. However, the results also indicate that these firms may be on a growth trajectory, as indicated by higher post-IPO sales. This could imply rational motives given higher expected cashflows (provided that higher sales eventually lead to higher profitability), a channel proposed by Pástor and Veronesi (2005). To approximate the motives of early movers more closely would ultimately require a longer post-IPO operating history, which is not yet available given the recency of the COVID-19 IPO wave.

Though hot issuers were less clearly differentiable from cold issuers in terms of ex-ante selection, they underperform their private peers profitability-wise while not growing at a faster rate. Their profitability underperformance differs significantly from the relative underperformance observed for cold issuers. This does not support the notion that listing gives hot issuers an advantage compared to their private peers given the economic conditions induced by the COVID-19 crisis. Even though ex-ante selection evidence was weak, this ex-post result lends some support to opportunistic motives of hot issuers. At the same time, signalling by underpricing does not set hot issuers apart.

1.5.3 First-mover advantage

So far, the results have indicated that early movers are better able to keep up with their matched private peers in terms of profitability while experiencing growth in sales. Hot issuers, on the other hand, are underperforming their private peers profitability-wise while being unable to outgrow them. This raises the question of whether this is caused by selection or a first-mover advantage experienced by early movers which disadvantages followers. Listing as pioneers of the IPO wave could enable early movers to grab market share from late movers that does not enable them to grow their sales to the same degree (Chemmanur and He, 2011).

I explore this channel by analysing the change in market share around the IPO. Following Chemmanur and He (2011), I define market share as the proportion of sales generated by a firm relative to total sales of its industry, defined using the Fama-French 49 industry specification. I then determine the growth in the market share as the difference between the log market share one and two years after the IPO relative to the log market share two years prior to the IPO. The same timeline is applied to each IPO firm's matched control. Regressing on the issuer type indicator renders this a DiD specification.

In order to isolate the growth in market share related to IPO timing rather than a firm's capacity for growth, I control for pre-IPO sales growth, VC presence, and an indicator for having filed a patent within the prior three years. As firms with higher market shares may be less able to grow further, I also control for pre-IPO market share. These control variables mirror Chemmanur and He (2011). I apply industry fixed effects based on Fama-French 49 industries to match the definition of the market share variable. This removes the influence of reduced market share growth caused by a higher number of listings in the same industry and year. All analyses also apply country, year fixed, and issuer type fixed effects. Standard errors are clustered on the firm level.

Table 1.6: Market share growth by market phase
This table presents differences-in-differences (DiD) regression estimates of IPO firms' market share growth from two years before to one (column I) and two (column II) years after the IPO compared to a matched sample of private control firms. IPO firms are differentiated by the market phase during which they list, i.e. during a cold market phase (*Cold issuer*), the first two quarters of the rising cycle (*Early mover*), or the hot issues period (*Hot issuer*). Issuer types are defined in Section 1.3.2. The issuer type of each IPO firm is applied analogously to its matched private control firm. The intercept term is included in the analyses, but not reported. Control variables are based on the matching year and include market share and sales growth as well as indicators for VC presence and patent filings. All regressions apply industry, country, and year fixed effects. In keeping with the market share definition, industry fixed effects are based on the Fama-French 49 industry. In addition, issuer type fixed effects indicating the cold market phase, rising cycle, and hot issues period are used in order to compare IPO firms only to privates matched for the according time period. Huber/White robust standard errors clustered by firm are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table A.1.

	(I)	(II)
	Δ Market share	
	t-2 to t+1	*t-2 to t+2*
Early mover	0.729***	0.845***
	(0.233)	(0.273)
Hot issuer	0.259**	0.492*
	(0.101)	(0.267)
Cold issuer	0.477***	0.655***
	(0.077)	(0.093)
Controls	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Year FE	Yes	Yes
Issuer type FE	Yes	Yes
N	1,314	918
Adj. R^2	0.044	0.189

Table 1.6 shows the results of this analysis. All issuer types grow their market shares relative to their private peer groups. However, early movers have the highest relative growth. Hot issuers have the lowest growth coefficients. When looking at the growth until the first post-IPO year, a Wald test indicates that the hot issuer coefficient differs significantly from both other issuer types. While the difference is less stark examining the growth up to the second post-IPO year, the general findings persist. While not causal, this suggests that the ex-post performance achieved by early movers need not be related exclusively to selection of firms with better prospects but could be influenced by a first-mover advantage.

Evidence of superior performance related to signalling presented in Section 1.5.2 was weak. If firms with better prospects are indeed signalling their quality, high

Table 1.7: Market share growth by market phase and signalling
This table presents differences-in-differences (DiD) regression estimates of IPO firms' market share growth from two years before to one (column I) and two (column II) years after the IPO compared to a matched sample of private control firms. IPO firms are differentiated by the market phase during which they list as well as via underpricing. During the first two quarters of the rising cycle, a firm with underpricing in the top tercile is classified as a *Leader* and *Early mover low* otherwise. During the hot issues period, a firm with underpricing in the top tercile is classified as a *Hot issuer high* and *Hot issuer low* otherwise. During a cold market phase, a firm is classified as a *Cold issuer*. The issuer type of each IPO firm is applied analogously to its matched private control firm. The intercept term is included in the analyses, but not reported. Control variables are based on the matching year and include market share and sales growth as well as indicators for VC presence and patent filings. All regressions apply industry, country, and year fixed effects. In keeping with the market share definition, industry fixed effects are based on the Fama-French 49 industry. In addition, issuer type fixed effects indicating the cold market phase, rising cycle, and hot issues period are used in order to compare IPO firms only to privates matched for the according time period. Huber/White robust standard errors clustered by firm are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table A.1.

	(I)	(II)
	Δ Market share	
	t-2 to t+1	*t-2 to t+2*
Rising cycle		
Early mover	0.779**	0.831**
	(0.347)	(0.336)
Leader	0.653***	0.885**
	(0.204)	(0.447)
Hot market		
Hot issuer low	0.236*	0.253
	(0.124)	(0.282)
Hot issuer high	0.308*	0.768
	(0.171)	(0.498)
Cold market		
Cold issuer	0.478***	0.655***
	(0.078)	(0.093)
Controls	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Year FE	Yes	Yes
Issuer type FE	Yes	Yes
N	1,314	918
Adj. R^2	0.044	0.187

underpricing firms should obtain higher market share growth. Table 1.7 analyses this conjecture. Up to the first post-IPO year, leaders do not obtain higher market share growth than early movers. Hot issuers with high underpricing achieve higher growth than those with low underpricing, but still below the growth achieved by issuers of the rising cycle. In column II, both early movers and leaders achieve similar growth rates. Hot issuers with high underpricing come closer to rising cycle

issuers and much outgrow hot issuers with low underpricing, which could indicate at least some signalling effect during this phase. However, the associated coefficient lacks significance.

1.6 Conclusion

This paper analyses how private firms' decision to conduct an IPO changes during an IPO wave. While previous studies compare hot and cold issuers directly, I argue that this fails to address the underlying issue of selection and may be biased by economic conditions prevailing throughout the wave.

By comparing wave issuers to private firms throughout the same time period, I approximate selection effects more closely. To this end, I leverage the European setting, where private and public limited liability firms are subject to extensive reporting requirements that allows me to draw up an extensive panel of private firms with a realistic listing option. I find that IPO wave issuers have lower ex-ante profitability, and that this effect is augmented for early movers issuing in the rising cycle of the IPO wave. Applying a matching strategy, I conduct a DiD analysis to compare each IPO firm to its closest matching private firm in terms of ex-post performance. I find that early movers of an IPO wave are not underperforming their private control group while showing higher sales growth.

Together with the ex-ante findings, this could suggest a mechanism as proposed by Alti (2006), whereby lower profitability firms find it optimal to list once market conditions improve. It is indicative of rational IPO motives suggested by Pástor and Veronesi (2005), with higher ex-post sales growth potentially in line with higher expected cashflows. On the other hand, analyses of market share growth provide evidence of first-mover advantages experienced by early movers. Hot issuers, which go public during the regular hot market period observed during COVID-19, are found to underperform their matched peers in terms of profitability without increased

growth, lending some support to the windows of opportunity hypothesis.

These results imply that there is selection into the IPO wave and timing aspects play a role along the wave. Longer ex-post horizons are required to ultimately distinguish rational from opportunistic motives. Nevertheless, the comparison of early movers and hot issuers via private firms lends important, novel insights into the motives of each issuer type.

So it is time to enact what I call a "Kantian shift" – and to move from a bottom-up approach to a top-down one. (...) Indeed, the creation of the [SEC] in the 1930s played a pivotal role in suppressing state efforts to fragment securities markets. [ESMA] does some of that in the EU, but it is not truly single. Supervision remains largely at the national level, which fragments the application of EU rules.

Christine Lagarde (2023)

2

The EU Prospectus Regulation and its Impact on SME Listings

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Abstract

Regulatory complexity is often blamed for the decline in IPO activity in Western countries. This paper contributes to this so-called *regulatory overreach hypothesis* by analysing the introduction of the EU growth prospectus in 2017, a simplified listing document for SMEs. For this purpose, we use a hand-collected database of 1,256 initial offerings at 8 different EU exchanges from 2016 to 2022. We find that to some extent the EU growth prospectus was successful in de-burdening and streamlining SME IPOs without jeopardising investor protection. We confirm EU growth prospectuses to be less complex in terms of word counts compared to full prospectuses without finding evidence that they are less informative. We find SMEs to be more likely to use the EU growth prospectus unless the IPO becomes relatively large. In terms of listing expenses, we do not substantiate that fixed listing costs embedded in overall listing expenses are smaller for companies using the EU growth prospectus. Also, using a triple difference analysis, we do not find robust evidence that the Prospectus Regulation led to a significant increase in IPO activity. Overall, our results put a question mark on the regulatory overreach hypothesis. At the same time, however, we show that IPO regulation can be simplified and made less burdensome without jeopardising investor protection

2.1 Introduction

In the EU, SME listings have more than halved since the financial crisis, from a yearly average of 478 from 2006-2007 to 218 from 2009-2017 (European Commission, 2018). This follows a trend of declining equity markets that has been well-documented for the US (e.g., Ritter et al., 2013; Doidge et al., 2017). Frequently termed the "backbone" of the EU's economy, SMEs generate the majority of the EU's private sector employment, therefore their increased vulnerability to economic shocks induced by reliance on bank financing has major implications (European Commission, 2018).

Regulators have recognised and sought to alleviate the disproportionate burden that listing costs present for smaller companies, both directly in the form of expenses and indirectly through the disclosure of proprietary information, in the hopes of rejuvenating SME listings. In the US, the Jumpstart Our Business Startups (JOBS) Act[1] of 2012 introduced measures to reduce these costs for smaller companies. The EU followed suit in 2017 by adopting the Prospectus Regulation (EU) 2017/1129[2], which introduced the EU growth prospectus, a new "prospectus light" for SMEs. Recently, the European Commission submitted the so-called *SME Listing Act Proposal* to the EU Parliament, which seeks to further deburden and streamline SME listings by, amongst others, replacing the EU growth prospectus by a new EU growth issuance document.[3,4] The Commission's work aims at fostering equity financing by SMEs and growth companies and presents a major effort towards the Capital Markets Union. It is mostly driven by the conviction that de-burdening IPOs for these

[1] Jumpstart Our Business Startups of 5 April 2012. H.R.3606, 112th Congress.

[2] Council Regulation (EU) 2017/1129 of 14 June 2017 on the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing Directive 2003/71/EC. OJ L 168/12.

[3] The proposal package consists of an amendment to the Prospectus Regulation (EU) 2017/1129, the Market Abuse Regulation (EU) 596/2014, the MiFIR (EU) 600/2014 as well as to MiFID 2014/65/EU. Finally, the Listing Directive 2001/34/EC is repealed by the proposal.

[4] This study was completed in January 2024, therefore the information and recommendations presented correspond to this date. Note that in the meantime, the European Commission and the Parliament agreed to implement the Listing Act.

companies would increase their propensity to tap into the equity market. Therefore, the EU growth prospectus seeks to reduce disclosure obligations while not curtailing investor protection provisions.

However, prior studies examining the effect of regulation have found limited effects on IPO activity. In the US, the decline in IPOs has been found to predate the Sarbanes-Oxley (SOX) Act, which increased regulatory requirements for public corporations (Gao et al., 2013; Doidge et al., 2013, 2017). Doidge et al. (2013) also deem SOX to be an unlikely cause for the low levels of small-firm IPOs. Overall, the *regulatory overreach hypothesis*, which contends that the costs of regulatory compliance have contributed to the dearth of IPOs, has been found to be inconsistent.

For Europe, the case is less clear. Cattaneo et al. (2015) confirm the limited impact of deregulation in Italy, finding an impact only on firm survival but not on the number of listings. Engelen et al. (2020), on the other hand, conduct a staggered analysis on the introduction of SOX-like provisions across Europe and find a decreased likelihood of going public for small and knowledge-intensive firms. For the US JOBS Act, while Dambra et al. (2015) do find an increase in IPOs after its enforcement, they contend that this is not attributable to the Act's de-burdening provisions but to its de-risking provisions, which allow confidential filings of IPO draft registration statements as well as direct communication with qualified investors before publicly filing (so-called 'testing-the-waters'). Dathan and Xiong (2022), however, show that these de-risking provisions exacerbated information asymmetries that actually reduced firms' listing propensities.

Following up this literature, the enactment of the EU growth prospectus in 2017 provides a further experiment which we can use to improve our understanding of the regulatory overreach hypothesis. This paper seeks to assess the effectiveness of the EU growth prospectus at boosting SME listings. Despite the pessimistic outlook given by prior work on (de-)regulation, EU equity markets are uniquely set up to cater to SMEs, and the EU growth prospectus addresses firms that are

significantly smaller than those addressed by the JOBS Act, which may raise the marginal benefit of deregulation. Given the continued regulatory effort devoted to take the alleviations introduced by the EU growth prospectus even further, we aim to provide insight into the potential of such measures. For this purpose, we identify 1,256 initial offerings at 8 EU stock exchanges over the period from 2016 to 2022, 113 of which used the EU growth prospectus. Moreover, we hand-collect detailed information on these initial offerings. To the best of our knowledge, this is the first paper to give a comprehensive overview of IPO activity in the EU including initial offerings on exchange-regulated markets, i.e. multilateral trading facilities (MTFs) and SME growth markets.[5,6] Over the same period, there were 942 IPOs in the US according to Jay Ritter's database.[7]

We derive expectations on the effectiveness of the reform by providing a framework on EU equity markets that illustrates the narrow scope of the reform. The EU growth prospectus may only be used on exchange-regulated markets. Given that its use is voluntary even when a firm is eligible for its use, the EU growth prospectus competes with two existing IPO channels, i.e. the full prospectus required for a listing on regulated markets and the admission document required for private placements.[8] Due to potential investor uncertainty regarding the novel EU growth prospectus, we expect there to be some hesitancy regarding its use, evidenced by eligible issuers opting out of the EU growth prospectus. Furthermore, mandatory disclosures required by the EU growth prospectus represent minimum obligations which firm could voluntary overfulfil. In this case, the EU growth prospectus would

[5]European equity markets are segmented into main and second-tier markets. Exchange-regulated markets fall into the latter category. More details are provided in Section 2.2.1 as well as Appendix B.4.

[6]The paper of Vismara et al. (2012) also deals with IPOs on exchange-regulated European markets. However, it was published long before the enactment of the Prospectus Regulation. Note that the distinction of regulated and exchange-regulated markets is an EU peculiarity. As professional databases do not or only partially collect information on IPOs on exchange-regulated markets, any comparison between EU and US IPO activity is distorted.

[7]Cf. `https://site.warrington.ufl.edu/ritter/ipo-data/`.

[8]Admission documents may be used on exchange-regulated markets by all private placements and those IPOs whose proceeds remain below an exemption threshold. We provide further details in Section 2.2.1 as well as Appendix B.4.

be close in length to the full prospectus.

Regarding listing expenses, we do not derive a clear prediction. On the one hand, given the failure of the JOBS Act to reduce direct listing costs (Chaplinsky et al., 2017) and the reduced potential for cost savings due to the comparatively low fees incurred by listings in Europe (Abrahamson et al., 2011), the EU growth prospectus is unlikely to be cheaper. On the other hand, its disclosure reductions may have lowered the cost of information production, especially as it is meant to be compilable without external advice.

We focus our analysis of the reform on four specific questions addressing its implementation and effectiveness. First, which firm characteristics have a positive impact on the propensity to use the EU growth prospectus as an IPO channel? Second, what is the impact of the reform on the informational content of prospectuses? Third, does the usage of this new IPO channel lower the direct listing costs of a company? And fourth, did the reform achieve its stated goal of raising SME listings?

Based on our hand-collected dataset, the results of this paper can be summarised as follows. First, the design of the EU growth prospectus seems to cater to the needs of SMEs as they are significantly more likely to use this vehicle when filing for an IPO. However, the likelihood of using the EU growth prospectus decreases with rising proceeds. Second, we find the EU growth prospectus to be significantly less complex compared to the full prospectus. Measuring document length in terms of word count reveals the EU growth prospectus to be significantly shorter than the full prospectus and more similar to admission documents. The section containing offer details is the only section for which we find no word-count difference between EU growth prospectuses and full prospectuses, which is in line with the goal of not curtailing investor protection. Third, while in terms of document length EU growth prospectuses are closer to admission documents rather than full prospectuses, we provide evidence that they are more informative. By using natural language processing techniques following Hanley and Hoberg (2010), we find that the degree of

content similarity between EU growth prospectuses and full prospectuses is significantly higher relative to admission documents. Again, this is in line with the goal of de-burdening and streamlining SME IPOs without jeopardising investor protection.

Fourth, we decompose flotation expenses into a fixed cost and variable cost component. Our analysis shows that in terms of the fixed cost component EU growth prospectuses are equally as expensive as full prospectuses, but more expensive than admission documents. In terms of variable costs, however, EU growth prospectuses are significantly less expensive than full prospectuses, but more expensive than admission documents. Nevertheless, we also show that these differences are not particularly relevant in economic terms.

Fifth, we address the question of whether the introduction of the EU growth prospectuses has increased the number the SME IPOs. When running a within EU difference-in-differences analysis, we find a positive impact on SME IPOs after the introduction of the EU growth prospectus. However, due to the impact of the COVID-19 crisis in the aftermath of the prospectus reform, there are reasonable arguments why post-reform IPO activity may be biased. Hence, we add a triple difference analysis by including US IPOs. When doing so, we find no impact of the reform on SME IPOs in the EU.

We contribute to the literature discussing the role of (de-)regulation on the reduced IPO activity observed since the early 2000s (e.g., Gao et al., 2013; Doidge et al., 2013, 2017). Specifically, we provide further evidence on the regulatory overreach hypothesis with a focus on SMEs. While Engelen et al. (2020) found increased SOX-like regulation in Europe to have harmed listing propensities, our results show that the deregulation within the Prospectus Regulation is unlikely to have boosted SME listings, similar to the findings of Cattaneo et al. (2015). Nevertheless, the European Commission is continuing its efforts to revive IPO markets through precisely this mechanism of deregulation, as evidenced by the SME Listing Act Proposal. Our findings confirm the limited efficacy of such efforts in European markets. At the

same time, however, our analysis shows that IPO regulation can be simplified and made less burdensome without jeopardising investor protection.

Insights into these European markets are our second major contribution. We note that research on IPOs in the EU has been limited, which we attribute both to limited data availability and the peculiarities of EU markets. We extend the work of Vismara et al. (2012) on the unique structure of EU IPO markets into regulated and exchange-regulated markets by providing further details on listing types, listing documents, and regulatory thresholds, as per the most recent legislation. We hope that these detailed institutional explanations as well as our methodology will encourage future research on EU IPOs.

The rest of the paper proceeds as follows. Section 2.2 lays down the Prospectus Regulation (EU) 2017/1129 and the rules for the EU growth prospectus introduced by this regulation while Section 2.3 derives expectations on its effectiveness from the institutional context, similar regulations in the US, and prior literature. In Section 2.4, we introduce our data collection process. Section 2.5 contains the main empirical analysis, while Section 2.6 concludes.

2.2 The Prospectus Regulation

2.2.1 The reform with a focus on initial offerings

The Prospectus Regulation (EU) 2017/1129 of 2017, enforced on the 21st of July 2019, replaced the preceding Prospectus Directive. The regulation marks an important step in the efforts of the EU to establish its Capital Markets Union (CMU). Unlike the directive, which was translated into national law, allowing for considerable divergence between EU member states, the regulation applies directly to all member states, enabling broader harmonisation of the prospectus content and approval processes.

The institutional setting of EU equity markets is noteworthy in terms of the

segmentation into main and second-tier markets (Vismara et al., 2012), which determines the applicability of the Prospectus Regulation. Market types to be distinguished are *regulated markets*, where EU law applies directly, and *multilateral trading facilities (MTFs)*, governed by private law established by the exchange itself. On MTFs, EU legislation only applies to specific undertakings. Here, the most relevant distinction for the purpose of studying the Prospectus Regulation refers to whether securities offers are addressed to the public or solely to qualified investors. For a detailed description of the institutional background of EU equity markets in terms of market and listing types, see Appendix B.4.

Figure 2.1 illustrates the main differences between the different exchange types as per the Markets in Financial Instruments Directive (MiFID 2004/39/EC).[9] Note that the Markets in Financial Instruments Directive II (MiFID 2014/65/EU)[10] established *SME growth markets (SME GMs)* as a special type of MTF where least 50 % of admitted issuers are SMEs.

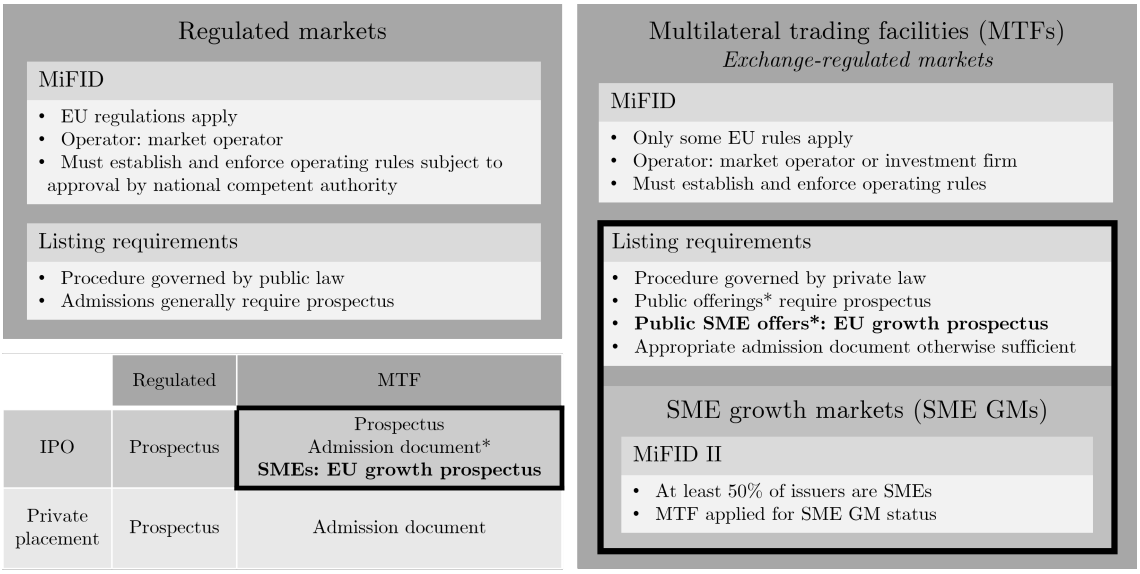
Firms conducting initial offerings on an exchange must produce a listing document whose scope depends on two dimensions: the market type that the firm seeks access to and the addressees of the offer (cp. Figure 2.1). A *prospectus* is required (1) where an offer is made to the public or (2) where shares are admitted to trading on a regulated market. A prospectus is always subject to the approval of the firm's national financial markets authority. Regardless of who the offer is addressed to, offerings on regulated markets therefore always trigger the prospectus requirement.

On MTFs, private placements are prospectus exempt. Instead, an issuing firm must publish and *admission document* whose content is mandated mostly by the MTF and which is approved by the MTF. For an IPO conducted on an MTF, the necessity to publish a prospectus depends on the amount of proceeds being raised.

[9]Council Directive 2004/39/EC of 21 April 2004 on markets in financial instruments amending Council Directives 85/611/EEC and 93/6/EEC and Directive 2000/12/EC of the European Parliament and of the Council and repealing Council Directive 93/22/EEC. OJ L 145/1.

[10]Council Directive 2014/65/EU of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU. OJ L 173/349.

Figure 2.1: Categorisation of EU market types, listing types, and prospectus requirements
This figure categorically illustrates the EU market types as well as prospectus requirements according to listing type. Changes incurred by the introduction of the novel EU growth prospectus are outlined in bold. Note that "SMEs" refers to all issuers eligible to utilising an EU growth prospectus.



**Admissions or offerings not exceeding a member state's exemption threshold are prospectus exempt.*

For proceeds remaining below the threshold set by the firm's member state, the admission document may be used instead of the prospectus.

For IPOs, the Prospectus Regulation introduces various changes. It maintains the necessity to publish a prospectus for security offers that are either addressed to the public or entail admission to a regulated market. However, it raises the exemption threshold below which no prospectus is required on an MTF from €100k to €1m total proceeds raised in the EU. Member states can raise this threshold to up to €8m at their discretion; the previous maximum was €5m. The SME Listing Act Proposal seeks to raise this threshold further to €12m.

Furthermore, to improve the information content of prospectuses for investors, the regulation mandates that only the most material risk factors be included and limits the length of prospectus summaries to enhance concision. The regulation clarifies the minimum prospectus content required with the aim of aiding retail investors in making informed investment decisions. The prospectus approval process, which

is handled by national financial market authorities, is streamlined regarding its timeline and level of scrutiny.

The reform introduced a new listing document, the *EU growth prospectus*, available to certain firms conducting IPOs on MTFs. The succeeding section describes this document.

2.2.2 EU growth prospectus

The Prospectus Regulation introduces a novel, standardised prospectus: the EU growth prospectus. For initial offerings, this document is available to the following three categories of issuers that have no shares admitted to a regulated market or are seeking said admission:[11]

1. *SMEs*, defined as issuers fulfilling at least two of the following three criteria, in accordance with Art. 2 (f) of the Prospectus Regulation (EU) 2017/1129:

   i Average number of employees during the financial year is less than 250,

   ii Total balance sheet amount does not exceed €43m,

   iii Annual net sales do not exceed €50m,

2. Non-SME issuers with a market capitalisation of less than €200m, conducting a public offering on an SME GM (*non-SME smallcaps on SME GMs)*,[12]

3. Non-listed companies with less than 500 employees publicly offering at most €20m (*small offerings*).

Figure 2.1 depicts the applicability of the EU growth prospectus within the different market and offering types in bold.[13] This highlights the narrowness of the scope

[11] This means that the EU growth prospectus is only available to issuers raising capital on MTFs. For example, an SME seeking to list on Euronext Growth (an MTF) may utilise the EU growth prospectus, an SME listing on Euronext (a regulated market) may not. See Figure 2.1 for visual clarification.

[12] The market capitalisation is determined by the product of the initial offer price and total shares outstanding immediately following the offering.

[13] Appendix B.4.2 provides examples of which listing document may be used for various offer constellations.

of this new document; out of the four quadrants formed by the choice of regulated market/MTF and IPO/private placement, the EU growth prospectus is available only to one. Within this quadrant, the scope is narrowed further by the existence of the other two document types. Below the prospectus exemption threshold, a firm could instead use an admission document. Compared to the EU growth prospectus, an admission document need not be approved by a financial markets authority. Beyond the exemption threshold, firms eligible to use the EU growth prospectus could voluntarily publish a full prospectus. The SME Listing Act Proposal seeks to eliminate this voluntary opt-in.

Nevertheless, the window within which the EU growth prospectus is available is narrow by design, and a firm may ultimately always opt for either an admission document or full prospectus instead. The choice of listing document may depend on the level of disclosure incurred, therefore we proceed to compare the content requirements of each document.

Content-wise, the EU growth prospectus could be described as requiring less disclosure than the full prospectus, but more than the admission document. Furthermore, where a firm is eligible to use the EU growth prospectus and has a market capitalisation up to €200m, it is classified as a *smallcap* and may omit more items than a *midcap* with a market capitalisation in excess of the threshold.

Some of the reductions offered by the EU growth prospectus include omitting patents and licenses, which is extended to R&D activities for smallcaps. This is notable due to the proprietary information typically entailed by these items.

In terms of financials, cash flow statements and changes in equity may be omitted. A notable difference to full prospectuses is that audited historical financial information need only be provided for the prior two rather than three financial years, the same as is required by admission documents. Smallcaps may additionally omit the operating and financial review, working capital statement, and statement of capitalisation and indebtedness. For admission documents used to seek access to

an SME GM, working capital statements must always be provided.[14] On the other hand, admission documents tend not to require operating and financial reviews at all, which the EU growth prospectus requires for midcaps.

Differences between the EU growth prospectus and admission documents applying to both smallcaps and midcaps can be regarded as rather minor. While smallcaps do benefit from not having to include a working capital statement, it is questionable whether this represents a meaningful content reduction. To a certain extent, this is by design given the diverging use cases of both documents. Overall, the content requirements of the EU growth prospectus are more stringent and extensive than those of admission documents. For a detailed comparison of the content requirements of the three listing documents, see Appendix B.4.3.

2.3 Expected impact of the reform

We seek to evaluate the Prospectus Regulation regarding its practical implementation and effectiveness at stimulating IPO activity. Such analyses are informative for regulators, as considerable resources were devoted to the reform and further efforts are planned in form of the SME Listing Act. Furthermore, by analysing the consequences of this reform we aim to contribute to the literature on the regulatory overreach hypothesis in IPO markets. We draw parallels to the US JOBS Act of 2012, which like the EU Prospectus Regulation sought to make IPOs more attractive for smaller firms.

2.3.1 Implementation

In terms of assessing the implementation of the Prospectus Regulation, the previous section noted the narrow scope of the reform as well as the optionality of using the

[14]Though the content of admission documents is largely determined by the exchange itself, certain items are directly mandated by EU law. For SME GMs, the working capital statement is one of these items.

EU growth prospectus. Companies may be hesitant to use this new listing document if is met by uncertainty from investors. In this case, firms that do use the EU growth prospectus would be expected to compensate investors with increased underpricing (Beatty and Ritter, 1986; Barth et al., 2017). Regulatory tightening like SOX has been found to reduce underpricing (Kaserer et al., 2011; Akyol et al., 2014), while loosening like JOBS had the opposite effect (Chaplinsky et al., 2017). For the EU growth prospectus, however, underpricing as a friction can be avoided because firms can choose to voluntarily file a full prospectus or voluntarily disclose more information than the EU growth prospectus minimally requires. Even reductions in required accounting disclosures can be substituted by more meaningful textual disclosures (Agarwal et al., 2017).[15]

Therefore, we believe it is worthwhile to examine both firm and issue characteristics that determine listing document choice. Given the breadth of documents available on MTFs and the voluntary nature of the EU growth prospectus, understanding this choice could be highly informative for regulators. We are not aware of prior studies examining this choice. Due the potential friction incurred by disclosure reductions, we expect that there may be some hesitancy to use the EU growth prospectus.

Furthermore, disclosure differentials between the listing document types as evidenced by document length and similarity provide instructive evidence on the marginal benefit of further content reductions suggested within the SME Listing Act Proposal. If the minimum disclosure required by the EU growth prospectus would be met by uncertainty, we would expect voluntary overfulfilment evidenced by a similar length to the full prospectus.

For the increased regulation imposed by SOX, Kaserer et al. (2011) confirm an increase in direct listing costs. Deregulation, however, need not have the opposite effect. The US JOBS Act introduced prospectus disclosure reductions for small

[15]In unreported analyses, we confirm that issuers using the EU growth prospectus do not face higher underpricing.

firms, similar to the EU growth prospectus, and with the same goal of reducing listing expenses. Chaplinsky et al. (2017) analyse the effect of the JOBS Act on direct listing costs and find no evidence of a reduction. Abrahamson et al. (2011) find underwriting spreads, a part of total direct listing costs, to be lower in Europe than the US, lowering the potential for cost reductions effected by the EU growth prospectus. The disclosure reductions of the EU growth prospectus relative to the full prospectus may nevertheless have lowered the cost of information production, especially as this document is intended to be compilable without external advice. Ultimately, examining the development of fixed listing costs that are independent of issue size before and after the reform will allow us to assess the success of the reform in lowering costs and assess the potential for further cost reductions (Kaserer and Kraft, 2003).

2.3.2 Effectiveness

Expectations regarding the effectiveness of the Prospectus Regulation at raising IPO activity by making IPOs more attractive for smaller firms can be derived from the US JOBS Act of 2012. Where the EU legislation targets and defines SMEs, the JOBS Act is concerned with *Emerging Growth Companies (EGCs)*. EGCs are considerably larger than EU SMEs in terms of net sales, which may not exceed $1bn (corresponding to approximately €980m), roughly twenty times the amount an EU SME may generate (assuming only one of the other two criteria is fulfilled).

Provisions made within the reform are classified by Dambra et al. (2015) as de-risking and de-burdening provisions. The former enable EGCs to reduce the costs of IPO withdrawals by allowing for direct communication with potential investors prior to filing a prospectus and initially filing a prospectus with the relevant authority confidentially ('testing the waters'). De-burdening provisions are highly similar to the content reductions within the EU growth prospectus.

Dambra et al. (2015) reach the conclusion that the increased IPO activity at-

tributable to the JOBS Act was caused by the de-risking rather than the de-burdening provisions. This is consistent with prior studies calling into question the relevance of disclosure costs for IPO volume (e.g., Gao et al., 2013; Doidge et al., 2013, 2017). For the Prospectus Regulation, this may mean that the EU growth prospectus could be ineffective at attaining its goal of inducing more SMEs to go public.

Nevertheless, given the fact that SMEs are defined to be significantly smaller than EGCs, the marginal benefit of de-burdening may be more pronounced. SMEs are more likely to lack qualified accounting employees required to compile the more demanding items of a full prospectus. If the EU growth prospectus can, as intended, be drafted without external advice and this cost is a deterrent for SMEs considering going public, the de-burdening provisions of this reform may have had a more noticeable effect than those of the JOBS Act.

The reduced mandatory disclosures of the EU growth prospectus could induce firms from more knowledge-intensive industries to go public given the competitive advantage inherent to the information they may now retain (Boone et al., 2016). For the JOBS Act, Dambra et al. (2015) show that subsequent increases in IPO activity were concentrated in such industries. In contrast to these findings, Dathan and Xiong (2022) show that de-risking exacerbated information asymmetries that reduced firms' listing propensities. Furthermore, they argue that the ability to reduce disclosure, viewed in isolation from de-risking by testing the waters, could theoretically induce lower quality firms to go public at higher underpricing. Lacking de-risking provisions, the Prospectus Regulation is unlikely to have lowered listing propensities. In terms of de-burdening, firms can already list with low disclosure on exchange-regulated markets, using the admission document. Therefore, an influx of listings composed of lower quality firms is similarly unlikely.

Prior work finds the *regulatory overreach hypothesis*, which contends that costs of regulatory compliance have contributed to the dearth of IPOs, to be inconsistent.

Gao et al. (2013) do not find a reduction in the number of IPOs caused by the US Sarbanes-Oxley (SOX) Act that increased the regulatory requirements of public corporations. Similarly, Doidge et al. (2013) conclude that the low levels of small-firm IPOs in the US were not caused by SOX. In the European setting, Cattaneo et al. (2015) study the impact of regulation and deregulation on Italian IPOs, finding that tightening of regulations has a positive impact on firm survival while loosening has the opposite effect. No effect is found for the number of listings. The findings of this literature lower expectations of the effectiveness of the deregulation enacted by the Prospectus Regulation. Nevertheless, using a staggered analysis on the introduction of SOX-like provisions across Europe, Engelen et al. (2020) show that such provisions reduced the listing propensities of small and knowledge-intensive firms. Deregulation of SMEs may similarly have higher marginal benefits.

Even with a general expectation on deregulation, the reform is limited by design. Through the presence of exchange-regulated markets, where SMEs targeted by the Prospectus Regulation are concentrated, and the possibility of listing on these markets with admission documents, whose disclosure costs are even lower than those of the EU growth prospectus, the reform may by limitation of its scope have been less impactful than anticipated. If a firm required access to capital markets and only the cost (directly via fees and indirectly via proprietary disclosures) of having to draw up a prospectus were deterrents, it could always list with lower proceeds and utilise the admission document instead. Given the admission document, the marginal benefit of the EU growth prospectus is narrow and the likelihood of its boosting IPO activity is slim. For IPOs, the EU growth prospectus does, however, allow SMEs to raise proceeds beyond the exemption thresholds. Therefore, the reform is more likely to have led to increased average IPO proceeds than it is to have boosted the number of IPOs.

2.4 IPOs in the EU: Data and Sample

To comprehensively study IPOs in the EU and address SMEs in particular, we consider the universe of new listings for all EEA exchanges with a registered SME growth market (SME GM) segment: Euronext (including Borsa Italiana), NASDAQ Nordic, Deutsche Börse, Nordic Growth Market (NGM), Spotlight Stock Market (SSM), Bolsas y Mercados Españoles (BME), Warsaw Stock Exchange (WSE), and Bulgarian Stock Exchange (BSE).[16,17] We focus on listings between January 2016 and September 2022 to adequately study the markets before and after the Prospectus Regulation of mid-2019. All listings are extracted from exchange websites.

As this study is concerned with IPOs, we regard only initial offerings by operating companies. This means that SPACs, REITs, and closed-end funds are excluded from the sample. Furthermore, companies with prior listings conducting market transfers, relistings, or secondary listing are not considered, neither are mergers, demergers, reverse takeovers. To qualify as an offering, the listing must have raised capital either for the company itself (via primary shares) or its shareholders (via secondary shares). This means that direct listings are disregarded. The addressees of the issue can be either retail (public) or institutional (private) investors.[18]

To classify the listings accordingly and retain only listings satisfying the above-stated criteria, we use labels given by the exchanges themselves and cross-validate them with information provided within each listing event's prospectus or admission document. To this end, prospectuses and admission documents are obtained from national financial market authority websites, ESMA registers, exchange websites,

[16]Zagreb Stock Exchange also has an SME GM segment, but there were no IPOs during the period of consideration.

[17]The SME GM segment is country specific, which is relevant for multi-country exchanges. For example, Nasdaq Nordic First North is an SME GM only in Denmark, Finland, and Sweden. Euronext Growth is an SME GM in Belgium, France, Ireland, and Portugal. For an overview of exchanges and segments by country, see Table B.4.2.

[18]For private placements, the sale of shares usually takes place before the company lists on the exchange. Where this sale took place more than six months prior to listing, it is regarded as a direct listing.

and company websites. Applying these criteria, we obtain 1,256 initial offerings by operating companies, representing the population of such listings on the aforementioned exchanges.

Information on each initial offering (such as proceeds and offer price) is hand-collected from prospectuses and admission documents. We conduct comparisons to US listings, whose specifics are obtained from Refinitiv's Securities Data Company (SDC Platinum) New Issues database.[19]

We augment the sample with financial data on each operating company taken from Refinitiv Worldscope, Orbis, and listing documents. Given that the classification of a company as an SME relies on pre-listing financial data, which may predate when full financial reporting was available for a given company, this combination of databases was required.

In total, we identify 1,256 initial offerings at 8 EU stock exchanges over the period from 2016 to 2022. 905 took place on MTFs, 113 of which used the EU growth prospectus. Further descriptive statistics are provided by Appendix B.2. Appendix B.4 provides an overview of listing and exchange types by country and presents descriptive statistics comparing IPOs and private placements.

2.5 Empirical evidence on the EU growth prospectus

2.5.1 Which issuers use the EU growth prospectus?

As established by the section 2.2.2, the EU growth prospectus can be utilised by IPOs on MTFs where the issuer is either an SME (category 1), a non-SME smallcap listing on an SME GM (category 2), or is conducting a small offering (category 3).

[19]While SDC Platinum generally has extensive coverage, depending on the market and listing type of EU IPOs, there are considerable omissions, necessitating the hand collection of listings from exchange websites. For US listings, on the other hand, SDC Platinum is the database of choice.

Table 2.1 shows the number of post-reform MTF IPO issuers fulfilling each of the three categories and corresponding criteria as well as the number of these issuers choosing to list with an EU growth prospectus.

Few IPOs fulfil a single category only (cases 1-6). Most issuers fulfilling only category 1 simultaneously fulfil all three criteria (case 4), instead of only the required minimum of two (cases 1-3). However, only few of these issuers list using an EU growth prospectus, with the majority opting instead to file a full prospectus. A negligible number of issues are conducted by non-SME smallcaps as per category 2, fulfilling none of the other categories (case 5). None of these offerings are conducted via the EU growth prospectus. There are no observations for IPOs that are exclusively small offerings (category 3; case 6). Small offerings are almost always conducted by SMEs, which is to be expected given their lower financing needs relative to non-SMEs.

When categories 1 and 2 bind, the issuer can be referred to as an *SME smallcap*. Half of these issuers conducting a large offering (case 7) use the EU growth prospectus. Comparing this with large offerings by SME midcaps (cases 1-4), only a third use the EU growth prospectus. As established by the previous section, smallcaps benefit from more extensive disclosure reductions within the EU growth prospectus than midcaps. Therefore, the higher rate of utilisation among SME smallcaps is consistent with expectations given the lower expected disclosure costs.

More than half of small offerings by SME midcaps (case 8) use the EU growth prospectus. Factoring out the 22 IPOs that are exempt from prospectus publication, almost all case 8 IPOs use the EU growth prospectus.

Interestingly, most MTF offerings since the reform have in fact fulfilled all categories of eligibility (cases 10-13), suggesting that the criteria have been generously chosen. Again, the rate of utilisation of the EU growth prospectus among these eligible issuers is low at a third of issuers, but rises to over 80 % when regarding only non-exempt IPOs. In sum, the EU growth prospectus appears to have successfully

Table 2.1: Fulfilment of EU growth prospectus criteria
This table indicates the number of IPOs on MTFs according to their fulfilment of categories and criteria of EU growth prospectus eligibility (see Section 2.2.2). For each criterion, a value of (0) 1 indicates (non-)fulfilment. Values in parentheses indicate the number of exempt IPOs according to each member state's threshold. All post-reform IPOs on MTFs are considered.

Case	Category 1			Category 2	Category 3	N	EU growth prospectus	Full prospectus	Admission Document
	Emps <250	TOAS ≤43m	Sales ≤50m	Scap ≤200m on SME GM	Emps<500 & Proceeds≤20m				
No category binds									
0		*not fulfilled*		0	0	15 *(0)*	0 *(0)*	15 *(0)*	0 *(0)*
Only category 1 binds									
1	1	1	0	0	0	0 *(0)*	0 *(0)*	0 *(0)*	0 *(0)*
2	1	0	1	0	0	7 *(0)*	1 *(0)*	6 *(0)*	0 *(0)*
3	0	1	1	0	0	0 *(0)*	0 *(0)*	0 *(0)*	0 *(0)*
4	1	1	1	0	0	23 *(0)*	9 *(0)*	14 *(0)*	0 *(0)*
Only category 2 binds									
5		*not fulfilled*		1	0	8 *(1)*	0 *(0)*	7 *(0)*	1 *(1)*
Only category 3 binds									
6		*not fulfilled*		0	1	0 *(0)*	0 *(0)*	0 *(0)*	0 *(0)*
Only categories 1 and 2 bind									
7		*fulfilled*		1	0	18 *(1)*	9 *(0)*	8 *(0)*	1 *(1)*
Only categories 1 and 3 bind									
8		*fulfilled*		0	1	60 *(22)*	34 *(2)*	6 *(0)*	20 *(20)*
Only categories 2 and 3 bind									
9		*not fulfilled*		1	1	2 *(0)*	1 *(0)*	1 *(0)*	0 *(0)*
All categories bind									
10	1	1	0	1	1	1 *(0)*	1 *(0)*	0 *(0)*	0 *(0)*
11	1	0	1	1	1	3 *(2)*	0 *(0)*	1 *(0)*	2 *(2)*
12	0	1	1	1	1	4 *(3)*	1 *(0)*	0 *(0)*	3 *(3)*
13	1	1	1	1	1	170 *(119)*	57 *(13)*	8 *(1)*	105 *(105)*

crowded out the full prospectus for non-exempt IPOs. While some exempt issuers choose to opt in to the EU growth prospectus, the majority still lists using exchange-regulated admission documents.

Overall, trends discernible from Table 2.1 suggest that the majority of MTF IPOs are exempt from having to publish a prospectus simply due to the low proceeds they raise. Exempt IPOs almost always publish admission documents, implying that the scope of utilisation of the EU growth prospectus as per its current designation is limited by default. Even though the fulfilment of any one of the three categories is sufficient to be eligible for the EU growth prospectus, issuers appear to be hesitant to use this document unless they fulfil at least two categories.

We further examine the choice of EU growth prospectus versus full prospectus. The marginal impact of the proceeds raised is of particular interest here, as Table 2.1 indicates that large offerings that are otherwise eligible for the EU growth prospectus are more likely to overfulfil and file a full prospectus. In order to determine the influence of all criteria on this choice, we use binary interaction regressions of the following form:

$$\begin{aligned} EGP_{i,j,t} = \beta_0 + \beta_1 SME_i + \beta_2 Smallcap_i + \beta_3 Proceeds\ OA_i + \\ \beta_4 SME_i \times Smallcap_i + \beta_5 SME_i \times Proceeds\ OA_i + \beta_6 Smallcap_i \times Proceeds\ OA_i + \\ \beta_7 SME_i \times Smallcap_i \times Proceeds\ OA_i + \phi_j + \epsilon_{i,j,t}, \end{aligned} \tag{2.1}$$

where *EGP* is an indicator dummy equal to 1 if the IPO i was conducted using an EU growth prospectus and 0 for a full prospectus. *SME* indicates whether the IPO firm is an SME according to the criteria laid out by the Prospectus Regulation. *Smallcap* indicates an IPO market capitalisation below €200m. *Proceeds OA* are measured in 2015 millions of Euros, centred about €20m, the threshold of a small offering. As total proceeds are used to determine small offering eligibility, we use proceeds including any overallotment options. As prospectus content is influenced

by the scrutinising financial markets authority j, we apply the applicable fixed effect ϕ. Standard errors are clustered by IPO i.

We estimate this regression using OLS and successively add interaction terms to proceeds, our main variable of interest. Using a linear probability model allows a more straightforward interpretation of interaction effects. Furthermore, given the small sample size and relatively low variability, OLS provides more robust approximations.

Table 2.2: Binary regression of choice for EU growth prospectus vs. full prospectus
This table reports the results of a binary interaction regression for the choice of EU growth prospectus vs. full prospectus. Listings documents of countries with at least five EU growth prospectuses, i.e., Sweden, Denmark, Finland, and France, are considered (Panel A, for further descriptive statistics, see Table B.2.1). Columns I, III, and IV are estimated using OLS. Column II is estimated using a logit regression, reported coefficients are log-odds. *EGP* is an indicator variable equal to 1 if the IPO was conducted using an EU growth prospectus and 0 for a full prospectus. *SME* and *Smallcap* are indicator variables on the firm conducting the IPO according to the Prospectus Regulation criteria. *Proceeds incl. OA* are measured in 2015 millions of Euros and are centred about €20m. We apply financial markets authority (FMA) fixed effects. Huber/White robust standard errors clustered by IPO are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table B.1.

	(I)	(II)	(III)	(IV)
	EGP	Pr(EGP)	EGP	EGP
Proceeds incl. OA (millions)	-0.004***	-0.066***	-0.003**	0.000
	(0.001)	(0.019)	(0.001)	(0.000)
Smallcap			0.048	-0.055
			(0.092)	(0.168)
Proceeds incl. OA (millions) × Smallcap			-0.009**	0.000
			(0.004)	(0.003)
SME				0.671***
				(0.051)
Proceeds incl. OA (millions) × SME				-0.009***
				(0.002)
Smallcap × SME				-0.093
				(0.169)
Proceeds incl. OA (millions) × Smallcap × SME				-0.010
				(0.007)
FMA FE	Yes	Yes	Yes	Yes
N	172	172	172	172
Adj./Pseudo-R^2	0.292	0.300	0.322	0.487

Table 2.2 shows the results of our analysis. In column I, we include proceeds as the only estimator, finding a negative association with the likelihood of using the EU growth prospectus. In order to interpret the economic effect more potently, we re-run the analysis using a logit regression, showing that for each additional million

Euros of proceeds raised above the small offering threshold of €20m, the likelihood of using the EU growth prospectus is reduced by 6.4 % ($= |e^{-0.066} - 1|$). In column III, we interact proceeds with being a smallcap, showing that while being a smallcap is positively but not significantly related to using the EU growth prospectus, this likelihood decreases with rising proceeds. In column IV, we add being an SME as a third interaction variable. The interaction of the SME indicator with proceeds raised shows that the likelihood of an SME filing an EU growth prospectus diminishes with rising proceeds. While the triple interaction between all three explanatory variables is insignificant, the direction of the coefficient is negative, such that when both SME and smallcap status are given, rising proceeds reduce the likelihood of using the EU growth prospectus.

We note that due to the small sample size, these results provide an initial implication only. As most of the firms in the sample qualify as SMEs, this variable has particularly low variability, therefore its strong positive association with choosing the EU growth prospectus is unsurprising. Nevertheless, the results provide some confirmation to the general trends by implied by Table 2.1. Furthermore, the analysis suggests that being a smallcap on its own has a limited effect on choosing the EU growth prospectus as opposed to the full prospectus.

The insights derived when examining who uses the EU growth prospectus suggest that SMEs accept and use the EU growth prospectus within limits. These limits are determined by the proceeds raised by the IPO. If these remain below the exemption thresholds, the admission document remains the listing document of choice. Above these thresholds, the EU growth prospectus has, to an extent, crowded out the full prospectus, especially for issuers of the SME category. However, the likelihood to overfulfil and use the full prospectus increases with rising proceeds. This could indicate higher uncertainty of larger issues that issuers seek to mitigate with increased disclosure. On the other hand, issuers raising higher proceeds may simply be more cautious, choosing to overfulfil due to perceived rather than actual uncertainty.

Given the current specification, the window within which the EU growth prospectus is used remains rather narrow between the other two listing document types. The SME Listing Act Proposal intends to widen the EU growth prospectus' use, making it mandatory where a firm is eligible to use it and the issue raises proceeds beyond the exemption thresholds. If investor uncertainty is indeed greater for larger issues, this may result in increased underpricing. Ultimately, the implementation of this particular provision will allow for the empirical determination of the value of information for larger issues, allowing for a distinction between uncertainty an overcautiousness.

2.5.2 How does the content of the EU growth prospectus differ from the full prospectus or admission documents?

We conduct a textual analysis to practically identify differences between the EU growth prospectus and other listing documents. Such an analysis is complicated by a variety of factors. First, while the content of the prospectus is mandated by EU regulation, companies frequently include appendices that can inflate both page and word counts. Second, EU listing documents need not be made available in machine-readable format and will often include scanned pages. Finally, the languages of the listing documents vary both across and within countries, therefore simple page or word counts are distorted by language verboseness.

We propose a methodology that overcomes these difficulties. Similar to Hanley and Hoberg (2010), we manually paginate each document to identify the main sections (see B.3 for details) while excluding appendices and generic disclaimers or taxation warnings. Certain document items, such as notes on financial statements or auditor reports, appear in the main body of some documents but in the appendix of others. These sections are therefore treated as appendices regardless of where they actually appear in the document.

The core documents we are left with are converted to machine-readable format

using optical character recognition provided by the Python package Pytesseract. We then address language differences by translating every document to English using Google Translate. Though the precise meaning of sentences may be affected by translation, the superseding analyses use word counts only, mitigating this concern.

When choosing appropriate measures of document length, both page and word counts are frequently employed. Though our document reduction excluding appendices increases the appropriateness of page counts, this measure faces the issue of being affected by choice of formatting and language verboseness. Though page counts have previously been applied to textually compare EU listing documents, we argue that they are biased and ultimately unsuitable. For comparisons of document lengths, we therefore resort to word counts, which are unaffected by formatting, using the translated core documents.

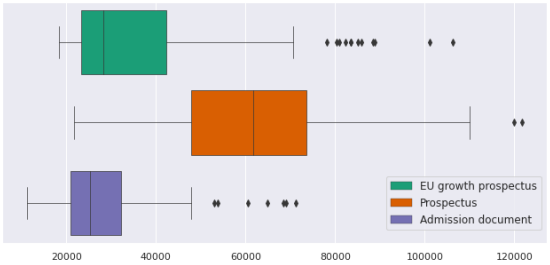
Figure 2.2 compares document lengths proxied by word counts for each listing document type.[20,21] Subfigure 2.2a shows that length-wise, the EU growth prospectus is closer to the admission document than the full prospectus. This appears to be true for most sections. The *business & market* section of the EU growth prospectus has the largest interquartile range, suggesting that this section could be most prone to voluntary additional disclosures. The other sections have noticeably tighter ranges that overlap more with the ranges of admission documents than full prospectuses. For the *financials* section, the median length of the EU growth prospectus is below that of the admission document. The long tails observed for the total document as well as *risk factors* and *business & market* could imply voluntary overdisclosure. For the *risk factors* section, this is particularly notable given the Prospectus Regulation's provision to include only the most material risk factors. Though we do not assess this section explicitly, this observation could hint at a mechanism similar to what Agarwal et al. (2017) observe for the JOBS Act, whereby reductions in mandatory

[20]Note that admission documents typically do not include a summary, therefore comparisons regarding this section are not conducted.

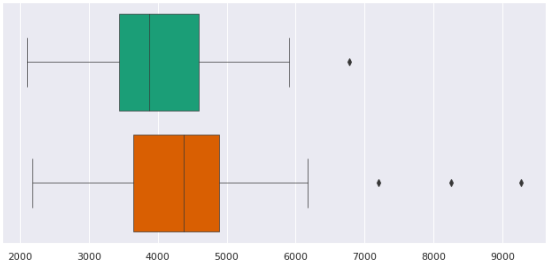
[21]Only countries with at least five filed EU growth prospectuses, namely Sweden, Finland, Denmark, and France, are considered in the textual analyses.

Figure 2.2: Boxplots of listing document lengths
This figure presents boxplots of document lengths proxied by word counts for EU Growth Prospectus, Full Prospectus, and admission documents. Subfigure 2.2a refers to the full documents while Subfigures 2.2b-2.2g refer to individual sections. For a description of items composing each section, refer to B.3. Listings documents of post-reform MTF IPOs in countries with at least five EU Growth Prospectuses, i.e., Sweden, Denmark, Finland, and France, are considered (Panel B, for further descriptive statistics, see Table B.2.1).

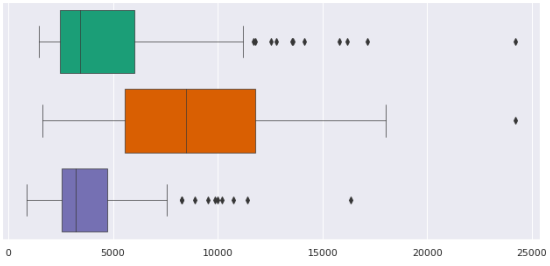
(a) Total words



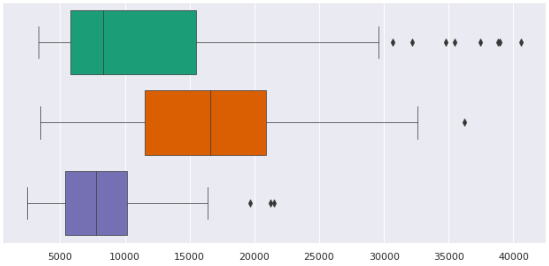
(b) Summary



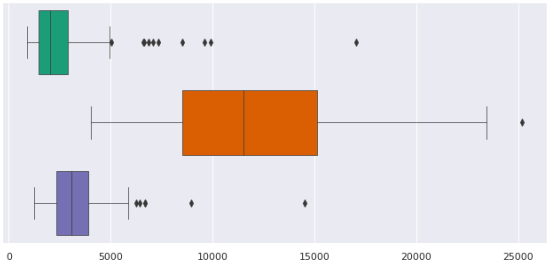
(c) Risk factors



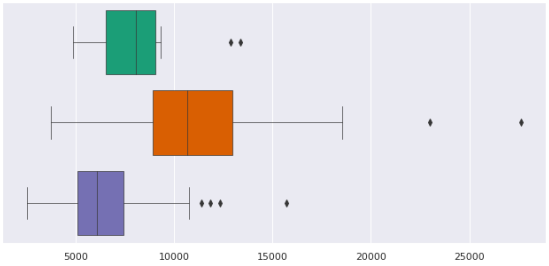
(d) Business & market



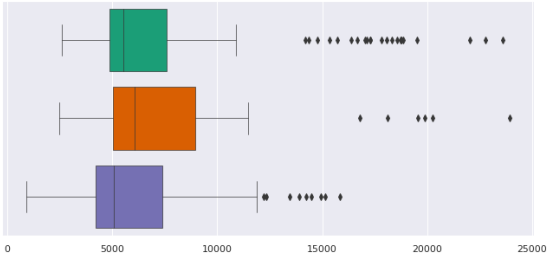
(e) Financials



(f) Corporate governance



(g) Offer details



accounting disclosures resulted in textual compensations in the risk factors section.

In recognition of the fact that (EU growth) prospectus content is influenced by the responsible financial markets authority and admission documents content is dictated by the exchange itself, we use fixed effects regressions to compare mean document lengths in Table 2.3, using both OLS and Poisson regressions. Prospectuses are significantly longer than the EU growth prospectus, which is true for all sections apart from *offer details*. Given that this section contains necessary information for the transaction at hand, this finding is in line with preserving investor protection. The *summary* of the full prospectus is only marginally longer than the EU growth prospectus, as expected given that the content of both sections is subject to a page limit of seven and six pages, respectively. Length-wise, the most different section is *financials*. Here, the incidence-rate ratio indicates that the full prospectus is 4.297 times longer, an economically sizeable difference. The mean word count differs by almost 9,000 words. Assuming a single-spaced page fits 500 words, this corresponds to 18 pages. This indicates that the alleviations of the Prospectus Regulation were meaningful. Despite the wide range length previously observed for the *business & market* section, at the mean, it is significantly shorter than the full prospectus. The *corporate governance* section also differs noticeably at over 7,000 additional words seen in the full prospectus at the mean and an incidence-rate ratio of 2.465 times the words in the EU growth prospectus.

In comparison to the admission document, the EU growth prospectus is significantly longer, though this difference is smaller in absolute terms than that to the full prospectus. The incidence-rate ratio indicates that admission documents are 0.818 times the length of EU growth prospectuses. The *business & market* section has the highest length difference, in line with the large length range of this section shown by Figure 2.2d. The *corporate governance* of the EU growth prospectus, on the other hand, is significantly shorter than the admission document.

Table 2.3: Listing documents length comparison
This table provides mean statistics for word counts of listing documents for IPOs on MTFs in the post-reform period. Listings in countries with at least five EU growth prospectuses, i.e., Sweden, Denmark, Finland, and France, are considered (Panel B, for further descriptive statistics, see Table B.2.1). Statistics on the *summary* section of admission documents are omitted, as this section is not regularly included. Test statistics determining equivalence of means and are computed using OLS regression. Values in parentheses are incident-rate ratios (IRR) obtained from Poisson regression. Both mean comparisons apply Huber/White robust standard errors clustered by IPO and fixed effects by exchange and financial markets authority. Values in italics refer to the mean percentage each section comprises of the total word count. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a description of items composing each section, refer to B.3.

	EGP		Prospectus			Admission document		
	N	Mean	N	Mean	Diff. (IRR)	N	Mean	Diff. (IRR)
Total words	111	37,781.432	61	62,149.115	25,895.441*** (1.721***)	103	28,794.641	-6,823.074*** (0.818***)
Summary	111	4,033.234	61	4,430.197	536.373*** (1.137***)			
		12.6 %		*7.5 %*				
Risk factors	111	5,037.784	61	9,094.852	3,059.296*** (1.586***)	103	4,013.078	-676.843* (0.863**)
		12.8 %		*14.2 %*		103	*13.6 %*	
Business & market	111	12,407.216	61	17,072.213	5,542.298*** (1.484***)	103	8,475.738	-3,348.661*** (0.734***)
		30.5 %		*26.9 %*		103	*29.3 %*	
Financials	111	2,671.108	61	11,890.098	8,925.375*** (4.297***)	103	3,386.204	795.992*** (1.304***)
		8.1 %		*19.2 %*		103	*12.2 %*	
Corporate governance	111	5,429.432	61	11,523.180	7,182.627*** (2.465***)	103	6,097.388	1,053.650*** (1.193***)
		14.6 %	61	*19.5 %*		103	*22.3 %*	
Offer details	111	7,949.027	61	7,747.082	289.505 (1.039)	103	6,325.155	-1,251.667*** (0.845***)
		21.1 %	61	*12.3 %*		103	*21.5 %*	

For regulators, these results suggest that the EU growth prospectus was, overall, effective at achieving reduced disclosure. This is particularly true for *financials* and *corporate governance*, where the EU growth prospectus is noticeably closer to and shorter than the admission document. The *business & market* section has the highest potential for further reductions. However, our analysis does not show what part of the disclosures made within this section are in fact voluntary overfulfilment of the minimum requirements, which would reduce the effectiveness of any further reductions.

We next analyse the content similarity of listings documents, following the bag-of-words approach of Hanley and Hoberg (2010). Using the Python packages NLTK and Spacy, we tokenise each of the translated core documents and eliminate stop-words, non-alphanumeric characters, and named entities. We then lemmatise all thus identified words to their root-forms (*lemmas*) and verify the existence and type of each word using the Merriam-Webster dictionary API. Pronouns, conjunctions, and articles are discarded. This leaves us with word lists for each listing document.

From these word lists, we create a dictionary of unique words representing all sample listing documents. This bag-of-words dictionary contains 8,804 words and is subsequently used to generate vectors counting the occurrence of each word in each listings document word list. This means that the count vectors have the same number of elements (i.e. 8,804) across all listings documents. We normalise these vectors by their magnitude, thereby setting the sum of elements of these normalised word vectors to 1.

These transformations then allow us to calculate the cosine similarity of each unique document pair i and j, excluding $i = j$. Cosine similarity is a common measure of textual similarity (Hanley and Hoberg, 2010). It is bounded by $[0, 1]$, where 1 indicates an identical distribution of words and 0 indicates no word overlap. Given 275 documents for IPOs on MTFs in Sweden, Denmark, Finland, and France in the post-reform period, there are $\frac{275 \times 274}{2} = 37,675$ unique document pairs to

consider.

We analyse the determinants of document similarity using OLS regressions of the following form:

$$Similarity_{i,j} = \beta_0 + \beta_1 Document\ type\ combination_{i,j} + \vec{v}\vec{X}_{i,j} + \eta_i + \epsilon_{i,j}, \quad (2.2)$$

where the dependent variable measures the cosine similarity for two listing documents i and j. The goal of this analysis is to determine the similarity of the three listing document types (EU growth prospectus, full prospectus, and admission document), therefore the main independent variable of interest *Document type combination* is a categorical variable with six levels for each possible document combination. The reference category is the combination of two admission documents, therefore the coefficients of the other combinations are interpretable relative to this base. We apply IPO fixed effects η and cluster standard errors on the IPO level.

$\vec{X}$ is a vector of control variables. On the firm-level, we include a dummy variable equal to 1 if both IPO firms belong to the same Fama-French 48 industry code. To account for content variation caused by national scrutiny and the exchange itself, we include dummy variables equal to 1 if two IPO firms are subject to the same financial markets authority and are listing on the same exchange, respectively. As IPOs cluster by time, we use a dummy variable indicating whether two IPOs occurred within the same 90-day time period and the absolute year difference between them.

Table 2.4 shows the results of the similarity analyses. On the level of the full documents (column I), there are significant increases in document similarity when comparing two EU growth prospectuses as opposed to two admission documents (the reference category). The same applies when comparing an EU growth prospectus to a full prospectus. There is no gain in similarity when comparing an EU growth prospectus to an admission document. The control variables impact document similarity in the expected directions, though the exchange itself does not have a significant impact on document similarity.

Table 2.4: Listing documents similarity analysis
This table presents regression analyses on the pairwise cosine similarity of two listing documents for IPOs on MTFs in the post-reform period by document section (for a description of items composing each section, refer to Table B.3). Listings in countries with at least five EU growth prospectuses, i.e., Sweden, Denmark, Finland, and France, are considered (Panel C, for further descriptive statistics, see Table B.2.1). The first five independent variables specify each possible document type combination (EU growth prospectus *EGP*, full prospectus *Prosp*, and admission document *Adm*), where the reference category is a combination of two admission documents (*Adm/Adm*). All regressions apply IPO fixed effects and Huber/White robust standard errors clustered by IPO (values in parentheses). ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table B.1.

	(I) Full document	(II) Risk factors	(III) Business market	(IV) Financials	(V) Corporate governance	(VI) Offer details
EGP/Adm	0.004	-0.016***	0.010***	-0.068***	-0.027***	0.007
	(0.003)	(0.004)	(0.002)	(0.003)	(0.003)	(0.006)
EGP/EGP	0.031***	-0.024***	0.029***	-0.066***	-0.011***	0.084***
	(0.004)	(0.004)	(0.002)	(0.004)	(0.003)	(0.007)
EGP/Prosp	0.040***	-0.053***	0.018***	-0.099***	-0.021***	0.062***
	(0.004)	(0.006)	(0.003)	(0.004)	(0.003)	(0.007)
Prosp/Adm	0.020***	-0.041***	0.004	-0.029***	0.007**	-0.005
	(0.004)	(0.006)	(0.003)	(0.004)	(0.004)	(0.007)
Prosp/Prosp	0.084***	-0.037***	0.022***	0.007	0.053***	0.097***
	(0.004)	(0.010)	(0.005)	(0.006)	(0.005)	(0.008)
Same FF48-industry	0.011***	0.006***	0.010***	-0.002*	-0.004**	-0.007***
	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
Same financial markets authority	0.067***	0.109***	0.045***	0.090***	0.123***	0.088***
	(0.002)	(0.006)	(0.003)	(0.003)	(0.004)	(0.004)
Same exchange	0.002	0.002	0.001	0.017***	0.015***	0.025***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Within same 90 days	0.005***	-0.001	0.007***	0.001	0.003*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Absolute year difference	-0.005***	0.003***	-0.002**	0.010***	0.007***	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
IPO FE	Yes	Yes	Yes	Yes	Yes	Yes
N	37674	37674	37674	37674	37674	37674
Adj. R^2	0.368	0.409	0.303	0.523	0.425	0.438

Following Hanley and Hoberg (2010), the economic magnitude of these results can be better approximated in terms of standard deviations. The standard deviation of full document similarities observed across all document pairs is 0.105. Therefore, the coefficient of 0.031 observed when two EU growth prospectuses are compared is 29.5 % of one standard deviation higher than when comparing two admission documents.

Looking at similarity differences for the level of two EU growth prospectuses across document sections, the similarity is lower as opposed to the base category

for *risk factors*, *financials*, and *corporate governance*, though the coefficient has low magnitude for the latter section (6.7 % of one standard deviation). *Risk factors* (column II) is a section whose content is explicitly addressed by EU legislation, with the Prospectus Regulation devoting considerable effort to preventing firms from listing generic risk factors. When comparing two prospectuses, the similarity of this section is also lower. The reduced similarity compared to admission documents could indicate that the goal of reducing generic risk factors was achieved.[22]

Across all sections other than *risk factors* and *financials*, the degree of similarity between the EU growth prospectus and the full prospectus is higher than between the former and admission documents. The lack of similarity of the latter section mirrors the length reduction shown previously, though the low similarity found in general could be due to the predominance of numbers in this section, reducing the likelihood of overlap in relatively shorter text.

Together with the results of Table 2.3, which presented evidence that the length of the EU growth prospectus is significantly reduced compared to the full prospectus, this indicates that the reform achieved its main goals despite their trade-off, namely the reduction of content while maintaining investor protection. For the SME Listing Act Proposal, this calls into question the marginal benefit of further content reductions as well as the continuing maintenance of investor protection.

2.5.3 Has the EU growth prospectus lowered listing expenses?

Next, we address the question of whether the EU growth prospectus achieved its goal of lowering listing expenses. While we cannot observe these costs directly, we can use the estimated expenses reported by firms on their listing documents as a proxy.[23,24] These costs are mostly reported as lump sums and not decomposed

[22]The *summary* section is excluded as it is not typically part of admission documents.

[23]These expenses are mostly reported as lump sums comprising underwriter spreads, legal fees, listing costs, etc. They correspond to total direct listing costs, cp. Chaplinsky et al. (2017).

[24]The estimated expenses were included in the majority of listing documents, with four exceptions.

further.

As listing expenses are distorted by proceeds raised, we use the approach of Kaserer and Kraft (2003) to decompose listing costs into their fixed and variable components. While proceeds correlate positively with variable listing costs, we expect cost reductions induced by the EU growth prospects to be reflected in fixed listing costs that are independent of the size of the issue.

To estimate the relative difference in decomposed listing costs of the EU growth prospectus compared to the other two listing document types, we use the following regression:

$$\begin{aligned}\frac{Expenses}{Proceeds}_{i,t} &= \beta_0 + \delta_0 Prospectus_i + \gamma_0 Admission\ document_i \\ &+(\beta_1 + \delta_1 Prospectus_i + \gamma_1 Admission\ document_i) \times Proceeds_i \\ &+\frac{\beta_2 + \delta_2 Prospectus_i + \gamma_2 Admission\ document_i}{Proceeds_i} \\ &+\phi_i + \mu_i + \epsilon_{i,t},\end{aligned} \tag{2.3}$$

where the dependent variable captures the ratio of expenses to total proceeds for IPO i in year t. *Prospectus* and *Admission document* are dummy variables equal to 1 if the corresponding listing document was used; the EU growth prospectus serves as the comparison group. The coefficient β_1 represents the variable costs of the listing and is multiplied with mean-centred *Proceeds* (in millions of 2015 Euros). β_2 captures the fixed costs of the issue and is divided by *Proceeds*. This reciprocal variable is also centred about its mean. The functional form of this regression equation is derived by defining total costs as a quadratic function of proceeds, where quadratic proceeds capture marginal changes (i.e. variable costs), and dividing by proceeds to obtain the relation in terms of average costs (cp. Kaserer and Kraft, 2003). We apply a financial markets authority fixed effect ϕ and exchange fixed effect μ. Standard errors are clustered by IPO i.

Table 2.5 shows the results of this regression analysis both without and with fixed

Table 2.5: Listing documents expenses decomposition
This table presents regression analyses on the ratio of listing expenses to proceeds for IPOs on MTFs in the post-reform period in countries with at least five EU growth prospectuses, i.e., Sweden, Denmark, Finland, and France, with available listing expenses (Panel D, for further descriptive statistics, see Table B.2.1). *Proceeds* and *Inverse proceeds* are centred about their respective means in millions of Euros. In column II, we apply fixed effects by financial markets authority (FMA) and exchange. Huber/White robust standard errors clustered by IPO are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table B.1.

	(I)	(II)
	Expenses/proceeds	Expenses/proceeds
Constant	0.109***	0.103***
	(0.006)	(0.007)
Admission document	-0.031	-0.160***
	(0.036)	(0.041)
Prospectus	-0.000	0.021*
	(0.015)	(0.012)
Proceeds (millions)	-0.000	-0.001***
	(0.000)	(0.000)
Admission document × Proceeds (millions)	-0.003	-0.013***
	(0.003)	(0.003)
Prospectus × Proceeds (millions)	-0.000	0.001*
	(0.000)	(0.000)
Inverse proceeds (millions)	0.086**	0.148***
	(0.033)	(0.041)
Admission document × Inverse proceeds (millions)	-0.097**	-0.118***
	(0.040)	(0.045)
Prospectus × Inverse proceeds (millions)	-0.011	0.013
	(0.070)	(0.059)
FMA FE	No	Yes
Exchange FE	No	Yes
N	271	270
Adj. R^2	0.141	0.345

effects (columns I and II, respectively). At average proceeds, from the first three terms of column II, average listing costs of admission documents are lower than those of the EU growth prospectus, while those of the full prospectus are higher. Looking at variable costs (the next three terms), the diminishment with rising proceeds is greater for admission documents compared to the EU growth prospectus. The difference for full prospectuses is economically negligible.

Our main variables of interest relate to fixed costs (last three terms). These are significantly lower for admission documents. There is no significant difference for full prospectuses. We are therefore unable to confirm lower costs incurred by the

EU growth prospectus.

The weak economic differences in emission expenses are further illustrated by Table 2.6, which uses the coefficients obtained from regression without fixed effects and variable centring to estimate listing expenses as a percentage of proceeds. As admission documents can be used up to a maximum of €8m in total proceeds, estimates for higher proceeds are omitted. Economically, the differences between the expenses incurred by each listings document are small. The most substantial difference arises at low proceeds of €1m for admission documents, which have approximately 5 percentage points lower expenses than the other two document types. For higher proceeds, however, this expense advantage disappears. Overall, the results obtained in this section raise questions regarding the relevance of the different floating alternatives for expenses incurred.

Table 2.6: Estimated listing expenses in percent of proceeds
This table presents listing expenses in percent of proceeds for different levels of proceeds, estimated using coefficients obtained from uncentred regression analysis without fixed effects.

Proceeds (€ millions)	EU growth prospectus (%)	Prospectus (%)	Admission document (%)
1	17.13	16.53	12.36
2.5	11.97	12.02	12.48
5	10.23	10.46	11.80
10	9.31	9.58	
25	8.60	8.73	
50	8.10	7.91	
100	7.35	6.49	

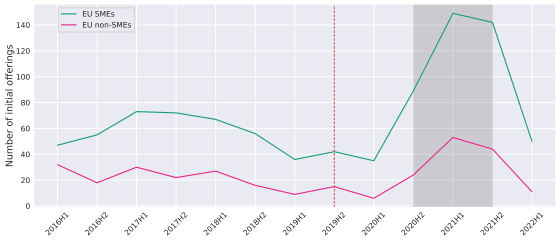
2.5.4 Impact of the reform on listings activity

While the previous section established the fundamentals of the reform and its implementation, we now seek to analyse the impact of the reform by evaluating whether it achieved its overarching goal of inducing more SMEs to go public. For this purpose, we aggregate our listings data at the nation-quarter level from the first quarter of 2016 to the third quarter of 2022 (the final quarter we have available), yielding 27 observations of total listings and total proceeds raised per country.

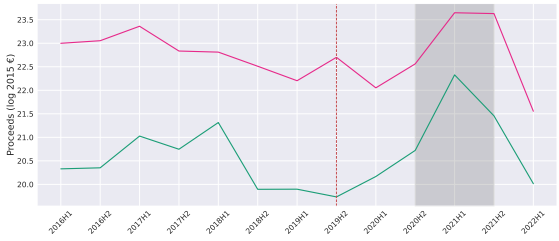
When graphically analysing the number of SME versus non-SME initial offerings

Figure 2.3: Listings activity SMEs and non-SMEs
This figure shows annual activity in initial offerings for SMEs and non-SMEs by number and the logarithm of proceeds in 2015 Euros in the EU and the US. The shaded area depicts the approximate time frame of the COVID-19 IPO boom.

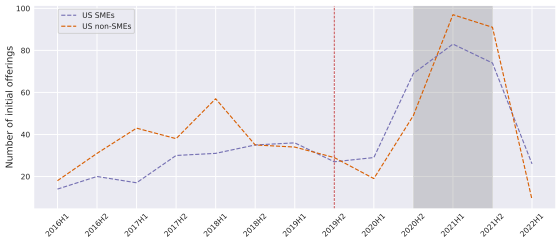
(a) EU



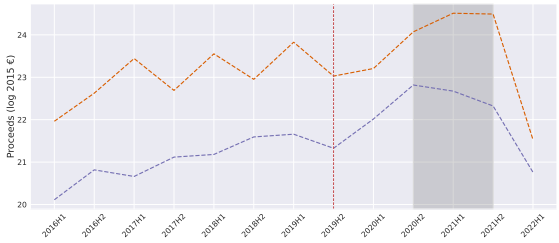
(c) EU - log-proceeds



(b) US



(d) US - log-proceeds



in the EU (Subfigure 2.3a), there appears to be a boost in the second half-year of 2020, one year after the reform. While it is plausible for the reform's effect to be delayed, allowing for firms and financial market authorities to become familiar with the novel EU growth prospectus, the visible increase in number of listings is more likely to be related to the COVID-19 crisis. Following the onset of this crisis, biotech companies in particular were induced to go public. As these companies are likely to be SMEs, they coincide with the group we would expect to be most affected by the Prospectus Regulation. There is also a visible albeit less prominent increase in the number of non-SME EU initial offerings.

Therefore, although a difference-in-differences framework comparing EU SMEs to non-SMEs would lend itself to analysing the impact of the reform on SME listings activity, the post-reform period is biased by the COVID-19 IPO boom. In order to net out this effect, we instead propose the use of a triple difference estimator comparing activity of SMEs and non-SMEs in the EU to that in the US.[25]

[25]SMEs are defined according to the definition of the Prospectus Regulation, see Section 2.2.2

Subfigure 2.3b shows that in the pre-reform period, there were generally fewer SME listings in the US. In the EU, SMEs already dominated listings activity during this time period (see Subfigure 2.3a), which is unsurprising given the relatively higher importance of SMEs for the EU economy. In the post-reform period, within the COVID-19-induced IPO boom period, there is a significant increase in listings of both US SMEs and non-SMEs.

Subfigures 2.3c and 2.3d confirm that SMEs raise lower proceeds than non-SMEs, with this gap being wider in the EU. While there is an immediate increase in SME proceeds raised following the reform, there is a simultaneous and larger increase for US SMEs.

We conduct a triple difference regression analysis of the following form:

$$\begin{aligned} Y_{i,j,q,t} = \beta_0 + \beta_1 SME_i + \beta_2 EU_j + \beta_3 Post_{q,t} \\ + \beta_4 SME_i \times EU_j + \beta_5 SME_i \times Post_{q,t} + \beta_6 EU_j \times Post_{q,t} \\ + \beta_7 SME_i \times EU_j \times Post_{q,t} \\ + \vec{v}\vec{X}_{j,t-1} + \delta_j + \tau_t \times \pi_q + \epsilon_{i,j,q,t}, \end{aligned} \tag{2.4}$$

where the dependent variable Y is a measure of listings activity aggregated by company group i in country j and quarter q in year t. SME_i indicates companies' status according to the Prospectus Regulation's definition, EU_j indicates listings in an EEA country, and $Post_{q,t}$ indicates quarters in the post-reform period. We apply country fixed effects δ and quarter-year fixed effects $\tau \times \pi$ and cluster standard errors by time.[26]

Following Dambra et al. (2015), we measure listings activity using (1) the number of initial offerings divided by the number of public firms and (2) total initial offerings proceeds divided by the market capitalisation of domestic listed firms. At the nation

for both the EU and US.

[26]Only sample countries with at least 10 listings are regarded, therefore Iceland, Ireland, and Portugal are excluded from triple difference analyses. For descriptive statistics across nation-quarters, see Table B.2.2.

level, we control for the annual GDP growth preceding each quarter.

Table 2.7: Differences-in-differences and triple differences analysis of listings activity
The dependent variable measures listings activity on the nation-quarter level. In columns I-II, the dependent variable is the number of listings scaled by the number of domestic listed firms of the prior year, in percent. In columns III-IV, the dependent variable is total listing proceeds divided by total domestic market capitalisation of the prior year, in percent. Columns I and III show the results of a difference-in-differences analysis using the sample of EU countries. Columns II and IV show the results of the triple-difference analysis including the US. Huber/White robust standard errors clustered by time are presented in parentheses. ***, ** and * indicate significance on the 1 %-, 5 %- and 10 %-levels, respectively. For a definition of variables see Table B.1. For descriptive statistics, see Table B.2.2.

	(I)	(II)	(III)	(IV)
	Scaled listings		Scaled proceeds	
SME	0.277***	-0.120**	-0.052***	-0.018***
	(0.057)	(0.047)	(0.012)	(0.004)
SME × Post	0.328**	0.162*	0.007	-0.009
	(0.147)	(0.080)	(0.017)	(0.008)
EU × Post		0.013		-0.003
		(0.104)		(0.019)
SME × EU		0.398***		-0.034**
		(0.077)		(0.014)
SME × Post × EU		0.166		0.017
		(0.179)		(0.016)
GDP growth	0.130***	0.127***	0.007	0.007
	(0.042)	(0.041)	(0.006)	(0.006)
Country FE	Yes	Yes	Yes	Yes
Year x Quarter FE	Yes	Yes	Yes	Yes
N	648	702	648	702
Adj. R^2	0.366	0.366	0.128	0.129

Table 2.7 shows that when analysing changes in the number of listings using a difference-in-differences setup (column I), there is a significant increase in the post-reform period. Using the triple difference setup (column II), however, this effect disappears for the triple interaction term, confirming that the increase in SME listings observed is more likely to have been caused by the COVID-19 crisis than the reform. There appears to be no effect on proceeds raised in either specification (columns II and IV). Given these weak findings, we refrain from conducting more granular analyses that decompose listings by type and market.

The triple difference estimation provides insights on potential spillover effects to non-SMEs in the treatment state (i.e., where $EU = 1$) in the post-reform period (Olden and Møen, 2022). The applicable coefficient $EU \times Post$ lacks significance, suggesting the absence of such an effect. Looking at pre-treatment SME activity

($SME \times EU$), while there appear to be significantly more listings in the EU than the US, they raise lower proceeds.

Overall, these findings do not suggest that the reform achieved its goal of inducing more SMEs to go public. The increase in SME listings that is observable is likely to be attributable to the COVID-19 crisis. Furthermore, in their analysis of the JOBS Act on listings activity of targeted firms, the effect documented by Dambra et al. (2015) seems to be immediate, making it unlikely for the reform's effect to have been delayed in the first place. As the Prospectus Regulation is based solely on de-burdening provisions, this supports Dambra et al. (2015)'s attribution of the observed impact to the de-risking provisions of the act. For the SME Listing Act Proposal, this leaves a rather uncertain outlook. Given that it seeks to expand de-burdening provisions further without addressing risk aspects of the IPO process, little impact on SME listings activity is to be expected.

2.6 Conclusion

This paper analysed the economic consequences of a simplified listing prospectus for SMEs, the EU growth prospectus, introduced with the Prospectus Regulation (EU) 2017/1129. For this purpose, we hand-collected a broad database of 1,256 initial offerings taking place at 8 different EU exchanges over the period from 2016 to 2022. 905 of these IPOs were MTF-based, indicating a surprisingly active EU IPO market outside the spotlight of regulated market IPOs.

Our analysis shows that the EU growth prospectus has, in some respects, achieved its goal of de-burdening and streamlining SME IPOs without jeopardising investor protection. We show that EU growth prospectuses are less complex in terms of word counts than full prospectuses. At the same time, we do not find evidence that they are less informative. We show SMEs to be likely to use the EU growth prospectus when filing for an IPO unless the IPO becomes relatively large. Regarding listing

expenses, we find statistically but not economically significant differences between the EU growth prospectus, full prospectuses, and admission documents.

Despite the fact that the EU growth prospectus might have delivered in terms of de-burdening and streamlining SME IPOs, it has not led to a significant increase in IPOs of these companies. This is at least true if we compare EU IPO activity before and after the introduction of the EU growth prospectus with US IPO activity. If we compare IPO activity within the EU, we find some evidence for increased activity. However, this outcome is likely biased by the COVID-19 crisis.

Based on these results it might well be possible to extend the successful aspects of de-burdening prospectuses to IPOs targeting regulated markets. There might also be room for further streamlining prospectuses for SMEs. In this respect, the recently published Listing Act proposal by the Commission is headed in the right direction. However, according to our analysis, a question mark has to be put on the presumption that the decline in IPO activity experienced in Western countries over the last 20 years is a direct consequence of regulatory complexity. In fact, by using the EU growth prospectus as a regulatory experiment we cannot corroborate this regulatory overreach hypothesis. Actually, the Prospectus Regulation was neither successful in reducing the listing expenses nor in increasing the number of IPOs. Hence, while de-burdening and streamlining IPO prospectuses is an important goal, the impact especially on listing activity should not be overestimated.

3

The Employee Poison Pill: Evidence on the Entrenchment Effect of Employee Ownership from IPO Underpricing

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Abstract

This study contributes to employee ownership (EO) takeover deterrence literature by utilising IPOs, when firms' ownership structures are first vulnerable to significant changes, as a novel setting. Using entrenchment theory, whereby firms deliberately underprice their IPOs to reduce takeover threats and achieve more dispersed ownership, I argue that EO and IPO underpricing are means to the same end, though underpricing represents a cost to the firm in the form of money left 'on the table'. With a dataset of European firms, I show that firms with pre-IPO broad-based EO experience 1.8 percentage points lower IPO underpricing. I explore entrenchment motives as a driver of this finding by analysing the resulting ownership dispersion. I find that EO has a direct negative effect on ownership concentration. I offer two channels for this finding. First, large EO shareholdings could limit the number of shares available to outsiders. Second, investors could anticipate the lower takeover probability of EO firms and take stakes accordingly. There is weak evidence suggesting that EO firms achieve more dispersed ownership at lower levels of underpricing, though the effect diminishes with increasing underpricing.

3.1 Introduction

The adoption of employee ownership (EO) schemes in Europe has seen a steady rise, with almost 50 % of listed companies offering share plans to all employees (EFES, 2023). EO can serve to align the interests of workers with those of shareholders and foster worker incentives (e.g., Chang, 1990; Kim and Ouimet, 2014), which has been shown to effect greater employment stability, reduced voluntary turnover, and increased ROE (Blasi et al., 2016; Kurtulus and Kruse, 2018). However, there is a duality of motives of EO adoption, which can also be used as a tool of managerial entrenchment, using employees to serve as friendly investors without taking control (Chang, 1990; Hellwig, 1998; Pagano and Volpin, 2005). This aspect of EO is well-documented in literature, with defensive EO being associated with negative share price reactions and evidence of EO being strategically structured to deter takeovers (Chang, 1990; Gordon and Pound, 1990; Chaplinsky and Niehaus, 1994; Dhillon and Ramírez, 1994; Beatty, 1995; Rauh, 2006). Indeed, Chaplinsky and Niehaus (1994) find a strong association of EO with reduced takeover likelihood exceeding the effect of poison pills.

While prior research has focussed on established listed companies, takeover concerns are already prevalent when a firm first formally ventures into separate ownership and control within its IPO (Field and Karpoff, 2002). IPO underpricing has been proposed to facilitate more dispersed post-IPO ownership (Booth and Chua, 1996), which Brennan and Franks (1997) attribute to managerial entrenchment motives within their *reduced monitoring hypothesis*. I argue that this hypothesis can be extended to more general entrenchment motives relating to takeover prevention; when ownership is dispersed, it is not profitable for individual shareholders to accumulate blockholdings. Instead, blockholdings are passed on from prior blockholders. Hence, they are not only related to monitoring concerns but can also facilitate changes in control and raise a firm's likelihood of becoming a takeover

target (Shleifer and Vishny, 1986; Boulton et al., 2010).

Both EO and IPO underpricing are therefore forms of entrenchment, though IPO underpricing is an indirect cost to the firm in the form of foregone proceeds that represent money left 'on the table'. Consequently, this study empirically examines how EO affects IPO underpricing. I hypothesise that EO is a substitute to costly, entrenchment-related IPO underpricing. Given the change of ownership occurring at the IPO and the possibility of the creation of blockholdings that could present a future takeover risk, I argue that IPOs are viable avenues for examining the strategic effectiveness of EO. At the same time, the interrelation and potential substitution of EO and IPO underpricing can provide further evidence on entrenchment theory of underpricing. In this regard, this study is similar to Smart and Zutter (2003), who argue the substitutability of IPO underpricing and dual-class shares, showing that dual-class firms have lower underpricing which they attribute to effectively secured corporate control.

Using a sample of 928 European firms going public from 1993 to 2019, 32.2 % of which have pre-IPO broad-based EO, I corroborate that EO firms experience 1.8 percentage points lower underpricing. This result supports the findings of Smart and Zutter (2003) for dual-class firms. Furthermore, in recognition of Aruğaslan et al.'s (2004) critique that reduced underpricing of dual-class firms is spuriously driven by their larger size and associated reduced uncertainty, I conduct a battery of robustness tests related to firm size. The effect remains robust to various firm size proxies and a size-matched sample specification. I consider alternative explanations related to more fundamental differences between EO and non-EO firms, none of which overturn the baseline result.

Therefore, I proceed to explore entrenchment motives as a mechanism for this result. Post-IPO ownership dispersion can provide an indication as to how EO entrenches firms. On the one hand, given EO firms underprice less and therefore ration their shares to a lesser extent, they could incur more concentrated ownership.

This corresponds to the mechanism proposed by Smart and Zutter (2003) for dual-class firms, which effectively secure voting control, rendering blockholdings in shares with inferior voting rights less relevant both in terms of monitoring and takeover risk. More concentrated ownership would result for EO firms that experience lower underpricing if EO has no direct effect on ownership. This would consequently suggest that blockholdings are less relevant to EO firms, potentially because the takeover deterring effect of EO exceeds the takeover facilitation of blocks. However, blockholdings remain relevant in terms of monitoring, which would be inconsistent with the reduced monitoring hypothesis. On the other hand, if EO firms achieve more dispersed post-IPO ownership, EO must have a direct effect on ownership. This would suggest that EO and underpricing are substitutes for achieving ownership dispersion.

Using hand-collected ownership data, I find evidence of such a direct effect of EO on ownership dispersion. EO firms are shown to have lower total blockholdings and a reduced size of the largest blockholding. These measures are relevant in terms of joint monitoring ability and monitoring incentive (Aruğaslan et al., 2004). Furthermore, smaller blockholdings impede takeovers. I offer two channels to explain this finding. First, larger EO shareholdings could limit the number of shares available to outsiders. Second, EO's distinction as a strong takeover deterrent could signal reduced takeover likelihood to investors, resulting in institutional shareholders taking lower stakes in line with Anderson et al.'s (2017) *M&A anticipation hypothesis*.

I provide weak empirical evidence for a direct substitution of IPO underpricing with EO. While EO firms are shown to achieve more dispersed ownership at mean underpricing, evidence that this effect persists at every level of underpricing is not robust. There is some indication that EO firms achieve more dispersed ownership at lower levels of underpricing, notably also when the firm is overpriced. At high levels of underpricing, EO and non-EO firms are indistinguishable in terms of ownership dispersion. This could suggest a diminishing marginal effect of EO.

I contribute to three strands of literature. First, I add to the literature examining EO as an entrenchment mechanism. Several studies confirm that defensive EO adopted in the presence of takeover threats is met by negative share price reactions (e.g., Chang, 1990; Gordon and Pound, 1990; Chaplinsky and Niehaus, 1994; Dhillon and Ramírez, 1994; Beatty, 1995). This mostly corresponds to EO as a *responsive* takeover defence to an immediate threat. By examining EO at the IPO, when takeover threats are unlikely to be imminent, I am able to provide evidence of EO related to *anticipatory* entrenchment (Dann and DeAngelo, 1988; Chang, 1990). Furthermore, the mentioned studies focus on established public firms. In contrast, my study examines how EO impacts a private firm's initial venture into separated ownership and control.

Second, I contribute to the literature on entrenchment theory of IPO underpricing. To this end, I extend Brennan and Franks (1997)'s reduced monitoring hypothesis to include entrenchment motives more generally, as more dispersed ownership is not only relevant to monitoring but also to takeover likelihood (Shleifer and Vishny, 1986; Boulton et al., 2010). Past research on entrenchment attempts during the IPO process uses dual-class share structures as the main explanatory variable (Smart and Zutter, 2003; Boulton et al., 2010), given their ability to transfer control rights to insiders. EO works in a similar but not identical manner. Blockholdings in shares with inferior voting rights are irrelevant to dual-class firms both in terms of monitoring and takeover likelihood. While it is conceivable that the takeover deterring effect of EO exceeds the takeover facilitation of blocks, any blockholdings will remain relevant in terms of monitoring. Unlike Smart and Zutter (2003), I consider the possibility of a direct effect of EO on ownership dispersion as well as the interaction effect of EO and underpricing. Examining entrenchment motives using EO is also relevant given concerns of dual-class shares being a spurious proxy that is more closely related to firm size (Aruğaslan et al., 2004).

This is closely related to a third strand of literature relating perceived takeover

likelihood at the IPO to resulting underpricing and ownership dispersion. Boulton et al. (2010) find that pre-IPO M&A activity is related to higher underpricing, though this relation disappears when looking at effectively entrenched firms, indicated by dual-class shares. I use EO as a further measure of entrenchment. Furthermore, the M&A anticipation hypothesis asserts investors' ability to use public information to anticipate an IPO firm's takeover likelihood (Anderson et al., 2017). I use this conjecture as a potential channel for a direct effect of EO on ownership.

The remainder of this paper is structured as follows. Section 3.2 reviews related literature and formulates expectations. In Section 3.3, I provide details on my sample and variables as well as outlining the empirical strategy. Section 3.4.1 presents analyses on the effect of EO on IPO underpricing. Section 3.4.2 explores entrenchment motives as a driver of these results, using evidence from ownership dispersion. Section 3.5 concludes.

3.2 Literature review and hypotheses

3.2.1 Entrenchment effects of EO

There is a duality of motives driving the adoption of EO, separated into what Hollandts et al. (2019) refer to as a *bright* and a *dark side*. On the bright side, EO can serve to align the interests of workers with those of shareholders and foster worker incentives (e.g., Chang, 1990; Kim and Ouimet, 2014), which has been shown to have positive effects in terms of greater employment stability (Kurtulus and Kruse, 2018), reduced voluntary turnover, and increased ROE (Blasi et al., 2016). In terms of productivity and performance gains, evidence is mixed and dependent on the structure of the EO plan. Kim and Ouimet (2014) find that employee stock ownership plans (ESOPs) enhance productivity and growth unless the number of employees gets too large, resulting in free-riding. Similarly, Blasi et al. (1996) provide evidence that EO-related performance gains are more pronounced at smaller firms.

Other studies question the efficacy of EO altogether and outline adverse effects that may occur even when EO is adopted with bright side intentions. Jensen and Meckling (1979) argue that EO entrenches workers and enables them to deviate from value maximisation. Faleye et al. (2006) describe this deviation as rational, given that employees derive utility from higher expected wages and are less concerned with cash flows beyond the minimum amount required to prevent wage or job cuts. They validate this empirically in terms of EO firms taking fewer risks, growing more slowly, and exhibiting lower levels of productivity. Overall, this suggests that there are nuances to EO: not all EO is created equal, nor is all EO value enhancing.

On the dark side, EO is adopted as a tool of managerial entrenchment. This can range from managers using EO to facilitate their own control and reduce risk to the use of EO as a takeover defence. Examining what Hellwig (1998) refers to as the 'natural alliance' of workers and managers, Pagano and Volpin (2005) argue that faced with a takeover threat, workers prefer incumbent management to potential wage cuts and monitoring by an outsider. Managers can increase employees' incentives to oppose takeovers by offering higher wages and longer-term contracts. By using an ESOP, employees can be given an active role opposing a takeover.[1] Indeed, Chaplinsky and Niehaus (1994) confirm ESOPs to be more effective takeover deterrents than poison pills and legal action. Rauh (2006) shows that the proportion of shares dedicated to an ESOP is positively related to the firm's perceived takeover likelihood.

Various studies address the duality of EO and attempt to disentangle its bright and dark sides. Generally, shareholders view takeover defences negatively because they can prevent value-enhancing takeovers (Dann and DeAngelo, 1988). Similarly, when ESOPs are adopted in the face of an explicit takeover threat, they are perceived as defensive and met by negative share price reactions (Chang, 1990; Gordon and

[1]Chang (1990) highlights the similarity of ESOPs used as a takeover defence to the 'white knight' defence, where a friendly acquirer is sought to purchase the company given an imminent unfriendly bid. Pagano and Volpin (2005) qualify this term, referring to defensive ESOPs as 'white squires' because employees serve as friendly investors without taking control.

Pound, 1990; Dhillon and Ramírez, 1994). The magnitude of negative share price reaction to ESOP announcements depends on takeover probability and the ESOP's perceived deterrence effectiveness (Chaplinsky and Niehaus, 1994; Beatty, 1995).

Nevertheless, defensive EO need not be value destroying if it results in an acquisition at a higher price. In fact, shareholders can benefit from higher returns when a company with such a scheme is acquired because employees have higher reservation prices when considering selling their shares to a bidder (Chaplinsky and Niehaus, 1994). Chang (1990) calls this the *stockholder interests hypothesis*: the bid price obtained in the presence of an ESOP is higher than the price uninformed outside shareholders would demand because the bidder has to negotiate with management. Furthermore, in the presence of an ESOP, more shares have to be purchased by a hostile bidder to secure control of the target firm. Assuming an upward-sloping supply curve of shares, this results in a higher bid price (Chang and Mayers, 1992).

Evidence for higher takeover premiums earned by EO firms is, however, limited. While Chaplinsky and Niehaus (1994) confirm acquired EO firms to earn higher returns, this difference is not significant. Furthermore, shareholders expecting higher takeover returns is incompatible with the consistent evidence of negative share price reactions to defensive ESOPs. Therefore, managerial entrenchment motives are more coherent with the adoption of defensive ESOPs.

3.2.2 Entrenchment effects of IPO underpricing

Entrenchment motives have been hypothesised to be one of the many drivers of IPO underpricing, the phenomenon by which firms forego proceeds from selling their shares in primary markets. Booth and Chua (1996) first proposed that underpricing generates excess demand for shares that results in more dispersed post-IPO ownership structure. According to this theory, firms choose the level of post-IPO ownership dispersion and optimum oversubscription per share, rationing shares by inducing an underpricing equilibrium such that proceeds are maximised.

While this mechanism is intuitive, there are multiple reasons why a firm would prefer more dispersed ownership. Booth and Chua (1996) attribute this to a firm's desire for improved liquidity, which lowers its cost of capital and could also be related to control considerations. Brennan and Franks (1997) provide another intuition with the *reduced monitoring hypothesis*, whereby more dispersed ownership reduces blockholdings and hence monitoring, entrenching managers. Field and Karpoff (2002) confirm the relevance of control issues at the IPO and find the use of takeover defences to be consistent with the rationales proposed by the reduced monitoring hypothesis. This suggests that the hypothesis can be extended to include takeover prevention and therefore entrenchment motives more generally.

Blockholdings are not only related to monitoring but also to a firm's likelihood of becoming a takeover target. When ownership is dispersed, it is not profitable for individual shareholders to accumulate a blockholding. Instead, blockholdings are passed on from prior blockholders (Shleifer and Vishny, 1986). Therefore, blockholdings can facilitate takeovers, which provides support to the notion that dispersed ownership achieved through underpricing can be driven by takeover-prevention motives (Boulton et al., 2010).

Furthermore, Zingales (1995) theorises that the IPO is the first step towards the eventual sale of a firm. Managers underprice in the first step to maximise ownership dispersion and hence returns obtained from a sale of the firm in a second step. This provides another mechanism by which takeover-related concerns are relevant at the IPO.

3.2.3 Hypotheses

To a certain degree, IPO underpricing is desirable (i.e., 'leaving a good taste in investors' mouths', Ibbotson, 1975), though excessive underpricing is an indirect cost to the firm because it represents money left 'on the table'. Reconciling the entrenchment motives inherent to both EO and IPO underpricing, EO could be a argued

to be a more cost-efficient means to the same end. Therefore, I hypothesise that EO mitigates the need for entrenchment-related IPO underpricing. Examining this hypothesis provides a new avenue within which to examine entrenchment motives of EO beyond the existing evidence based on public firms. Furthermore, it contributes to entrenchment theory of undepricing.

Section 3.2.1 highlighted that most studies analyse the entrenchment effect of EO by focusing on share price reactions to ESOP announcements or utilising changes in takeover legislation. Furthermore, they are based on established public companies and mostly focus on EO as a *responsive* takeover defence to an immediate threat. I seek to further explore this effect in the thus far unexplored setting of IPOs. This enables me to infer how EO affects a private firm's initial exposure to separate ownership and control. Given the change of ownership structure occurring at the IPO and the possibility of the creation of blockholdings that could present a future takeover risk, IPOs are further viable avenues for examining the strategic effectiveness of EO. Moreover, takeover threats are unlikely to be imminent at the IPO, allowing me to provide evidence of EO related to *anticipatory* entrenchment (Dann and DeAngelo, 1988; Chang, 1990).

My approach is similar to a study conducted by Smart and Zutter (2003), who find that firms with dual-class shares underprice less because voting control remains with managers. Here, dual-class share structures serve as a proxy for effectively secured corporate control. Smart and Zutter (2003) show that dual-class firms underprice less and therefore have more concentrated post-IPO ownership. Nevertheless, they are less likely to be acquired. The presence of blockholders in shares with inferior voting rights is irrelevant to these firms.

However, Aruğaslan et al. (2004) raise several concerns regarding Smart and Zutter's (2003) findings. They show that dual-class firms underprice less because they are larger and hence have lower uncertainty, therefore the presence of dual-class shares is a spurious measure of entrenchment. Furthermore, they contend that it is

also size driving the observed, more concentrated ownership.

I argue that EO may be better suited to examining entrenchment theory of underpricing. Unlike dual-class shares, where shares with inferior voting rights are allocated in the IPO, rendering outside blocks irrelevant to monitoring and takeover concerns, any blocks in the post-IPO ownership structure of EO firms remain pertinent in these regards. Furthermore, even if blockholdings in inferior voting rights are ineffective at monitoring, they may still facilitate takeovers to a certain degree (Shleifer and Vishny, 1986).

If EO firms do indeed underprice less, the effect on the resulting ownership dispersion is unclear, making it instructive to analyse. On the one hand, similar to the mechanism proposed by Smart and Zutter (2003), if EO firms do not underprice to ration their shares, they could incur more concentrated post-IPO ownership. This would indicate that there is no direct effect of EO on blockholdings. Moreover, it would suggest that blockholdings are less relevant to EO firms, potentially because the takeover deterring effect of EO exceeds the takeover facilitation of blocks. It could also be in line with Zingales's (1995) theory of higher ownership dispersion maximising the eventual sale price of the firm. Given employees' higher reservation price in a takeover (Chaplinsky and Niehaus, 1994), the need for an otherwise dispersed ownership base may be diminished. Nevertheless, more concentrated ownership remains relevant in terms of monitoring, which is inconsistent with the reduced monitoring hypothesis. This would imply that entrenchment motives of underpricing are aimed at takeover deterrence but not monitoring by outsiders. Moreover, evidence of higher takeover premiums earned by EO firms is limited.

On the other hand, if a more dispersed post-IPO ownership structure is observed for EO firms, then EO must have a direct effect on ownership concentration. This could follow from several mechanisms. If the EO shareholding is large, this reduces the shares available to outsiders. However, this effect would not be limited to EO but apply to large insider shareholdings more generally. Instead, more dispersed

ownership could be driven by a signalling effect. According to the *M&A anticipation hypothesis* proposed by Anderson et al. (2017), institutional shareholders can use public information to predict a firm's likelihood in becoming a takeover target, where likely targets attract more concentrated ownership. Given that EO is a takeover deterrent, the presence of EO could therefore signal a reduced target likelihood, resulting in lower blockholder ownership.

Overall, the analysis of the resulting post-IPO ownership structure of EO firms can provide further insight into the mechanisms by which EO leads to entrenchment. I treat this analysis as explorative and refrain from formulating an expectation.

It should be noted that the outlined effects on underpricing and ownership concentration are expected to occur only for *broad-based* EO, i.e. such EO that is accessible to all employees, not just executives. First, such EO is expected to make up a larger block of a firm's shares, making it more effective at deterring takeovers (Kim and Ouimet, 2014). Second, prior studies fail to find a relation between executive-only EO and underpricing (Lowry and Murphy, 2007; Fu et al., 2015). Rather than having an entrenching effect, such executive-only EO substitutes the dilution of insider ownership occurring at the IPO. Furthermore, executives may have an incentive to underprice more in order to render stock options tied to the IPO offer price in-the-money.

3.3 Method

3.3.1 Data and Sample

Data on employee ownership is provided by the European Federation of Employee Share Ownership (EFES), entailing detailed information on listed European firms with a market capitalisation of at least 200 thousand Euros. The EFES data is provided as a panel from 2005-2019 and is based on financial statement disclosures. The date of the first EO plan is also provided. Descriptions of the history of EO

for each firm allow me to derive the type of EO the first plan corresponds to, and more importantly whether this plan was open to all employees (i.e., whether it was *broad-based*).

Data on each firm's IPO is taken from the Securities Data Company (SDC) Platinum's *New Issues* database. To calculate underpricing and corroborate SDC data, I use stock market data from Datastream. I identify the first closing price with a positive trading volume in Datastream. Frequently, this price will be preceded by another price that has no associated trading volume. In most cases, this price corresponds to the offer price set by the firm for its IPO. If the offer price in Datastream is missing or differs from the offer price reported in SDC, I manually confirm both the offer price and first closing price using LexisNexis. If the thus obtained offer price does not correspond to SDC, I exclude the entry as I cannot confirm the data's accuracy.

I supplement this data with financial accounting data from the Worldscope database. Further control variables are provided by SDC itself, though they were frequently unavailable. Therefore, relevant data was taken directly from prospectuses, firm annual reports, and LexisNexis, where available. Full controls were finally available for 928 firms.

Ownership data is hand-collected from prospectuses, annual reports, and company websites (where absent from annual reports). I use the first annual report following the IPO. In this manner, I am able to track pre and post-IPO blockholders, allowing me to determine which new blockholders enter a firm. This data is available for 834 firms.

3.3.2 Measures

Following prior underpricing literature, underpricing is measured as the discrete percent change between the IPO offer price and first closing price of firm i:

$$Underpricing_i = \frac{First\ closing\ price_i - Offer\ price_i}{Offer\ price_i}$$

The main explanatory variable intends to provide information on the presence of EO at the time of the IPO. To identify the impact of different types of EO, multiple operationalisations are used. The simplest variable is a dummy equal to 1 if the firm had any type of EO involving equity participation prior to its IPO.[2] However, EO can be set up to include only executive employees. Fu et al. (2015) show that such EO serves as a substitute for diluted insider ownership but is not in line with entrenchment theory or associated with underpricing. Therefore, the second and main specification of a dummy variable of EO takes on the value of 1 only when *broad-based* EO was present prior to the IPO, meaning that all employees are included.

Various control variables are introduced, informed by prior work on IPO underpricing. The first confounding construct I control for is the fundamental uncertainty investors have regarding a firm's value once it becomes public, known as ex-ante uncertainty (Ritter, 1984; Beatty and Ritter, 1986). Various proxies operationalising this construct have been proposed. Established firms with more operating history are expected to face lower uncertainty than younger firms, hence firm age is a viable control (Ritter, 1984). However, this operationalisation disregards volatility inherent to a firm's business model. A better measure of ex-ante uncertainty is

[2]The type of EO used must involve employees directly or indirectly owning company shares, as no entrenchment effect is to be expected otherwise. For example, profit sharing, where employees participate in firm profits without becoming owners, is insufficient, as there are no ownership-associated governance benefits for employees. EO schemes that do render employees owners include share awards, employee stock options (ESOs), employee stock purchase programmes (ESPPs), and employee share ownership plans (ESOPs). There is usually a vesting period involved with these types of ownership.

given by firm sales, which Ritter (1984) also found to be a measure of asymmetric information risk.[3] Still, sales are also influenced by macroeconomic conditions. Although gross proceeds of an issue were frequently used as a proxy in the past, Habib and Ljungqvist (1998) argue that these are related to underpricing due to dilution, regardless of uncertainty. I measure ex-ante uncertainty using total assets and consider alternatives in robustness tests.

The valuation of an issuing firm may be subject to information spillovers from companies in the same industry. The performance of a given firm's industry may alter its perceived prospects. I control for this using the prior 30-day return of an issuing firm's industry, determined using the Fama-French 48 industry classification (Ljungqvist and Wilhelm, 2003; Edelen and Kadlec, 2005). The return of each industry portfolio is taken from Kenneth French.

Depending on how many shares a firm offers in its IPO, pre-issue shares held by insiders are diluted. Loughran and Ritter (2002) show that this dilution is offset by wealth gains experienced by insiders retaining pre-issue shares, caused by underpricing and positive offer price revisions. This holds unless the number of shares offered is critically larger than the pre-issue shares retained. Therefore, the greater the ratio of shares retained to shares offered (i.e. the *overhang*), the lower the dilution and the greater the wealth gain incurred by insiders due to underpricing. This leads to the expectation that IPOs with higher overhang face lower underpricing costs and are more likely to be subject to underpricing (Bradley and Jordan, 2002; Lowry and Murphy, 2007). Overhang is therefore included as a control variable.

In order to further address information asymmetry, dummy variables indicating whether the IPO firm has venture capital (VC) backing, was previously subject to a leveraged buyout (LBO), or is being carved out are implemented. Reverse LBO or carve-out firms are expected to have more public information available, lowering uncertainty and hence underpricing (Schipper and Smith, 1986; Muscarella

[3] The asymmetric information model proposed by Rock (1986) theorises that firms underprice their issues to keep uninformed investors in the market.

and Vetsuypens, 1989). VC-backed IPOs have been found to face lower underpricing due to certification and monitoring by the venture capitalist (Barry et al., 1990; Megginson and Weiss, 1991). However, underpricing could also be higher due to grandstanding by the venture capitalist (Lee and Wahal, 2004). Due to the potential influence of VC-backing, it is included as a control.

During the offer period, information acquired from investors can be used to adjust the offer price. According to Benveniste and Spindt (1989), however, this adjustment is only partial in order to retain investors' incentive to disclose their private information. Hanley (1993) examines this empirically, confirming that the revelation of positive information results in greater underpricing. Following Hanley (1993), I measure the impact of private investor information using the percent difference between the offer price and the mean of the indicative price range, which was hand-collected from prospectuses or taken from SDC. Offers without price ranges are assumed to be fixed price offerings, which is captured by a separate indicator variable.

To measure the level of post-IPO ownership dispersion, I hand-collect the proportion of shares held by outside shareholders (or blockholders) holding at least 5 % as indicated on the first annual report following the IPO. Following Field and Sheehan (2004), I define outside shareholders as those shareholders who are not employed by the firm and exclude holding companies. I also compute the proportion of shares held by the largest blockholder as well as the number of blockholders.

Control variables influencing a firm's ownership dispersion are less well defined in literature than those for underpricing, though there is some overlap. As in Demsetz and Lehn (1985), I introduce controls for firm size (measured by pre-IPO total assets) and firm volatility (volatility of returns in the year after the IPO). The debt ratio is also expected to influence ownership, as are the previously introduced dummies for VC-backing, reverse LBOs, and carve-outs. I use tangibility, which is the ratio of fixed assets (i.e., property, plant, and equipment) to total assets, as a control

for agency costs (Field and Sheehan, 2004). Overhang is also relevant, as a higher retention of shares could reflect the intention to maintain control of the firm or, if induced by a lock-up period, facilitate the entry of a new blockholder if pre-IPO shareholders such as VC or private equity (PE) firms are seeking to exit the firm (Anderson et al., 2017).

All continuous variables are winsorised at the 1st and 99th percentiles. Table C.1 provides an overview of all variables.

3.3.3 Empirical Strategy

To ascertain the impact of employee ownership on IPO underpricing, OLS regressions of the following form are used:[4]

$$Underpricing_{i,j,k,t} = \beta_0 + \beta_1 EO_i + \vec{v}\vec{X}_{i,j,k,t} + \delta_j + \kappa_k + \tau_t + \epsilon_{i,j,k,t}, \tag{3.1}$$

where the indices i, j, k, and t refer to firm, industry, country, and year (of the IPO), respectively. Industries are defined using the Fama-French 12-industries classification. *EO* describes the measure of employee ownership and $\vec{X}$ is a vector of control variables (see Section 3.3.2). δ_j, κ_k, and τ_t control for industry, country, and year fixed effects, respectively. As previous studies show potential correlation within industries during 'hot issues' markets, I cluster the error term by industry and year.

The direct effect of pre-IPO broad-based EO on ownership dispersion is analysed using the following model:

$$Ownership_{i,j,k,t+1} = \beta_0 + \beta_1 EO_i + \vec{v}\vec{X}_{i,j,k,t} + \delta_j + \kappa_k + \tau_t + \epsilon_{i,j,k,t}, \tag{3.2}$$

[4] Table C.1 provides an overview of all variables.

and the interaction effect of EO and underpricing is analysed as follows:

$$Ownership_{i,j,k,t+1} = \beta_0 + \beta_1 EO_i + \beta_2 Underpricing_i + \beta_1 EO_i \times Underpricing_i + \vec{v}\vec{X}_{i,j,k,t} + \delta_j + \kappa_k + \tau_t + \epsilon_{i,j,k,t}, \tag{3.3}$$

where *Ownership* refers to the measure of post-IPO blockholder ownership derived from the first annual report following the IPO. *EO* is an indicator variable reflecting the presence of pre-IPO broad-based EO. *Underpricing* is centred about its mean. The error term is clustered at the firm level.

3.3.4 Sample descriptives

Subfigure 3.1a illustrates the distribution of sample IPO firms across European states. The majority of firms is from the United Kingdom, followed by France, Germany, and Italy. The proportion of IPO firms with broad-based IPOs (Subfigure 3.1b) is highest in Finland, Norway, France, and the United Kingdom. Figure 3.2 shows the proportion of EO firms in each industry. More than 30 % of firms in the business equipment, finance, healthcare, and retail industries have broad-based EO prior to their IPO. The non-durables and durables industries have the lowest proportion of EO firms.

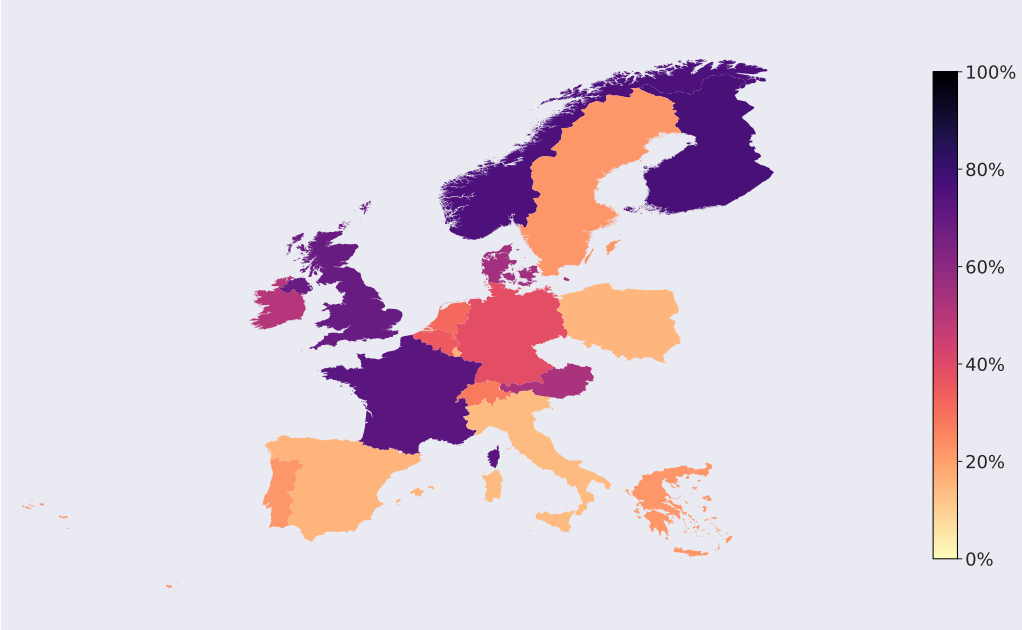
Figure 3.3 presents sample characteristics over the years covered, 1993-2019. Subfigure 3.3a shows the number of IPOs per year. The peaks around 1999 and 2006 are indicative of the 'hot issues' markets leading up to the dotcom and global financial crises. Subfigure 3.3b illustrates the mean annual level of underpricing across the sample. Consistent with Subfigure 3.3a, the highest level of underpricing is discernible around the dotcom bubble period. This highlights the need to control for such market conditions.

Figure 3.4 presents the clustering of IPOs and IPO underpricing to industries and years. Subfigure 3.4a shows the number of IPOs by both year and corresponding

Figure 3.1: Sample distribution by country
This figure shows the distribution of sample firms by country. Subfigure 3.1a presents the number of firms, and Subfigure 3.1b presents the proportion of firms with pre-IPO broad-based IPO by country.

(a) Sample firms by country

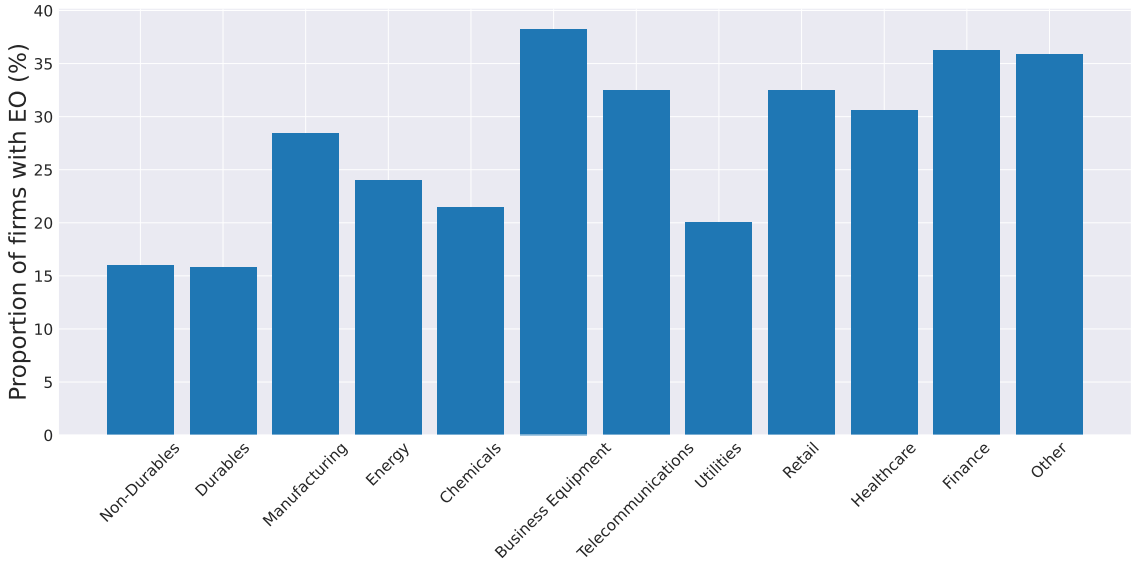
(b) Proportion of sample firms with broad-based EO prior to IPO by country



Fama-French 12 industry. During the dotcom bubble period, a clustering in the business equipment industry is visible. This industry exhibits high overall numbers of IPOs relative to other industries. Subfigure 3.4b illustrates the level of IPO

underpricing in the same categories. Again, the dotcom bubble period emerges as a hot issues period, concentrated in a couple of industries. To mitigate the impact of serial correlation by year and industry, the regression analyses cluster the error term accordingly.

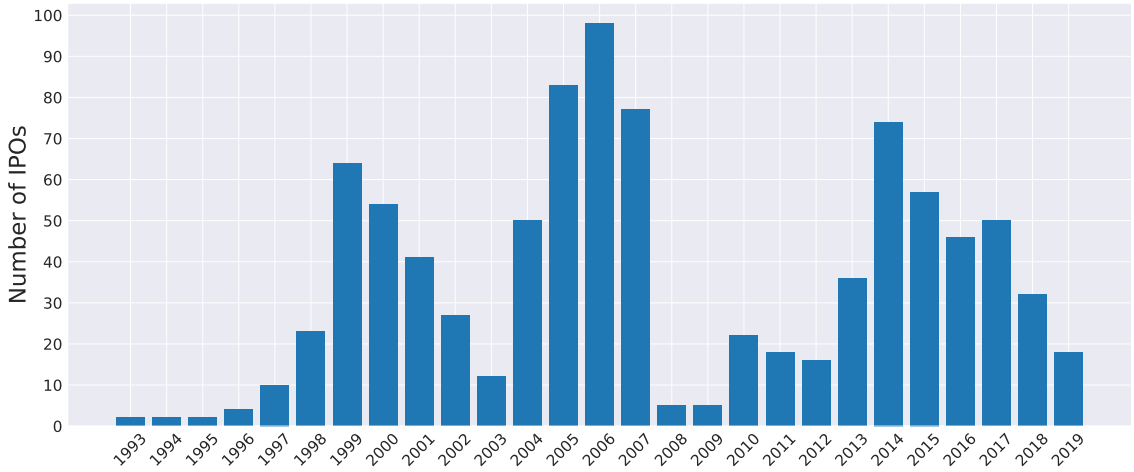
Figure 3.2: EO firms by industry
This figure shows the proportion of firms with pre-IPO broad-based EO in each Fama-French 12 industry.



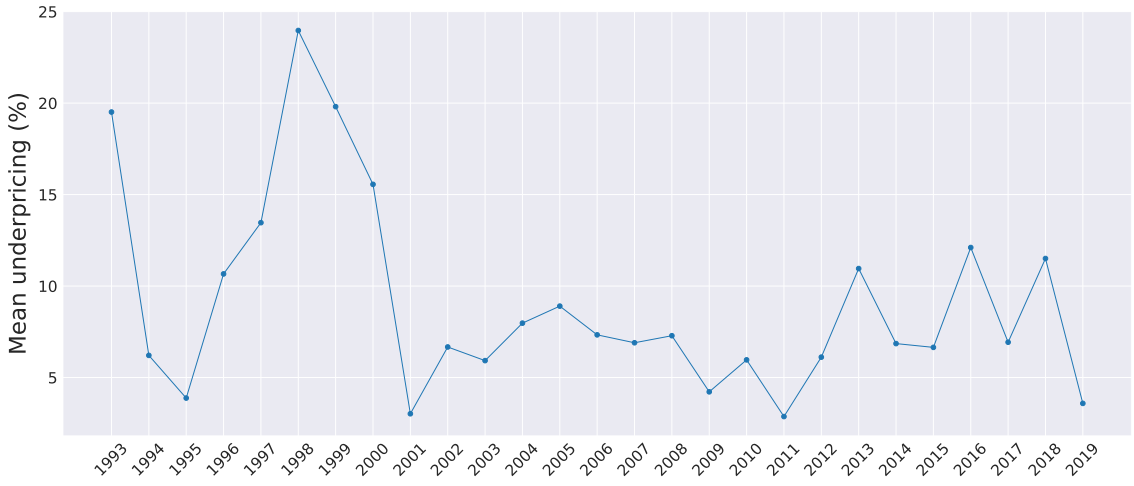
Examining the point in time at which firms introduce their first EO scheme relative to their IPO, Figure 3.5 indicates a clear clustering closer to the IPO. A larger number of EO schemes is introduced prior to than after the IPO. Most frequently, EO is first issued in the same year as the IPO. This could be due to the convenience, given the structural changes taking place at this point in time. However, it could also be a strategic attempt to mitigate takeover concerns arising due to the IPO, consistent with the arguments made previously. Remarkably, the majority of EO plans first issued in the same year but still before the IPO are broad-based. This is consistent with the hypothesised entrenchment effect, which arises only due to broad-based EO. Even though the number of EO plans issued just after the IPO is also high, these are mainly non-inclusive or executive-only plans. Of all plans issued, except for the period at but still prior to the IPO, a greater portion is non-inclusive

Figure 3.3: Sample IPOs over time
This figure illustrates the development of sample IPOs over time. Subfigure 3.3a presents the frequency of sample IPOs for each sample year, 1993-2019. Subfigure 3.3b shows the mean level of IPO underpricing for each sample year.

(a) IPOs by year



(b) Underpricing by year

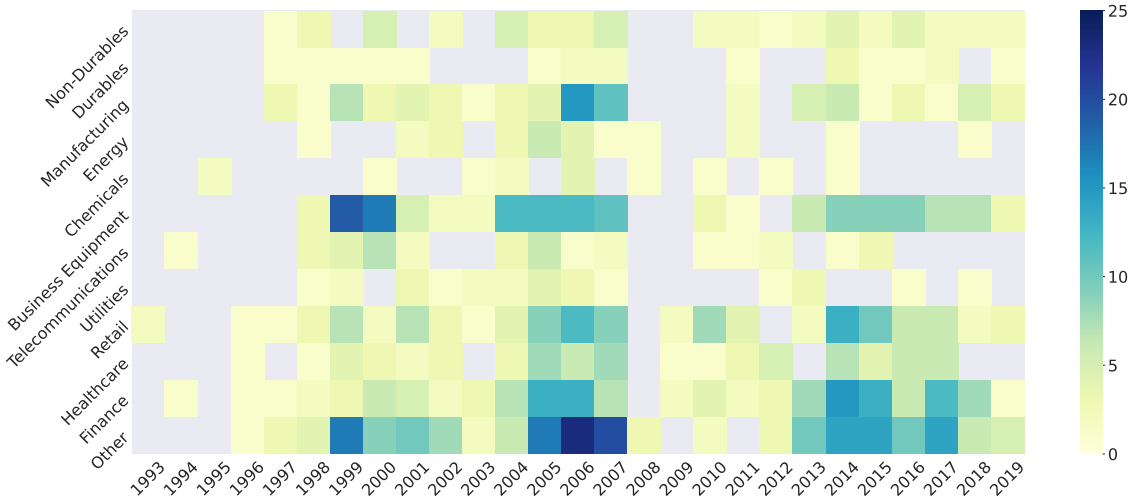


prior to the IPO but broad-based after the IPO.

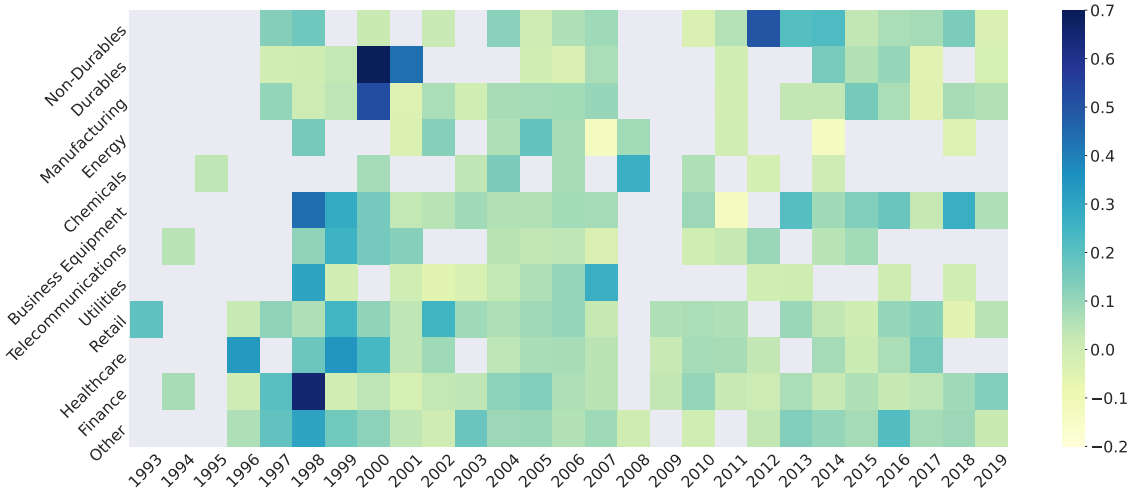
Any discovered effect of EO on underpricing may be spuriously driven by fundamental differences between EO and non-EO firms. Therefore, it is important to understand the characteristics of EO firms at the IPO. Table 3.1 presents univariate comparisons of firm and IPO characteristics across the two firm types. EO firms appear to be robustly larger than non-EO firms at a high level of significance. This is true for various measures of firm size, i.e. total assets, sales, employees, and proceeds raised at the IPO. In terms of total assets, for instance, EO firms have a

Figure 3.4: Sample IPOs over time by industry
This figure presents sample IPOs by year and industry, based on the Fama-French 12 industries specification. Subfigure 3.4a presents the frequency of sample IPOs for each sample year by industry, 1993-2019. Subfigure 3.4b shows the average level of IPO underpricing by industry for each sample year.

(a) IPOs by industry and year



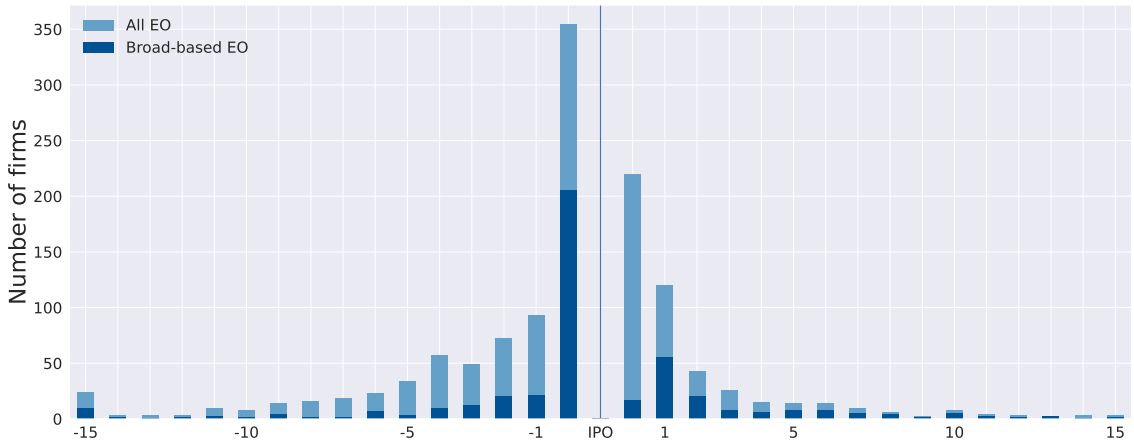
(b) Underpricing by industry and year



(geometric) mean size of €480.55 million ($= e^{6.177} - 1$), while non-EO firms average at €224.65 million ($= e^{5.419} - 1$). Despite having a higher number of employees, the average annual salary is significantly higher at EO firms. This could be in line with entrenchment motives, assuming higher salaries are used to strengthen the worker-manager alliance (Pagano and Volpin, 2005; Kim and Ouimet, 2014).

EO firms do not, however, appear to be more established in terms of age and profitability (ROA). Though they have lower tangibility, this difference is not sig-

Figure 3.5: Introduction of first EO scheme relative to IPO
This figure shows the number of firms introducing their first (broad-based) EO scheme at a given number of years prior to or after their IPOs. For instance, the bar at -1 shows the number of firms introducing EO schemes 1 year before the IPO, while the bar at 1 shows the number of firms doing so 1 year after the IPO. The vertical line represents the time of the IPO. As some firms introduced schemes in the same year as the IPO, the bars immediately to the right and left of IPO refer to schemes introduced less than one year but before and after the IPO, respectively. The rightmost and leftmost columns include observations beyond the indicated axis.



nificant. Capital structure-wise, the debt ratios of the two firm types are highly similar. EO firms are slightly more likely to have VC involvement and be prior LBO firms. Looking at firm valuation in terms of market values obtained after the IPO, EO firms do not differ significantly using either market-to-book (MTB) ratios or Tobin's Q.

At the IPO, the univariate mean difference in underpricing indicates an effect in the hypothesised direction, with EO firms underpricing at 7.0 %, which is significantly lower than the underpricing of non-EO firms at 10.4 %. EO firms raise significantly higher proceeds and sell relatively more secondary shares as indicated by a lower ratio of primary shares. Secondary shares are existing shares, the proceeds of which go directly to the shareholder selling them, not to the firm itself. This is consistent with the higher incidence of VC involvement observed for EO firms. Though not significant, the lower overhang of EO firms indicates that share retention by EO firms is lower, in line with the lower primary ratio. This could be indicative of effective entrenchment if EO reduces the need to retain shares.

Table 3.1: Univariate sample analysis
This table provides mean comparisons for various firm and IPO characteristics across the two groups of broad-based EO and non-EO firms. A t-test comparing equivalence of sample means is conducted using Huber/White robust standard errors. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1.

	EO firms		Non-EO firms		Difference	
	N	Mean	N	Mean	Mean	t-stat
Firm characteristics pre-IPO						
Log of firm age	299	2.817	629	2.714	0.103	1.241
Log of total assets	299	6.177	629	5.419	0.758***	4.945
Log of sales	299	5.697	629	4.973	0.724***	4.675
Log of employees	297	7.071	595	6.572	0.499***	3.692
Log of average salary	252	11.170	511	11.007	0.163***	3.485
ROA	299	0.031	622	0.030	0.001	0.125
Tangibility	297	0.191	624	0.215	-0.024	-1.492
Debt ratio	297	0.341	628	0.317	0.024	1.021
VC indicator	299	0.147	629	0.107	0.041*	1.699
Reverse-LBO indicator	299	0.237	629	0.170	0.067**	2.335
Carve-out indicator	299	0.284	629	0.242	0.043	1.366
Firm characteristics post-IPO						
MTB	296	4.779	616	4.635	0.145	0.374
Tobin's Q	296	2.639	616	2.816	-0.177	-1.040
IPO characteristics						
Underpricing	299	0.070	629	0.104	-0.034***	-3.463
Log of proceeds	299	5.523	629	5.009	0.514***	5.124
Primary ratio	299	0.448	629	0.533	-0.086***	-3.185
Overhang	299	2.445	629	2.640	-0.195	-1.186
Offer price revision	299	-0.014	629	-0.013	-0.001	-0.159
Fixed price indicator	299	0.204	629	0.253	-0.049*	-1.677

3.4 Results

3.4.1 The effect of broad-based EO on IPO underpricing

Table 3.2 shows results of the baseline regressions examining the impact of EO on IPO underpricing. Without controls (column I), firms with pre-IPO broad-based EO face substantially reduced underpricing by 3.1 percentage points. By including ex-ante uncertainty and market-based controls (column II), the effect is attenuated to a decrease by 1.9 percentage points but remains marginally robust. Notably, this specification controls for firm size using total assets, which was shown to be higher for EO firms (see Table 3.1). The coefficient on this variable is negative and highly significant, as expected, indicating that larger firms face lower uncertainty that must

be compensated through underpricing.

Table 3.2: EO and IPO underpricing
This table presents OLS regression estimates of underpricing given the presence of broad-based EO. The dependent variable (*Underpricing*) measures the percent difference between a firm's first closing price and its offer price. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. Huber/White robust standard errors clustered by industry and year are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1. Descriptive statistics are shown by Panel A of Table C.2.

	(I)	(II)	(III)
	Underpricing	Underpricing	Underpricing
EO: BB	**-0.031*** **	**-0.019***	**-0.018****
	(0.010)	**(0.010)**	**(0.009)**
Log of total assets		-0.010***	-0.006**
		(0.003)	(0.003)
30-day industry return		0.278**	0.159
		(0.119)	(0.107)
Overhang		0.004	0.003
		(0.003)	(0.003)
VC indicator		0.013	0.020
		(0.017)	(0.017)
Reverse-LBO indicator		-0.018	-0.005
		(0.012)	(0.011)
Carve-out indicator		-0.008	0.001
		(0.013)	(0.012)
Offer price revision			0.610***
			(0.067)
Fixed price indicator			0.033**
			(0.015)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	928	928	928
Adj. R^2	0.103	0.127	0.215

In column III, when full controls are introduced, the EO coefficient remains robust at 1.8 percentage points lower underpricing. Overall, a robust negative impact of broad-based EO in line with the hypothesised impact is therefore discernible. The direction of the coefficients of the control variables are as expected, though in the base specification (column II) only total assets and industry returns have significant impact. The offer price revision variable included in column III is highly significant and has the expected sign.

To ascertain whether executive-only EO has a similar effect, I repeat the baseline analyses of Table 3.2 using only the control group. Now, the treatment variable

Table 3.3: Executive-only EO and IPO underpricing
This table presents OLS regression estimates of underpricing given the presence of executive-only EO. The dependent variable (*Underpricing*) measures the percent difference between a firm's first closing price and its offer price. *EO: exec-only* is a dummy indicating the presence of executive-only EO prior to the IPO, i.e. those firms that constitute the control group of the analyses conducted in Table 3.2. Huber/White robust standard errors clustered by industry and year are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1. Descriptive statistics are shown by Panel A of Table C.2.

	(I) Underpricing	(II) Underpricing	(III) Underpricing
EO: exec-only	**0.015**	**0.016**	**0.016**
	(0.020)	**(0.019)**	**(0.018)**
Log of total assets		-0.014***	-0.009**
		(0.004)	(0.004)
30-day industry return		0.348**	0.210
		(0.170)	(0.150)
Overhang		0.005	0.004
		(0.003)	(0.003)
VC indicator		0.023	0.030
		(0.022)	(0.021)
Reverse-LBO indicator		-0.015	0.001
		(0.017)	(0.016)
Carve-out indicator		-0.003	0.009
		(0.018)	(0.017)
Offer price revision			0.629***
			(0.086)
Fixed price indicator			0.037*
			(0.022)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	627	627	627
Adj. R^2	0.101	0.134	0.211

EO equals one if a firm introduced executive-only EO prior to its IPO. The results are shown by Table 3.3. As expected (Fu et al., 2015), no statistically significant impact on underpricing is discernible throughout any specification. Furthermore, the direction of the coefficient indicates higher underpricing associated with executive EO, reinforcing the mechanism proposed by Lowry and Murphy (2007) whereby executives underprice more to render stock options tied to the IPO in-the-money. These findings contrast with those of Table 3.2 and show that only broad-based EO has a meaningful impact on IPO underpricing in line with entrenchment theory.

To ensure that any captured effect is not caused by fundamental differences between firms introducing EO at some point in their lifetime and those that never

Table 3.4: EO and IPO underpricing: EO firms only
This table presents OLS regression estimates of underpricing given the presence of broad-based EO, restricting the sample to include only those firms that introduce any type of EO at some point in their lifetime, even if this is after the IPO. The dependent variable (*Underpricing*) measures the percent difference between a firm's first closing price and its offer price. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. Huber/White robust standard errors clustered by industry and year are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1. Descriptive statistics are shown by Panel A of Table C.2.

	(I)	(II)	(III)
	Underpricing	Underpricing	Underpricing
EO: BB	**-0.036****	**-0.029****	**-0.031****
	(0.015)	**(0.015)**	**(0.014)**
Log of total assets		-0.008**	-0.005
		(0.004)	(0.003)
30-day industry return		0.115	0.023
		(0.132)	(0.120)
Overhang		0.004	0.003
		(0.004)	(0.004)
VC indicator		0.007	0.010
		(0.027)	(0.027)
Reverse-LBO indicator		-0.018	-0.006
		(0.015)	(0.015)
Carve-out indicator		-0.016	-0.008
		(0.012)	(0.012)
Offer price revision			0.613***
			(0.086)
Fixed price indicator			0.028
			(0.019)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	437	437	437
Adj. R^2	0.072	0.088	0.202

do so, the analyses shown by Table 3.4 repeat the baseline regressions using only firms of the former type. All firms in these analyses eventually become EO firms. Compared with the baseline specification, the treatment group remains the same while the control group is limited to firms introducing broad-based EO after their IPO. The results remain similar in all specifications and are even augmented. In column I, EO firms underprice 3.6 percentage points less, compared to 3.1 percentage points less using the full sample (see Table 3.2). Using full controls, the effect persists. These findings do not suggest that the effect of EO on underpricing is driven by more fundamental, unobserved differences between EO and non-EO firms. Nevertheless, unobserved heterogeneity cannot be fully ruled out.

EO firms were shown to be significantly larger than non-EO firms using various measures of size (see Table 3.1). This warrants additional analyses to allay concerns of this fundamental difference spuriously driving the results. In particular, Aruğaslan et al. (2004) show that the negative effect Smart and Zutter (2003) find dual-class shares to have on underpricing disappears once controlling for size with alternative measures. A similar mechanism could be at play for EO firms; if the fact that they are larger reduces uncertainty, this could be a viable alternative driver for their reduced underpricing.

I therefore conduct a series of size-related robustness tests. First, I repeat the baseline regressions using sales, employees, and total IPO proceeds as alternative size proxies (see Table C.3.1). The negative coefficient of EO remains robust to each of these alternatives.

Next, I match each EO firm to a non-EO firm within the same industry that is closest to it in size (measured by total assets). Any significant differences in the size variables between EO and non-EO firms disappear (see Table C.3.2). When repeating the baseline analyses for the size-matched sample, EO firms underprice less than non-EO firms in all settings with a magnitude exceeding the effect obtained in the non-matched analysis (see Table C.3.3). Overall, this reinforces the main results and suggests that the impact of EO on underpricing is not merely driven by firm size.

Firms based in the UK constitute almost 30 % of the panel. This is starkly more than any other country in the panel and could lead to results being driven by the UK to a large extent. Therefore, Table C.4 repeats the analyses of Table 3.2 without UK firms. The direction and significance of the observed effect remain comparable, with augmented effect sizes. A dependency of my findings on the UK is not confirmed.

3.4.2 Entrenchment effect of EO

The prior section established the negative effect of EO on IPO underpricing, as hypothesised. This finding was shown to be robust to alternative explanations related to more fundamental differences between EO and non-EO firms. Therefore, I next examine whether entrenchment motives can adequately explain the finding in an exploratory analysis.

A firm's post-IPO ownership structure can provide evidence of entrenchment, with more dispersed ownership indicating reduced monitoring or lower takeover risks. Having established that EO firms underprice less, it is unclear how this effects the resulting ownership dispersion. This depends on whether EO has a direct effect on ownership.

Assuming entrenchment theory of underpricing holds, higher underpricing results in more dispersed ownership. If EO has no direct effect on ownership, then EO firms underpricing less should have *less* dispersed ownership. This would correspond to Smart and Zutter's (2003) finding for dual-class shares and indicate that blockholdings are less relevant to EO firms. However, as blockholders of EO firms are still able to monitor management, this would be inconsistent with the reduced monitoring management. Still, it could indicate entrenchment via takeover deterrence.

On the other hand, EO could have a direct effect on ownership by reducing the shares available to outsiders or signalling reduced takeover likelihood. In this case, EO would be a substitute to underpricing to achieve dispersed ownership.

Given these considerations, I first examine the direct effect of EO on various measures of post-IPO ownership dispersion. Table 3.5 shows the results.[5] Column I measures blockholdings as the total holding percentage of all blockholders with a stake of at least 5 %. According to Aruğaslan et al. (2004), this is a proxy for joint monitoring ability. Total blockholdings are found to be 4.5 percentage points lower

[5]To ease interpretation, the analysis is conducted using a linear probability model. Appendix C.5 repeats the analyses using fractional response and Poisson models (Papke and Wooldridge, 1996). The direction of coefficients remains consistent.

Table 3.5: EO and ownership dispersion
This table presents OLS regression estimates of the direct effect of EO on various measures of ownership dispersion. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. In column I, *Total blockholdings* refers to the sum of all blockholdings, where a blockholding refers to outside shareholdings of least 5 % of shares outstanding. *Largest blockholding* (column II) is the proportion of shares held by the largest blockholder. *Log number of blockholdings* is the count of blockholdings, transformed using the natural logarithm ($ln(x+1)$). Huber/White robust standard errors clustered by firm are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1. Descriptive statistics are shown by Panel B of Table C.2.

	(I) Total blockholdings	(II) Largest blockholding	(III) Log number of blockholdings
EO: BB	**-0.045****	**-0.028****	**-0.079***
	(0.018)	**(0.012)**	**(0.046)**
VC indicator	0.121***	0.034**	0.399***
	(0.024)	(0.015)	(0.066)
Reverse-LBO indicator	0.103***	0.073***	0.239***
	(0.022)	(0.017)	(0.058)
Carve-out indicator	0.031	0.032**	0.026
	(0.022)	(0.016)	(0.026)
Overhang	-0.001	-0.001	-0.015*
	(0.004)	(0.003)	(0.009)
Log of total assets	-0.003	0.003	-0.048***
	(0.005)	(0.003)	(0.012)
Debt ratio	0.035	0.007	0.143**
	(0.027)	(0.018)	(0.068)
Tangibility	-0.043	-0.036	-0.075
	(0.041)	(0.026)	(0.108)
Firm volatility	1.024	1.258**	-1.250
	(0.882)	(0.542)	(2.158)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	834	834	834
Adj. R^2	0.175	0.114	0.248

in EO firms. Compared with the mean total blockholding of 26.1 % (see Table C.2), this corresponds to a substantial relative decrease of 17 %.

Column II examines the largest blockholding, a measure for monitoring incentive (Aruğaslan et al., 2004). This is 2.8 percentage points lower for EO firms, or almost 18 % of the mean largest blockholding.

The final measure of ownership dispersion is the (log) number of blockholdings (column III). Here, EO firms have 7.6 % ($= e^{-0.079} - 1$) fewer blockholdings at marginal significance. At the (geometric) mean, firms have approximately 1.42 ($= e^{0.885} - 1$) blockholders, a 7.6 % reduction of which is not economically meaningful.

This suggests that EO firms have smaller but not necessarily fewer blockholdings.

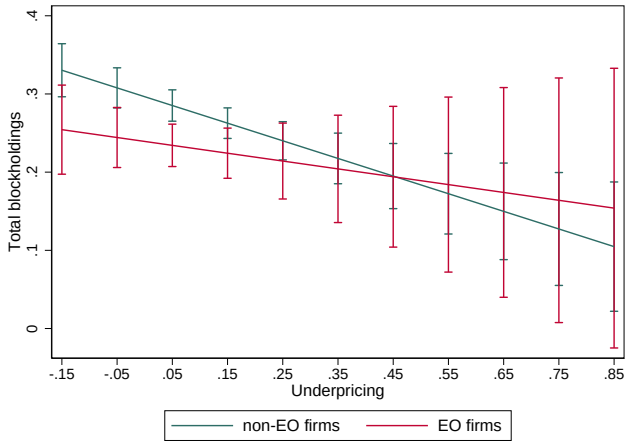
Overall, these findings imply that there is a direct effect of EO on ownership dispersion, making it conceivable that EO firms achieve more dispersed ownership despite being less underpriced. Therefore, I next examine the joint effect of EO and underpricing by interacting the two constructs. Column I of Table 3.6 shows the results for total blockholdings. Both the coefficients for EO and underpricing are highly significant. The impact of underpricing on ownership dispersion is confirmed, with a 1 percentage point increase in underpricing reducing total blockholdings by 0.23 percentage points. Given that underpricing is centred about its mean, a firm with mean underpricing will have a 4.6 percentage point reduction in total blockholdings if it has broad-based EO.

The interaction term of EO and underpricing is not significant, indicating that EO firms do not have higher ownership dispersion at every level of underpricing. Nevertheless, it is worth examining the interaction graphically. Subfigure 3.6a shows the predictive margins of total blockholdings across different values of underpricing for EO and non-EO firms, holding other control variables at their means. For lower levels of underpricing, EO firms are shown to achieve lower total blockholdings. This only reverses at high levels of underpricing, at which point there is such considerable overlap between the confidence intervals of both firm types that they do not differ at all. The overlap, while present, is much smaller for lower levels of underpricing. The sample mean of underpricing is 8.4 %. At this value, the differential total blockholdings of EO firms differ significantly. Therefore, despite the lack of significance of the interaction effect, there is some weak evidence of a substitution effect of EO and underpricing. In particular, EO firms seem to have more dispersed ownership even when they are overpriced.

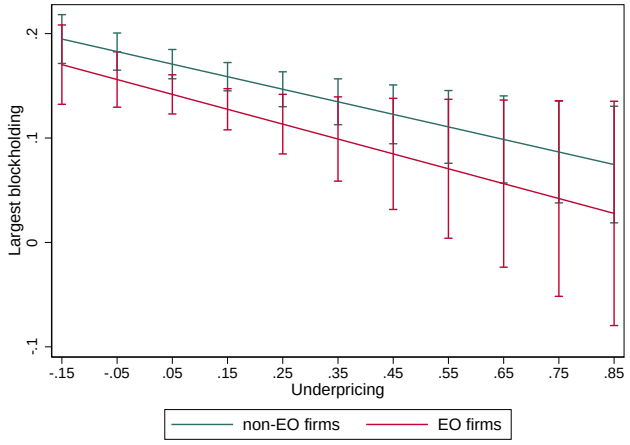
Both EO and underpricing also have negative impact on the largest blockholding (column II). Though the interaction is negative, it is insignificant. Subfigure 3.6b shows a similar pattern as for total blockholdings, with EO firms achieving

Figure 3.6: Predictive margins of the interaction effect of EO and underpricing on ownership dispersion
This figure shows plots of the predictive margins of the relation between underpricing and ownership dispersion for EO and non-EO firms obtained in Table 3.6, holding other control variables at their means.

(a) Total blockholdings



(b) Largest blockholding



(c) Log number of blockholding

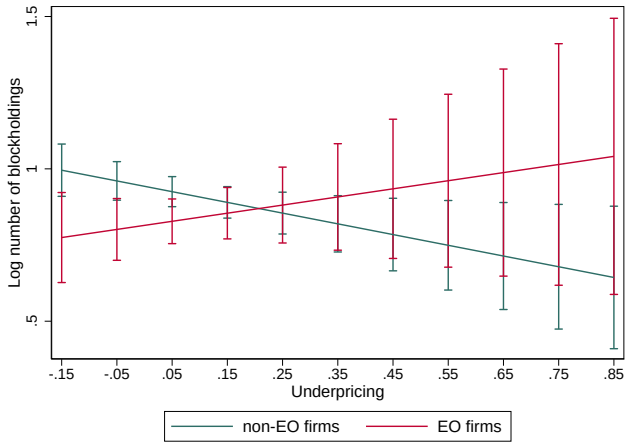


Table 3.6: Interaction effect of EO and IPO underpricing on ownership dispersion
This table presents OLS regression estimates of the interaction effect of EO and IPO underpricing on various measures of ownership dispersion. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. *Underpricing* measures the percent difference between a firm's first closing price and its offer price. In column I, *Total blockholdings* refers to the sum of all blockholdings, where a blockholding refers to outside shareholdings of least 5 % of shares outstanding. *Largest blockholding* (column II) is the proportion of shares held by the largest blockholder. *Log number of blockholdings* is the count of blockholdings, transformed using the natural logarithm ($ln(x+1)$). Huber/White robust standard errors clustered by industry and year are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1. Descriptive statistics are shown by Panel B of Table C.2.

	(I) Total blockholdings	(II) Largest blockholding	(III) Log number of blockholdings
EO: BB	**-0.046*** **	**-0.030** **	**-0.071**
	(0.018)	**(0.012)**	**(0.047)**
Underpricing	**-0.226*** **	**-0.120*** **	**-0.352** **
	(0.055)	**(0.037)**	**(0.153)**
EO: BB × Underpricing	**0.125**	**-0.022**	**0.618***
	(0.128)	**(0.080)**	**(0.324)**
VC indicator	0.122***	0.034**	0.399***
	(0.024)	(0.015)	(0.066)
Reverse-LBO indicator	0.102***	0.072***	0.244***
	(0.022)	(0.017)	(0.058)
Carve-out indicator	0.030	0.031**	0.029
	(0.022)	(0.016)	(0.029)
Overhang	0.000	0.000	-0.014
	(0.004)	(0.003)	(0.009)
Log of total assets	-0.004	0.002	-0.049***
	(0.005)	(0.003)	(0.012)
Debt ratio	0.029	0.003	0.137**
	(0.027)	(0.018)	(0.068)
Tangibility	-0.036	-0.030	-0.074
	(0.040)	(0.025)	(0.107)
Firm volatility	1.289	1.418***	-0.924
	(0.867)	(0.536)	(2.159)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	834	834	834
Adj. R^2	0.187	0.124	0.252

lower concentrations of the largest blockholding around mean underpricing and EO becoming irrelevant when underpricing is high.

In terms of the number of blockholdings (column III), the weak effect observed for EO firms previously without including underpricing (cp. Table 3.5) is attenuated further and becomes insignificant. Underpricing has a more pronounced negative effect. For this specification, the interaction is positive and significant. The pre-

dicted margins shown by Subfigure 3.6c help contextualise these results. Again, at lower levels of underpricing, EO firms appear to have lower numbers of blockholders. The slope is positive, indicating a reversal of the relation between underpricing and ownership dispersion for EO firms. However, the confidence intervals are the widest of any specification, considerably overlapping the observed values of non-EO firms.

Synthesising these findings, at the mean level of underpricing, EO firms appear to be more entrenched than non-EO firms as shown by total blockholdings and the largest blockholding. This indicates that the joint monitoring ability of blockholders could be reduced along with the monitoring incentive of any single blockholder. The number of blockholdings is not shown to differ for EO firms, indicating that blockholders remain present, but at lower stakes.

There is weak evidence that EO firms achieve higher ownership dispersion around mean underpricing, ranging to overpriced issues. When underpricing is large, EO firms do not appear to obtain more dispersed ownership beyond the effect of underpricing itself. This suggests a diminishing marginal effect of EO.

The observed effects could be driven by various mechanisms. Larger EO shareholdings could limit the number of shares available to outsiders. Furthermore, given EO's distinction as a strong takeover deterrent, it could signal reduced takeover likelihood to investors in line with the M&A anticipation hypothesis (Anderson et al., 2017).

It is crucial to treat these results as indications that warrant further study, neither overstating nor understating their significance. In particular, ownership data is challenging to analyse for several reasons. First, ownership variables are not linear, introducing some bias to the presented analyses. Second, while functional form can be adjusted (see Appendix C.5), ownership variables are also censored. Reporting thresholds only apply for stakes of at least 5 %, rendering stakes below this threshold unobservable. This results in an inflation of nil values and considerable skewness. Finally, the presented sample size is small, limiting the power of the analyses.

3.5 Conclusion

EO is an established takeover deterrent promoting managerial entrenchment. Similarly, the reduced monitoring hypothesis proposes that IPO underpricing facilitates more dispersed ownership by rationing shares (Brennan and Franks, 1997). I extend this hypothesis to include entrenchment motives more generally, as post-IPO blockholdings could facilitate takeovers and such control concerns are relevant at the IPO (Shleifer and Vishny, 1986; Field and Karpoff, 2002; Boulton et al., 2010). Given that both EO and IPO underpricing are therefore forms of entrenchment, though IPO underpricing comes at the cost of leaving money 'on the table', I expect that EO firms should experience less underpricing.

Using a sample of 928 European firms, 32.2 % of which have broad-based EO prior to their IPO, I empirically confirm that EO firms experience 1.8 percentage points lower underpricing than non-EO firms. This finding persists in various robustness tests. In particular, it does not seem to be driven by more fundamental differences between EO and non-EO firms, such as firm size.

Exploring entrenchment motives as a mechanism for this finding, I use hand-collected ownership data to assess the impact of EO on ownership dispersion. I provide evidence that EO has a direct effect on ownership dispersion, with EO firms having reductions in total blockholdings and the size of the largest blockholding of 4.5 and 2.8 percentage points, respectively. I propose two channels for this result. First, larger EO shareholdings could limit the number of shares available to outsiders. Second, EO's distinction as a strong takeover deterrent could signal reduced takeover likelihood to investors in line with the M&A anticipation hypothesis (Anderson et al., 2017).

I examine the joint effect of EO and underpricing on ownership dispersion. While EO firms are shown to achieve more dispersed ownership at mean underpricing, evidence that this effect persists across various levels of underpricing is not robust.

There is some indication that EO acts as a substitute for lower levels of underpricing, notably also when firm are overpriced. At high levels of underpricing, EO firms and non-EO firms are indistinguishable in terms of ownership dispersion. Future research with a larger dataset is required to more precisely characterise this interrelation and provide robustness to my exploratory analysis.

4

Conclusion

This dissertation consists of three essays that examine research questions on European IPOs. I shed light on institutional distinctions that characterise EU equity markets and analyse how the decision to go public changes during an IPO wave, the efficacy of regulatory de-burdening at stimulating SME listings, and the role of entrenchment considerations at the IPO. In this chapter, I summarise the main findings and contributions.

In the *first essay* (Chapter 1), I analyse how selection into going public changed during the COVID-19 IPO wave, contributing to the debate of opportunistic versus rational motives. Using extensive private firm data, I overcome problems of selection bias inherent to prior studies, turning selection into a feature of my analysis. Ex-ante, I find that issuers of the IPO wave are mostly similar to non-wave issuers, except that they are robustly less profitable, especially if they are early movers. Ex-post, early movers do not underperform their matched private peers while showing some evidence of superior sales growth. This suggests rational motives in line with

lower profitability firms timing the market due to improved overall listing conditions (Alti, 2006) or higher expected cashflows (Pástor and Veronesi, 2005), though a first-mover advantage could also be involved (Chemmanur and He, 2011). Other hot issuers underperform their private peers without increased sales growth, which is only weakly consistent with opportunism.

The *second essay* (Chapter 2) investigates the effect of the new EU growth prospectus introduced by the Prospectus Regulation on SME listings. I provide detailed institutional descriptions of EU equity markets along with a framework of initial listings. This illustrates the narrow scope of applicability of the EU growth prospectus, which competes with two other listing documents. I verify EU growth prospectuses to be less complex in terms of word counts than full prospectuses, without finding evidence that they are less informative. This shows that in some respects, the reform has succeeded in de-burdening and streamlining SME IPOs without jeopardising investor protection. Regarding listing expenses, however, the EU growth prospectus is not shown to have meaningfully lower costs. The EU growth prospectus is not associated with lower fixed costs than full prospectuses. Furthermore, I am unable to confirm that the reform boosted SME listings activity.

Finally, in the *third essay* (Chapter 3), I examine entrenchment aspects of both EO and IPO underpricing. EO is an acknowledged takeover deterrent, and I argue that general entrenchment motives are similarly applicable to IPO underpricing. However, underpricing represents an indirect cost to the firm in the form of money left 'on the table'. Therefore, I hypothesise that EO mitigates the need for entrenchment-related underpricing, acting as a substitute. I confirm that EO firms experience lower underpricing, a finding that prevails in various robustness tests. In exploratory analyses considering entrenchment motives as a mechanism for this result, I investigate the post-IPO ownership dispersion of EO firms. I find a direct effect of EO on ownership, as well as weak evidence of a substitution of entrenchment-related IPO underpricing with EO.

Overall, the three essays of this dissertation contribute to literature, offer insights for policymakers, and reveal avenues for future research. The *first essay* suggests that the risk of adverse selection during IPO waves to the detriment of investors is less prevalent than some prior studies suggest. Furthermore, the COVID-19 IPO wave seemed to attract firms from different industries in Europe than it did in the US, which may provide ground for further research. The *second essay* casts doubt on the efficacy of de-burdening SME listings at boosting IPO activity. Moreover, it provides detailed institutional explanations and methodological insights, which I hope will encourage further research on EU IPOs that can in turn provide a more extensive foundation for future policy initiatives. The *third essay* provides exploratory evidence of a substitution effect of EO and IPO underpricing related to entrenchment motives. This provides several avenues for further corroboration using alternate data. The proposed allowance of dual-class shares across the EU could provide another setting within which to examine entrenchment-related underpricing.

A

Chapter 1

A.1 List of variables

Table A.1: List of variables
This table presents a list and definition of the variables used in Chapter 1. All inflation adjustments are conducted using Eurostat's Harmonised Indices of Consumer Prices (HICP). All continuous variables are winsorised at the 1st and 99th percentiles.

Variable	Description
Firm variables	
Country	Country of incorporation. *Source: Orbis.*
Industry	Industry according to the NACE Rev. 2 section. *Source: Orbis.*
Total assets	Total assets in 2015 millions of Euros. Log transformed as indicated ($ln(x+1)$). *Source: Orbis.*
Firm age	Maximum of years since firm establishment as per the date of incorporation provided by Orbis and the years of operating history available. This reduces instances of erroneous firm age values caused by updates in the date of incorporation reflecting legal changes rather than the founding date. Log transformed as indicated ($ln(x+1)$).*Source: Orbis.*
Leverage	Loans and long-term debt divided by total assets. *Source: Orbis.*
ROA	Return on assets, calculated as net income divided by total assets. *Source: Orbis.*
VC indicator	Dummy equal to 1 if a venture capitalist was invested in the firm in a given financial year. *Source: PitchBook.*
Tangibility	Fixed assets divided by total assets. *Source: Orbis.*
Patent indicator	Dummy equal to 1 if the firm filed at least one patent within the last three years. *Source: Orbis.*
Sales growth	Annual growth rate in sales. *Source: Orbis.*
Additional variables used in ex-post analyses	
Post	Dummy indicating financial years after a firm's IPO, applied analogously to matched private control firm.
ROS	Return on sales, calculated as net income divided by sales. *Source: Orbis.*
Sales	Net sales in 2015 Euros. Log transformed as indicated ($ln(x+1)$). *Source: Orbis.*
Market share	Firm sales divided by total sales within the same Fama-French 49 industry.*Source: Orbis, Kenneth French.*
Δ Market share	Growth in market share based on the difference between post-IPO log market share and log market share two years prior to the IPO. *Source: Orbis.*
Issuer types	
Cold issuer	Dummy equal to 1 if the firm lists before the onset of the COVID-19 rising cycle and hot issues period, i.e. before July 2020. *Source: own data.*
Early mover	Dummy equal to 1 if the firm lists during the COVID-19 rising cycle, i.e. from July 2020 to December 2020. *Source: own data.*
Hot issuer	Dummy equal to 1 if the firm lists during the COVID-19 hot issues period, i.e. from January 2021 to January 2022. *Source: own data.*

A.2 Descriptive statistics

Table A.2: Descriptive statistics
This table reports the number of observations (N), mean value (Mean), standard deviation (SD), 25^{th} percentile (p25), median (p50), and 75^{th} percentile (p75) of variables used in Chapter 1. All currency values are expressed in 2015 Euros. For a definition of variables see Table A.1.

	N	Mean	SD	P25	Median	P75
Panel A: full sample						
Total assets (millions)	8,348,237	11.733	36.700	1.167	2.226	6.243
Log of total assets	8,348,237	1.098	1.392	0.155	0.800	1.831
Firm age	8,348,237	20.408	15.150	9.024	17.161	27.795
Log of firm age	8,348,237	2.798	0.781	2.305	2.899	3.360
Leverage	8,348,237	0.257	0.308	0.000	0.098	0.485
ROA	8,348,237	0.050	0.110	0.001	0.025	0.080
VC indicator	8,348,237	0.005	0.072	0.000	0.000	0.000
Tangibility	8,348,237	0.258	0.310	0.007	0.108	0.445
Patent indicator	8,348,237	0.024	0.153	0.000	0.000	0.000
Sales (millions)	7,307,377	10.460	32.379	0.374	1.621	5.299
Log of sales	7,307,377	1.286	1.223	0.317	0.964	1.840
Panel B: sample with available sales growth						
Total assets (millions)	6,518,731	12.548	38.084	1.215	2.339	6.588
Log of total assets	6,518,731	1.168	1.385	0.194	0.850	1.885
Firm age	6,518,731	21.340	14.965	10.078	18.207	28.504
Log of firm age	6,518,731	2.879	0.708	2.405	2.955	3.385
Leverage	6,518,731	0.247	0.300	0.000	0.091	0.462
ROA	6,518,731	0.048	0.103	0.002	0.025	0.077
VC indicator	6,518,731	0.005	0.068	0.000	0.000	0.000
Tangibility	6,518,731	0.256	0.304	0.010	0.115	0.435
Patent indicator	6,518,731	0.026	0.158	0.000	0.000	0.000
Sales (millions)	6,518,731	11.083	33.380	0.492	1.785	5.726
Log of sales	6,518,731	1.347	1.225	0.400	1.024	1.906
Sales growth	6,518,731	0.248	1.386	-0.088	0.020	0.170

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Table A.2: (continued)

	N	Mean	SD	P25	Median	P75
Panel C: matched ex-post performance panel						
Total assets (millions)	6,018	49.892	69.755	3.100	13.835	62.994
Log of total assets	6,018	2.817	1.601	1.411	2.697	4.159
Firm age	6,018	13.145	11.696	5.851	10.002	17.000
Log of firm age	6,018	2.401	0.693	1.924	2.398	2.890
Leverage	6,014	0.288	0.281	0.000	0.229	0.508
ROA	6,014	-0.020	0.170	-0.104	0.013	0.069
Tangibility	6,013	0.097	0.193	-0.005	0.013	0.119
Patent indicator	6,018	0.224	0.417	0.000	0.000	0.000
VC indicator	6,018	0.209	0.407	0.000	0.000	0.000
Sales (millions)	6,012	49.344	79.901	1.394	9.338	48.695
Log of sales	6,012	15.692	2.864	14.148	16.050	17.701
Market share in t-2 (%)	1,584	0.047	0.321	0.000	0.001	0.006
Market share growth from t-2 to t+1	1,570	0.326	1.216	-0.089	0.166	0.573
Market share growth from t-2 to t+2	1,327	0.756	1.612	-0.031	0.407	1.585

B

Chapter 2

B.1 List of variables

Table B.1: List of variables
This table presents a list and definition of the variables used in Chapter 2. All inflation adjustments are conducted using Eurostat's Harmonised Indices of Consumer Prices (HICP). All continuous variables are winsorised at the 1st and 99th percentiles.

Variable	**Description**
General listing and firm variables	
Admission document	Dummy equal to 1 if an IPO was conducted using an admission document.
EGP	Dummy equal to 1 if an IPO was conducted using an EU growth prospectus.
Employees	Number of employees in the financial year preceding a firm's initial offering.
Expenses	Total listing expenses stated on a firm's listing document, in 2015 Euros.
Expenses/proceeds	Ratio of total listing expenses to total proceeds.
Market capitalisation	Product of the initial offer price and total shares outstanding immediately following the offering.
Proceeds	Total proceeds raised by the initial offering, excluding any overallotment options, in 2015 Euros.
Proceeds incl. OA	Total proceeds raised by the initial offering, including any overallotment options, in 2015 Euros.
Prospectus	Dummy equal to 1 if an IPO was conducted using a full prospectus.
ROA	Return on assets, calculated as net income divided by total assets in the financial year preceding a firm's initial offering.
Sales	Net sales in the financial year preceding a firm's initial offering, in 2015 Euros.
Smallcap	Dummy equal to 1 if the firm is a smallcap according to the Prospectus Regulation, i.e. if its market capitalisation at the IPO is less than €200m.
SME	Dummy equal to 1 if the firm is an SME according the the Prospectus Regulation, i.e. if it fulfills at least two of the following three criteria: (i) less than 250 employees; (ii) total assets not exceeding €43m; (iii) net sales not exceeding €50m.
Total assets	Total assets in the financial year preceding a firm's IPO, in 2015 Euros.
Underpricing	Percent change between firm's initial offer price and its first closing price: $\frac{First\ closing\ price - Offer\ price}{Offer\ price}$.
Textual analysis variables	
Absolute year difference	Absolute difference in listing date year of two compared listing documents.
Same exchange	Dummy equal to 1 if the destination exchange of two compared listing documents is the same.

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Table B.1: (continued)

Variable	**Description**
Same FF48-industry	Dummy equal to 1 if the firms of the two compared listing documents belong to the same Fama-French 48-industry.
Same financial markets authority	Dummy equal to 1 if the firms of two compared listing documents are subjects of the same financial markets authority based on their ISIN code or country of listing for non-EEA countries.
Similarity	Cosine similarity of two listing documents.
Total words	Count of distinct words of machine-readable listings document, translated to English and reduced to relevant pages (see B.3).
Within same 90 days	Dummy equal to 1 if listings of two compared listings documents occur within 90 days of each other.
Listings activity analysis variables	
EU	Dummy equal to 1 for countries to which the Prospectus Regulation applies (i.e. the European Economic Area).
GDP growth	Annual growth in gross domestic product in percent, as provided by the Worldbank.
Post	Dummy indicating quarters in the post reform period, i.e. from Q3-2019.
Scaled listings	Quarterly number of listings by country divided by the prior year's total number of domestic listed firms, multiplied by 100. Domestic listed firms are provided by the Worldbank for Germany, Poland, Spain, and the US and hand-collected otherwise due to large stretches of missing data.
Scaled proceeds	Quarterly total listings proceeds by country divided by the prior year's total market capitalisation of domestic listed firms, multiplied by 100. The market capitalisation of domestic listed firms is provided by the Worldbank for Germany, Poland, Spain, and the US and hand-collected otherwise due to large stretches of missing data.

B.2 Descriptive statistics

Table B.2.1: Descriptive statistics
This table reports the number of observations (N), mean value (Mean), standard deviation (SD), 25^{th} percentile (p25), median (p50), and 75^{th} percentile (p75) of variables used in Chapter 2. All currency values are expressed in 2015 Euros. For a definition of variables see Table B.1.

	N	Mean	SD	P25	Median	P75
Panel A: post-reform MTF IPOs using the EU growth prospectus or full prospectus in Sweden, Denmark, Finland, and France						
Total assets (millions)	172	145.445	1387.856	2.309	7.396	25.364
Sales (millions)	172	30.446	136.019	0.220	3.575	17.225
Employees	172	79.727	158.041	8.500	27.500	81.500
ROA	151	-0.215	0.428	-0.362	-0.067	0.045
Proceeds incl. OA (millions)	172	26.914	46.590	4.220	11.180	25.292
Proceeds (millions)	172	23.557	40.474	4.020	10.369	22.422
Underpricing	170	0.050	0.308	-0.116	0.000	0.130
Market capitalisation (millions)	172	524.550	1315.806	76.184	162.184	392.914
Total expenses (millions)	171	1.697	2.177	0.399	0.890	2.167
Expenses/proceeds	171	0.102	0.096	0.068	0.090	0.112
Panel B: listings documents of post-reform MTF IPOs in Sweden, Denmark, Finland, and France						
Total words	275	39820.665	22300.443	23299.000	30220.000	53064.000
Summary	186	4198.253	1145.025	3454.000	4101.500	4820.000
Risk factors	275	5553.916	4169.224	2623.000	3838.000	7406.000
Business & market	275	11969.480	7965.391	6121.000	9350.000	15690.000
Financials	275	4983.884	4691.935	1951.000	3020.000	5955.000
Corporate governance	275	7031.316	3998.365	3890.000	5894.000	9264.000
Offer details	275	7296.018	4477.302	4666.000	5640.000	8035.000
Summary/total words	186	0.107	0.042	0.072	0.094	0.146
Risk factors/total words	275	0.134	0.046	0.102	0.130	0.156
Business & market/total words	275	0.293	0.075	0.235	0.289	0.338
Financials/total words	275	0.121	0.066	0.069	0.113	0.165
Corporate governance/total words	275	0.186	0.066	0.131	0.177	0.226
Offer details/total words	275	0.193	0.063	0.150	0.196	0.238

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Table B.2.1: (continued)

	N	Mean	SD	P25	Median	P75
Panel C: within-section cosine similarities of Panel B listings documents						
Full document	37675	0.571	0.105	0.499	0.576	0.646
Risk factors	37675	0.613	0.159	0.482	0.603	0.757
Business & market	37675	0.375	0.117	0.288	0.365	0.453
Financials	37675	0.573	0.112	0.495	0.571	0.651
Corporate governance	37675	0.592	0.163	0.458	0.593	0.731
Offer details	37675	0.644	0.140	0.556	0.656	0.745
Panel D: Panel A firms with available listing expenses						
Total assets (millions)	271	98.192	1108.584	1.373	4.439	13.187
Sales (millions)	271	21.058	109.335	0.181	1.991	11.272
Employees	271	72.192	222.781	7.000	16.000	55.000
ROA	216	-0.218	0.424	-0.362	-0.074	0.036
Proceeds incl. OA (millions)	271	18.252	38.825	2.304	5.363	17.789
Proceeds (millions)	271	16.009	33.738	2.264	4.727	15.499
Underpricing	264	0.079	0.350	-0.119	0.000	0.185
Market capitalisation (millions)	271	366.274	1069.152	55.209	106.219	254.338
Total expenses (millions)	271	1.198	1.853	0.260	0.513	1.203
Expenses/proceeds	271	0.110	0.082	0.074	0.097	0.124

Table B.2.2: Descriptives for triple-difference analyses
This table reports the number of observations (N), mean value (Mean), and median (p50) across all nations and quarters used in the tripe-difference analyses. EU/EEA countries with less than 10 listings are excluded, i.e. Iceland, Ireland, and Portugal. For a definition of variables see Table B.1.

	Scaled listings (%)						Scaled proceeds (%)					
	SMEs			Non-SMEs			SMEs			Non-SMEs		
Country	N	Mean	Median	N	Mean	Median	N	Mean	Median	N	Mean	Median
Belgium	27	0.158	0.000	27	0.105	0.000	27	0.006	0.000	27	0.045	0.000
Bulgaria	27	0.232	0.000	27	0.014	0.000	27	0.034	0.000	27	0.021	0.000
Denmark	27	1.228	0.752	27	0.181	0.000	27	0.005	0.002	27	0.069	0.000
Finland	27	1.049	0.690	27	0.508	0.546	27	0.014	0.005	27	0.061	0.005
France	27	0.457	0.389	27	0.125	0.127	27	0.004	0.004	27	0.018	0.001
Germany	27	0.170	0.188	27	0.329	0.228	27	0.009	0.001	27	0.069	0.014
Italy	27	1.466	1.120	27	0.465	0.318	27	0.009	0.005	27	0.075	0.033
Netherlands	27	0.097	0.000	27	0.557	0.000	27	0.002	0.000	27	0.084	0.000
Norway	27	1.788	0.901	27	0.732	0.467	27	0.106	0.018	27	0.149	0.055
Poland	27	0.156	0.122	27	0.080	0.000	27	0.015	0.004	27	0.107	0.000
Spain	27	0.034	0.032	27	0.016	0.000	27	0.011	0.001	27	0.038	0.000
Sweden	27	1.831	1.416	27	0.330	0.165	27	0.035	0.034	27	0.094	0.021
US	27	0.432	0.346	27	0.474	0.388	27	0.005	0.003	27	0.027	0.019

	GDP growth (%)					
	SMEs			Non-SMEs		
Country	N	Mean	Median	N	Mean	Median
Belgium	27	1.215	1.793	27	1.215	1.793
Bulgaria	27	2.625	3.040	27	2.625	3.040
Denmark	27	2.006	2.343	27	2.006	2.343
Finland	27	1.324	1.225	27	1.324	1.225
France	27	0.820	1.843	27	0.820	1.843
Germany	27	0.995	1.492	27	0.995	1.492
Italy	27	0.172	0.926	27	0.172	0.926
Netherlands	27	1.650	2.192	27	1.650	2.192
Norway	27	1.396	1.119	27	1.396	1.119
Poland	27	3.850	4.450	27	3.850	4.450
Spain	27	1.027	2.976	27	1.027	2.976
Sweden	27	2.178	2.071	27	2.178	2.071
US	27	2.007	2.294	27	2.007	2.294

B.3 Prospectus pagination: section harmonisation

Table B.3: Harmonisation of prospectus sections
This table gives an overview of correspondence of prospectus and EU growth prospectus items defined by Commission Delegated Regulation (EU) 2019/980 to harmonised overarching sections. Items included in the *disregarded* section are excluded from analyses.

Section	**Items**
Summary	-Summary
Risk factors	-Risk factors
Offer details	-Reasons for the offer and use of proceeds
	-Information concerning the securities to be offered/admitted to trading
	-Terms and conditions of the offer of securities to the public
	-Admission to trading and dealing arrangements
	-Selling securities holders
	-Expense of the issue/offer
	-Dilution
Business/market	-Information about the issuer
	-Business overview
	-Organisational structure
	-Trend information
Corporate	-Administrative, management, and supervisory bodies and senior management
governance	-Remuneration and benefits
	-Board practices
	-Employees
	-Major shareholders
	-Share capital
	-Related party transactions
	-Dividend policy
	-Legal and arbitration proceedings
	-Material contracts
Financials	-Working capital statement
	-Capitalisation and indebtedness
	-Operating and financial review
	-Capital resources
	-Financial information concerning the issuer's assets and liabilities, financial position, and profits and losses

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Table B.3: (continued)

Section	**Items**
Disregarded	-Persons responsible, third party information, experts' reports, and competent authority approval
	-Information on statutory auditors
	-Taxation of income received from securities
	-Regulatory environment
	-Auditing of financial information
	-Memorandum and articles of association
	-Documents available
	-Disclaimers

B.4 Institutional background

B.4.1 Listing on EU exchanges

B.4.1.1 Exchange types

EU exchanges can fundamentally be divided into two types: regulated markets and multilateral trading facilities (MTFs). Their distinction is laid out by the Markets in Financial Instruments Directive (MiFID 2004/39/EC)[1]. Both regulated markets and MTFs connect buyers and sellers of financial instruments in a non-discretionary manner, such that contracts are facilitated. Regulated markets, however, are fully governed by public law, i.e. EU and national legislation. They are managed by a designated market operator.

MTFs, on the other hand, are subject to private law established by the exchange itself, hence their frequent designation as *exchange-regulated* markets. EU legislation directly applies only to specific undertakings on these markets, such as the offering of securities to the public. MTFs may be operated by market operators or investment firms.

Table B.4.1 shows the number of initial offerings by exchange type for all sample exchanges. During the sample period, only 351 initial offerings took place on regulated markets, less than a third of the total. This highlights the importance of exchange-regulated markets in the EU, where the remaining two-thirds occurred.

The Markets in Financial Instruments Directive II (MiFID 2014/65/EU)[2] established a further exchange type within the category of MTFs: SME growth markets (SME GMs). An MTF can register as an SME GM if at least 50 % of its admitted

[1]Council Directive 2004/39/EC of 21 April 2004 on markets in financial instruments amending Council Directives 85/611/EEC and 93/6/EEC and Directive 2000/12/EC of the European Parliament and of the Council and repealing Council Directive 93/22/EEC. OJ L 145/1.

[2]Council Directive 2014/65/EU of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU. OJ L 173/349.

Table B.4.1: Initial offerings by exchange type
This table shows the number of initial offerings from 2016 to September 2022, distinguishing IPOs and private placements, by exchange types. The number of initial offerings on SME GMs, as a special type of MTF, are stated separately from total MTF listings.

Exchange	Type	IPOs	Private placements	Total
Euronext	Regulated	103	37	140
	MTF	87	276	363
	–SME GM	*53*	*119*	*172*
NASDAQ Nordic	Regulated	98	0	98
	MTF	328	18	346
	–SME GM	*184*	*8*	*192*
Deutsche Börse	Regulated	45	8	53
	MTF	11	0	11
	–SME GM	*5*	*0*	*5*
NGM	Regulated	0	0	0
	MTF	57	2	59
	–SME GM	*16*	*0*	*16*
SSM	Regulated	0	0	0
	MTF	77	1	78
	–SME GM	*30*	*0*	*30*
BME	Regulated	1	13	14
	MTF	5	22	27
	–SME GM	*2*	*14*	*16*
WSE	Regulated	41	0	41
	MTF	7	6	13
	–SME GM	*4*	*0*	*4*
BSE	Regulated	5	0	5
	MTF	9	0	9
	–SME GM	*9*	*0*	*9*
All	Regulated	293	58	351
	MTF	581	325	906
	–SME GM	*303*	*141*	*444*

issuers are SMEs. As of October 2022, 15 SME GMs are registered with ESMA.[3] The first MTF to register as an SME GM was Borsa Italiana's Euronext Growth segment in January 2018.[4] The most recent registration was Sweden's Spotlight Stock Market in September 2020.[5]

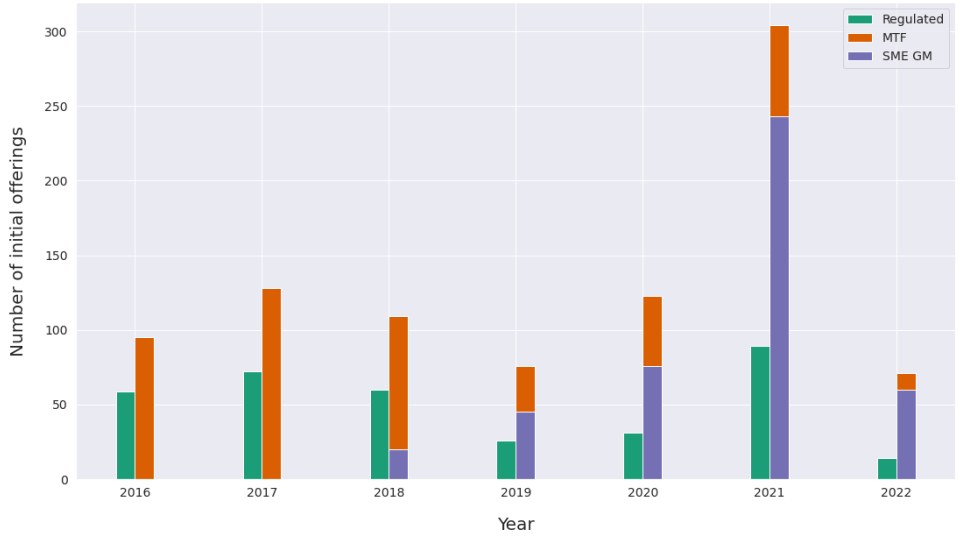
Table B.4.2 gives an overview of sample exchanges, segments, and exchange types by country. With the exception of Euronext Access, Access+, and Euronext Growth

[3]There are 18 registered SME GMs when including exchanges with multiple trading venues and market identifier codes, e.g. the Scale segment of Deutsche Börse operated by Börse Frankfurt and Xetra.

[4]At the time of registration, Borsa Italiana was still part of London Stock Exchange and the SME GM was known as *AIM Italia*.

[5]Cp. ESMA register `https://registers.esma.europa.eu/publication/searchRegister?core=esma_registers_upreg`.

Figure B.4.1: Annual initial offerings by exchange type
This figure shows the annual number of initial offerings by market type from 2016 to September 2022, with SME GMs distinguished as a type of MTF.



in Norway as well as NASDAQ Nordic First North in Iceland, all MTFs have been registered as SME GMs. This underlines the importance of exchange-regulated markets for SMEs.

Examining initial offerings over time, Figure B.4.1 illustrates the relative importance and prevalence of MTFs as opposed to regulated markets, recently realising more than twice as many offerings. With most MTFs obtaining SME GM status, most offerings occur on these markets. In 2021, the year after the registration of the last SME GM, 80 % of MTF offerings took place on SME GMs. Almost all of the remaining 20 % listed on Norway's Euronext Growth market.

B.4.1.2 Listing types

Initial offerings can generally be conducted via three main listing types: IPOs, private placements, and direct listings. Direct listings do not involve the sale of shares, therefore no proceeds are raised by this type of listing. Instead, only existing shares are listed on an exchange without an underwritten offering. The other two

Table B.4.2: Exchanges by country
This table presents exchanges included in the sample by country and categorises their equity segments according to EU market types. The registration dates of MTFs as SME GMs is obtained from the ESMA register.

Country	Exchange	Segments	Type
Belgium	Euronext	Euronext	Regulated market
		Euronext Growth	SME GM since 15.10.2019
		Access/Access+	MTF
Bulgaria	BSE	Premium Equities Segment	Regulated market
		Standard Equities Segment	Regulated market
		beam Equities	SME GM since 20.12.2018
Denmark	NASDAQ Nordic	Main Market	Regulated market
		First North	SME GM since 16.06.2019
Finland	NASDAQ Nordic	Main Market	Regulated market
		First North	SME GM since 08.07.2019
France	Euronext	Euronext	Regulated market
		Euronext Growth	SME GM since 09.10.2019
		Access/Access+	MTF
Germany	Deutsche Börse	Prime Standard	Regulated market
		General Standard	Regulated market
		Scale	SME GM since 16.12.2019
Iceland	NASDAQ Nordic	Main Market	Regulated market
		First North	MTF
Ireland	Euronext	Euronext	Regulated market
		Euronext Growth	SME GM since 11.10.2019
Italy	Euronext	Euronext	Regulated market
		Euronext STAR	Regulated market
		Euronext Growth	SME GM since 03.01.2018
Netherlands	Euronext	Euronext	Regulated market
Norway	Euronext	Oslo Børs	Regulated market
		Euronext Expand	Regulated market
		Euronext Growth	MTF
Poland	WSE	Main Market	Regulated market
		NewConnect	SME GM since 26.07.2019
Portugal	Euronext	Euronext	Regulated market
		Euronext Growth	SME GM since 11.10.2019
		Access/Access+	MTF
Spain	BME	Mercado continuo	Regulated market
		BME growth	SME GM since 29.07.2020
Sweden	NASDAQ Nordic	Main Market	Regulated market
		First North	SME GM since 26.06.2019
	NGM	Main Regulated	Regulated market
		Nordic SME	SME GM since 26.06.2019
	SSM	SSM	SME GM since 28.09.2020

listing types both involve the sale of either primary or secondary shares.

IPOs and private placements differ in that the former impose no limitations regarding the investors that the offering is addressed to. That is, the offer can be

broadly subscribed by *public* investors, i.e. retail investors. Private placements, on the other hand, are addressed solely to *qualified* investors, as laid out by MiFID II, which are broadly equivalent to institutional investors. Following the primary sale of shares, these qualified investors may, however, trade their shares with any type of investor in the secondary market.

Why, then, do companies limit the addressees of their offerings in the primary market? One benefit of this type of listing arises for offerings conducted on MTFs (see Figure 2.1): admissions on these markets are not subject to EU legislation, particularly the Prospectus Regulation, if they are non-public. This means that on MTFs, only public offerings require the publication of a prospectus; private placements do not. On regulated markets, on the other hand, the admission of securities generally triggers the prospectus requirement, regardless of whether it is an IPO or a private placement.

This relative benefit of private placements is reflected by the types of listings taking place on each type of market: virtually all private placements occur on MTFs, while only 58 private placements or 17 % of the total take place on regulated markets (see Table B.4.1).

Table B.4.3 examines the differences between firm and offer characteristics of private placements and IPOs more closely for MTFs. The median private placement firm appears to be significantly larger than the median IPO firm in terms of total assets, sales, and employees. In economic terms, these differences are moderate, with private placement firms having €9.8m more total assets at the median. In terms of profitability, private placement firms obtain 8.2 % higher ROA at the median. At the mean, except for total assets, these differences are augmented in magnitude.

Regarding offer characteristics, private placement firms raise significantly higher proceeds both at the mean and median. This is to be expected given the prospectus requirement inherent to IPOs applies only above a certain threshold of proceeds raised. IPOs on MTFs often remain below this limit so as to circumvent this re-

quirement. Private placements on MTFs are prospectus exempt regardless of the proceeds raised. However, this flexibility appears to come at the indirect cost of higher underpricing.

Given the general prospectus-exempt characteristic of MTF private placements, we would assume that the lower legal requirements become apparent in terms of lower expenses. However, Table B.4.3 shows that private placements entail significantly higher costs at both the mean and median, although this difference is less than half a million Euros. This could be the result of the higher proceeds raised by private placements. Yet, when using the ratio of total expenses to proceeds raised, the significant difference remains, with private placements facing 3.5 % higher costs than IPOs at the mean.

Another notable trend regarding choice of public versus private offerings is country-specific clustering. Figure B.4.2 compares IPOs and private placements by country. While some countries have only few of both listing types, some exhibit a clear convergence to a listing type. For instance, most initial offerings by far take place in

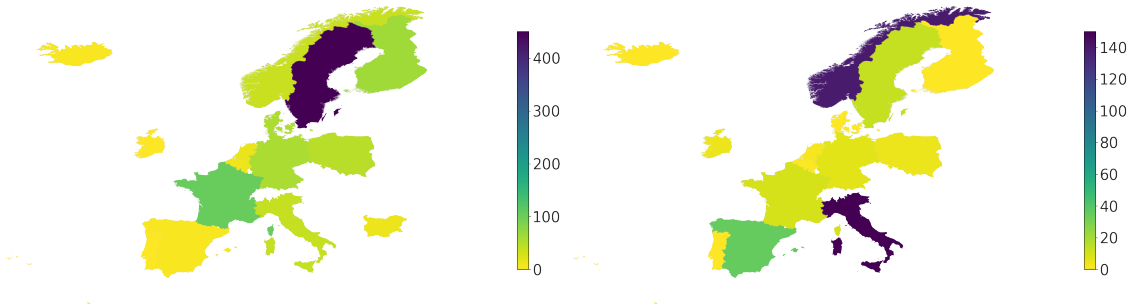
Table B.4.3: Firm and offer characteristics by offer type on MTFs
This table provides mean and median statistics for various firm and offer characteristics by offer type for initial offerings taking place on MTFs. Currency values are in 2015 millions of Euros. Test statistics determining equivalence of sample means and medians are computed using t-tests and Wilcoxon rank tests, respectively, applying Huber/White robust standard errors. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table B.1.

	Private placements			IPOs			Difference	
	N	Mean	Median	N	Mean	Median	Mean	Median
Firm characteristics								
Total assets	325	143.928	13.486	580	75.721	3.650	68.209	9.832***
Sales	325	45.535	9.045	579	16.097	1.170	29.438**	7.875***
Employees	325	153.815	40.000	579	78.007	15.000	75.808**	25.000***
ROA	285	-0.102	0.013	494	-0.225	-0.069	0.123***	0.082***
Offer characteristics								
Proceeds incl. OA	321	29.531	9.983	580	13.565	4.480	15.966***	5.504***
Proceeds	321	27.784	9.785	580	11.977	4.020	15.807***	5.764***
Underpricing	268	0.163	0.068	536	0.075	0.000	0.088***	0.069***
Market capitalisation	322	742.503	85.571	577	258.055	85.296	484.449***	0.704
Expenses	174	1.243	0.877	549	0.983	0.466	0.260*	0.412***
Expenses/proceeds	174	0.139	0.116	549	0.102	0.093	0.035***	0.024***

Sweden and almost all of them are IPOs. Italy and Norway, on the other hand, have few IPOs but more than 100 private placements each. Generally, there appear to be far fewer private placements than IPOs for all sample countries except Italy, Norway, and Spain.

Figure B.4.2: Map of initial offerings
This figure shows the number of initial offerings by country from 2016 to September 2022. Subfigure (a) shows IPOs and Subfigure (b) shows private placements.

(a) IPOs **(b)** Private placements



Little research has thus far been devoted to studying the differences between private placements and IPOs, despite the relative importance of private placements in the EU. Though only briefly outlined here, we hope the technical and methodological insights provided serve to encourage future studies on this topic.

B.4.2 Examples of the prospectus requirement

A prospectus is required (1) where an offer is made to the public or (2) where shares are admitted to trading on a regulated market. Requirement (1) applies to both regulated markets and MTFs (including SME GMs) as soon as an offer entails non-qualified or retail investors. An IPO is exempt from this requirement only if it raises proceeds below the threshold of €1m to €8m, depending on the amount set by the respective member state. For example, if a company conducts an IPO with total proceeds of €9m, the company is required to issue a prospectus regardless of whether it is listing on a regulated market or an MTF, as requirement (1) is

fulfilled and the proceeds raised exceed the exemption threshold. Were it to raise €100k and thereby remain beneath the exemption threshold, then requirement (1) would still be fulfilled, but the company would be exempt from the obligation to publish a prospectus if it lists on an MTF. In this case, the company could instead compile an admission document, whose content is mandated by the MTF, not EU law. If it chooses to list on a regulated market, however, requirement (2) would apply, necessitating a prospectus.

If the company is eligible for utilising an EU growth prospectus and it seeks to list via an IPO with proceeds of €9m, then it may choose to publish an EU growth prospectus rather than a full, regular prospectus, if and only if it is listing on an MTF. If the same company were instead to conduct the same issue on a regulated market, it would nevertheless have to publish a full prospectus.

Requirement (2) mandates the publication of a prospectus for shares being included on a regulated market. If this requirement is fulfilled, there is no option for the use of an EU growth prospectus instead of a full prospectus. Still, it is worth examining this requirement together with the listing type to further understand when the prospectus obligation binds on which market type. If a company chooses to list via a private placement, then it would not trigger the prospectus obligation as per requirement (1). If the private placement is conducted on an MTF, requirement (2) is not fulfilled and no prospectus is required. However, if the private placement is to take place on a regulated market, requirement (2) binds.

Illustrating these cases with examples, a company A conducting a private placement raising €9m on a regulated market has to publish a prospectus, because requirement (2) is fulfilled. If company A were to conduct the same private placement on an MTF, neither requirement (1) nor (2) are triggered, therefore no prospectus is required. If company B is an SME conducting an IPO raising €100k and thereby eligible for the use of an EU growth prospectus in principal, the fact that the offering is taking place on a regulated market means that the EU growth prospectus is

insufficient. On an MTF, the company would be eligible for use of the EU growth prospectus, though the offering is also beneath the exemption thresholds. An admission document would therefore suffice, unless the company voluntarily decides to opt in to using the EU growth prospectus. The company could also voluntarily produce a full prospectus despite being prospectus exempt and eligible for the reduced EU growth prospectus.[6]

B.4.3 EU growth prospectus: content vis-à-vis full prospectus and admission documents

The content of the EU growth prospectus was defined such as to satisfy multiple objectives. The document strives to reduce costs and red tape for SME issuers, thereby easing their access to capital markets and ensuring that the costs associated with raising capital are not disproportionate to the small amounts that SMEs tend to seek. These goals trade off with the need for adequate information on the investors' side, curbing the items that can ultimately be omitted. Another overarching goal according to Commission Delegated Regulation (EU) 2019/980[7], which supplements Prospectus Regulation (EU) 2017/1129 and defines required prospectus content, is enabling issuers to draft an EU growth prospectus without external advice.

Disclosure is reduced in contrast to the full prospectus and varies from both the full prospectus and admission documents (ESMA, 2018; ESMA, 2017). The extent of the differences further depends on whether the issuer is eligible to file an EU growth prospectus classifies as a *smallcap* or a *midcap*, differentiated by a market capitalisation up to or exceeding €200m, respectively. Smallcaps may omit more items than midcaps.

[6]The SME Listings Act Proposal seeks to eliminate the option of firm's qualifying for use of the EU growth prospectus to voluntarily overfulfil and produce a full prospectus.

[7]Commission Delegated Regulation (EU) 2019/980 of 14 March 2019 supplementing Regulation (EU) 2017/1129 of the European Parliament and of the Council as regards the format, content, scrutiny and approval of the prospectus to be published when securities are offered to the public or admitted to trading on a regulated market, and repealing Commission Regulation (EC) No 809/2004. OJ L 166/26.

From Commission Delegated Regulation (EU) 2019/980, compared to the full prospectus, no disclosure is notably required on patents and licenses, and smallcaps can additionally exclude R&D activities. In terms of corporate governance, information on board practices or employees (except for their shareholdings) can be omitted. Further disclosure cuts include information on statutory auditors, important events in the development of the issuer's business, validations for statements on the issuer's competitive position, and joint ventures or undertakings.

For some items, while disclosure is still required, it is reduced when compared to the content provisions of full prospectuses. Within the EU growth prospectus, 'principal activities', a section on the issuer's main products and significant new products, does not require an annual product overview or information on the status of development of new products. The description of the issuer's 'principal markets' need not entail a breakdown of total revenues. Regarding organisational structure, it suffices to explain dependencies upon entities within its company group where material to business undertakings, without detailing ownership percentages or voting power (subsidiaries and holdings). EU growth prospectus issuers need not indicate changes in financial performance caused by trends or describe such trends that are likely to materially affect performance. The issuer's regulatory environment need not be addressed and evaluated in a dedicated section, needing only to be referred to when relevant to strategy and operations. Corporate governance disclosure reductions are limited to not needing to state board or senior management members' prior company affiliations.

Regarding the issuer's financials, capital resources (except for borrowing requirements and funding structure), cash flow statements, and changes in equity may be omitted. Audited historical financial information need only be provided for the prior two rather than three financial years. If the last audited financial statements is more than nine months old, interim financial information need not be provided.

Smallcaps benefit from further reductions to financial disclosures. They need not

include an operating and financial review, working capital statement, or statement of capitalisation and indebtedness in their EU growth prospectus.

Though admission documents are exchange-specific, they have certain commonalities allowing a comparison to the EU growth prospectus. The need to include financial statements for the prior two financial years is a similarity of both documents. Admission documents frequently require disclosure on board practices, employees, as well as subsidiaries and holdings (ESMA, 2017). As outlined above, these are not required within the EU growth prospectus. Where an admission document is used to seek access to an SME GM, a working capital statement must be included. This inclusion is in fact mandated by Commission Delegated Regulation (EU) 2019/980 and is therefore a regulated item of the otherwise largely unregulated admission documents. EU growth prospectus issuers need only include a working capital statement if they classify as a midcap. On the other hand, the operating and financial reviews, which the EU growth prospectus requires for midcaps, is largely not required by admission documents at all.

Chapter 3

C.1 List of variables

Table C.1: List of variables
This table presents a list and definition of the variables used in Chapter 3. All inflation adjustments are conducted using the Consumer Price Index (CPI). All continuous variables are winsorised at the 1^{st} and 99^{th} percentiles.

Variable	**Description**
Main variables	
EO: BB	Dummy equal to 1 if broad-based EO entailing equity participation was introduced prior to the IPO. *Source: EFES.*
EO: exec-only	Dummy equal to 1 if executive-only EO entailing equity participation was introduced prior to the IPO. *Source: EFES.*
Underpricing	Percent change between firm's IPO offer price and its first closing price: $\frac{First\ closing\ price - Offer\ price}{Offer\ price}$. *Source: Datastream, SDC.*
Total blockholdings	Sum of all outside blockholdings expressed as a proportion of total shares. *Source: own data.*
Largest blockholding	Sum of the largest blockholding expressed as a proportion of total shares. *Source: own data.*
Number of blockholdings	Number of blockholdings exceeding 5% of total shares. Log transformed as indicated ($ln(x+1)$). *Source: own data.*
Control variables	
30-day industry return	Continuous 30-day return of Fama-French 48 industries. Control for industry information spillovers. *Source: Kenneth French.*
Average salary	Annual salary in 2010 US dollars divided by the number of employees. Log transformed as indicated ($ln(x+1)$). *Source: Worldscope.*
Carve-out	Dummy equal to 1 if IPO corresponds to a carve-out. *Source: SDC.*
Country	Country of incorporation. *Source: EFES.*
Debt ratio	Ratio of book debt to book equity, control for leverage. *Source: Worldscope.*
Employees	Number of employees. Log transformed as indicated ($ln(x+1)$). *Source: Worldscope.*
Firm age	Years since firm establishment. Log transformed as indicated ($ln(x+1)$). *Source: Orbis, SDC, Worldscope.*
Firm volatility	Standard deviation of returns in the year after the IPO, control for volatility. *Source: Datastream.*
Fixed price indicator	Dummy equal to 1 if the IPO was a fixed-price offering. *Source: SDC, own data.*
Industry	Industry according to the Fama-French 12 industry classification. *Source: Kenneth French, SDC.*

continued on next page

Table C.1: (continued)

Variable	**Description**
MTB	Market-to-book ratio, market value of equity divided by book value of equity. *Source: Worldscope.*
Offer price revision	Percent difference between offer price and mean of indicative price range, control for investor information: $\frac{Offer\ price - Mean\ filing\ range}{Mean\ filing}$, where $Mean\ filing = \frac{Offer\ price\ range\ high + Offer\ price\ range\ low}{2}$. *Source: SDC, own data.*
Overhang	Ratio of shares retained to shares offered, control for wealth gains incurred by IPO underpricing: $\frac{Shares\ retained}{Shares\ offered}$, where *Shares retained = Pre-IPO shares outstanding - Secondary shares offered. Source: SDC, own data.*
Primary ratio	New shares issued by the firm divided by total shares offered at the IPO. *Source: SDC, own data.*
Proceeds	Total proceeds raised at the IPO in 2010 millions of US dollars. *Source: SDC.*
ROA	Return on assets, calculated as net income divided by total assets. *Source: Worldscope.*
Reverse-LBO	Dummy equal to 1 if firm was subject to a leveraged buy-out. *Source: SDC.*
Sales	Net sales in 2010 millions of US dollars. dollars. Log transformed as indicated ($ln(x+1)$). *Source: Worldscope.*
Tangibility	Ratio of fixed (i.e., property, plant, equipment) to total assets, control for agency costs. *Source: Worldscope.*
Tobin's Q	Market value of assets (determined by subtracting book value of equity from total assets and adding market value of equity) divided by book value of assets. *Source. Worldscope.*
Total assets	Total assets in 2010 millions of US dollars. Log transformed as indicated ($ln(x+1)$). *Source: Worldscope.*
VC indicator	Dummy equal to 1 if firm has venture capital backing at its IPO. *Source: SDC.*
Year	Year of the IPO. *Source: SDC.*

C.2 Descriptive statistics

Table C.2: Descriptive statistics
This table reports the number of observations (N), mean value (Mean), standard deviation (SD), 25^{th} percentile (p25), median (p50), and 75^{th} percentile (p75) of variables used in Chapter 3. All currency values are expressed in 2010 US dollars. For a definition of variables see Table C.1.

	N	Mean	SD	P25	Median	P75
Panel A: underpricing analyses						
EO: BB	928	0.322	0.468	0.000	0.000	1.000
Underpricing	928	0.093	0.161	0.000	0.049	0.139
Log of total assets	928	5.663	2.235	4.013	5.630	7.164
30-day industry return	928	0.013	0.053	-0.017	0.017	0.048
Overhang	928	2.577	2.372	1.151	2.031	3.000
VC indicator	928	0.120	0.325	0.000	0.000	0.000
Reverse-LBO indicator	928	0.192	0.394	0.000	0.000	0.000
Carve-out indicator	928	0.255	0.436	0.000	0.000	1.000
Offer price revision	928	-0.013	0.081	-0.048	0.000	0.040
Fixed price indicator	928	0.237	0.426	0.000	0.000	0.000
Panel B: ownership analyses						
EO: BB	834	0.333	0.472	0.000	0.000	1.000
Total blockholdings	834	0.261	0.241	0.000	0.212	0.461
Largest blockholding	834	0.157	0.161	0.000	0.107	0.237
Log number of blockholdings	834	0.885	0.646	0.000	1.099	1.386
Underpricing	834	0.084	0.147	0.000	0.048	0.133
VC indicator	834	0.119	0.324	0.000	0.000	0.000
Reverse-LBO indicator	834	0.209	0.407	0.000	0.000	0.000
Carve-out indicator	834	0.273	0.446	0.000	0.000	1.000
Overhang	834	2.455	2.219	1.131	1.971	3.000
Log of total assets	834	5.839	2.209	4.224	5.864	7.324
Debt ratio	834	0.333	0.304	0.084	0.284	0.507
Tangibility	834	0.211	0.231	0.034	0.129	0.314
Firm volatility	834	0.025	0.013	0.016	0.021	0.029

C.3 Robustness test with size-matched control group

Table C.3.1: EO and IPO underpricing using alternative size measures
This table repeats the baseline analyses of Table 3.2 using alternative measures of firm size. The dependent variable (*Underpricing*) measures the percent difference between a firm's first closing price and its offer price. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. Huber/White robust standard errors clustered by industry and year are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1.

	(I)	(II)	(III)
	Underpricing	Underpricing	Underpricing
EO: BB	**-0.020****	**-0.019****	**-0.020****
	(0.009)	**(0.009)**	**(0.009)**
Log of sales	-0.003		
	(0.003)		
Log of employees		-0.001	
		(0.002)	
Log of proceeds			-0.005
			(0.004)
30-day industry return	0.155	0.142	0.155
	(0.109)	(0.119)	(0.108)
Overhang	0.003	0.004	0.002
	(0.003)	(0.003)	(0.003)
VC indicator	0.021	0.013	0.023
	(0.017)	(0.015)	(0.017)
Reverse-LBO indicator	-0.006	-0.009	-0.007
	(0.011)	(0.011)	(0.011)
Carve-out indicator	-0.001	-0.007	-0.002
	(0.013)	(0.013)	(0.012)
Offer price revision	0.615***	0.599***	0.622***
	(0.067)	(0.069)	(0.069)
Fixed price indicator	0.038**	0.043***	0.038**
	(0.016)	(0.016)	(0.015)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	928	892	928
Adj. R^2	0.213	0.203	0.213

Table C.3.2: Univariate comparison of EO firms and size-matched non-EO firms
This table provides mean comparisons for various firm and IPO characteristics for the size-matched sample across the two groups of broad-based EO and non-EO firms. A t-test comparing equivalence of sample means is conducted using Huber/White robust standard errors. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1.

	EO firms		Non-EO firms		Difference	
	N	Mean	N	Mean	Mean	t-stat
Firm characteristics pre-IPO						
Log of firm age	299	2.817	299	2.770	0.047	0.477
Log of total assets	299	6.177	299	6.052	0.125	0.722
Log of sales	299	5.697	299	5.585	0.113	0.650
Log of employees	297	7.071	285	7.035	0.037	0.245
Log of average salary	252	11.170	257	10.998	0.172***	3.297
ROA	299	0.031	295	0.034	-0.003	-0.376
Tangibility	297	0.191	298	0.217	-0.026	-1.401
Debt ratio	297	0.341	299	0.349	-0.008	-0.310
VC indicator	299	0.147	299	0.120	0.027	0.960
Reverse-LBO indicator	299	0.237	299	0.194	0.043	1.292
Carve-out indicator	299	0.284	299	0.254	0.030	0.829
Firm characteristics post-IPO						
MTB	296	4.779	295	4.312	0.467	1.109
Tobin's Q	296	2.639	295	2.464	0.175	0.974
IPO characteristics						
Underpricing	299	0.070	299	0.102	-0.032**	-2.555
Log of proceeds	299	5.523	299	5.383	0.140	1.229
Primary ratio	299	0.448	299	0.507	-0.059*	-1.872
Overhang	299	2.445	299	2.529	-0.085	-0.460
Offer price revision	299	-0.014	299	-0.020	0.006	0.921
Fixed price indicator	299	0.204	299	0.187	0.017	0.515

Table C.3.3: EO and IPO underpricing: size-matched sample
This table repeats the baseline analyses of Table 3.2 using the size-matched sample. The dependent variable (*Underpricing*) measures the percent difference between a firm's first closing price and its offer price. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. Huber/White robust standard errors clustered by industry and year are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1.

	(I)	(II)	(III)
	Underpricing	Underpricing	Underpricing
EO: BB	**-0.038*** **	**-0.035*** **	**-0.034*** **
	(0.012)	**(0.011)**	**(0.011)**
Log of total assets		-0.005	-0.001
		(0.004)	(0.003)
30-day industry return		0.371***	0.251**
		(0.141)	(0.123)
Overhang		0.005	0.004
		(0.003)	(0.003)
VC indicator		-0.004	0.005
		(0.018)	(0.018)
Reverse-LBO indicator		-0.031**	-0.015
		(0.013)	(0.013)
Carve-out indicator		0.000	0.006
		(0.017)	(0.016)
Offer price revision			0.569***
			(0.080)
Fixed price indicator			0.040**
			(0.017)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	595	595	595
Adj. R^2	0.107	0.133	0.235

C.4 Robustness test excluding UK

Table C.4: EO and IPO underpricing excluding UK
This table repeats the baseline analyses of Table 3.2 excluding the UK. The dependent variable (*Underpricing*) measures the percent difference between a firm's first closing price and its offer price. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. Huber/White robust standard errors clustered by industry and year are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1.

	(I)	(II)	(III)
	Underpricing	Underpricing	Underpricing
EO: BB	**-0.039*** **	**-0.033** **	**-0.029** **
	(0.014)	**(0.014)**	**(0.012)**
Log of total assets		-0.007*	-0.003
		(0.004)	(0.004)
30-day industry return		0.258*	0.121
		(0.149)	(0.138)
Overhang		0.008**	0.007*
		(0.004)	(0.003)
VC indicator		0.026	0.039*
		(0.023)	(0.023)
Reverse-LBO indicator		-0.019	-0.004
		(0.016)	(0.014)
Carve-out indicator		-0.001	0.007
		(0.017)	(0.017)
Offer price revision			0.632***
			(0.079)
Fixed price indicator			0.043
			(0.030)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	659	659	659
Adj. R^2	0.118	0.141	0.234

C.5 Robustness test with applicable functional form

Table C.5.1: EO and ownership dispersion: adjusted functional form
This table repeats the analyses of Table 3.5 using applicable functional forms. Columns I and II fit a fractional logistic response model to account for the fractional form of the dependent variables. Column III fits a Poisson regression on the count dependent variable. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. In column I, *Total blockholdings* refers to the sum of all blockholdings, where a blockholding refers to outside shareholdings of least 5 % of shares outstanding. *Largest blockholding* (column II) is the proportion of shares held by the largest blockholder. *Number of blockholdings* is the count of blockholdings. Huber/White robust standard errors clustered by firm are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1. Descriptive statistics are shown by Panel B of Table C.2.

	(I) Total blockholdings	(II) Largest blockholding	(III) Number of blockholdings
EO: BB	**-0.236****	**-0.213****	**-0.076**
	(0.094)	**(0.092)**	**(0.064)**
VC indicator	0.630***	0.262**	0.528***
	(0.117)	(0.113)	(0.076)
Reverse-LBO indicator	0.543***	0.517***	0.304***
	(0.113)	(0.114)	(0.078)
Carve-out indicator	0.181	0.242**	0.053
	(0.112)	(0.110)	(0.053)
Overhang	-0.002	-0.001	-0.024
	(0.020)	(0.020)	(0.017)
Log of total assets	-0.021	0.017	-0.078***
	(0.026)	(0.025)	(0.017)
Debt ratio	0.187	0.056	0.156**
	(0.133)	(0.122)	(0.078)
Tangibility	-0.251	-0.311	-0.107
	(0.232)	(0.217)	(0.155)
Firm volatility	5.745	9.340**	-2.872
	(4.634)	(3.728)	(3.078)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	835	835	835
Pseudo-R^2	0.065	0.041	0.128

Table C.5.2: Interaction effect of EO and IPO underpricing on ownership dispersion: adjusted functional form
This table repeats the analyses of Table 3.6 using applicable functional forms. Columns I and II fit a fractional logistic response model to account for the fractional form of the dependent variables. Column III fits a Poisson regression on the count dependent variable. *EO: BB* is a dummy indicating the presence of broad-based EO prior to the IPO. *Underpricing* measures the percent difference between a firm's first closing price and its offer price. In column I, *Total blockholdings* refers to the sum of all blockholdings, where a blockholding refers to outside shareholdings of least 5 % of shares outstanding. *Largest blockholding* (column II) is the proportion of shares held by the largest blockholder. *Number of blockholdings* is the count of blockholdings. The intercept term is included in the analyses, but not reported. Huber/White robust standard errors clustered by industry and year are presented in parentheses. ***, ** and * indicate significance on the 1%-, 5%- and 10%-levels, respectively. For a definition of variables see Table C.1. Descriptive statistics are shown by Panel B of Table C.2.

	(I) Total blockholdings	(II) Largest blockholding	(III) Number of blockholdings
EO: BB	**-0.224****	**-0.230****	**-0.060**
	(0.097)	**(0.092)**	**(0.064)**
Underpricing	**-1.509*****	**-1.090*****	**-0.629****
	(0.389)	**(0.356)**	**(0.265)**
EO: BB × Underpricing	**0.998**	**-0.159**	**0.998****
	(0.742)	**(0.699)**	**(0.441)**
VC indicator	0.632***	0.261**	0.527***
	(0.118)	(0.113)	(0.075)
Reverse-LBO indicator	0.544***	0.505***	0.311***
	(0.113)	(0.114)	(0.078)
Carve-out indicator	0.172	0.233**	0.053
	(0.113)	(0.110)	(0.053)
Overhang	0.003	0.003	-0.022
	(0.020)	(0.019)	(0.017)
Log of total assets	-0.030	0.011	-0.082***
	(0.026)	(0.025)	(0.017)
Debt ratio	0.155	0.028	0.153*
	(0.133)	(0.122)	(0.079)
Tangibility	-0.213	-0.260	-0.102
	(0.231)	(0.216)	(0.154)
Firm volatility	7.262	10.591***	-2.299
	(4.528)	(3.679)	(3.052)
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	835	835	835
Pseudo-R^2	0.069	0.044	0.131

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