Erasmus School of Economics

ERASMUS UNIVERSITY ROTTERDAM

The impact of the JOBS Act on IPO activity and innovation

Abstract

On April 5, 2012, the Jumpstart Our Business Startups ("JOBS") Act was signed into law to reenergise the initial public offering ("IPO") market of the United States, particularly for emerging growth companies ("EGCs"). This study examines the impact of the JOBS Act on US IPO activity, EGC IPO activity, and innovation. The results of this study provide evidence that the JOBS Act increases the IPO activity of US companies and the number of IPOs of EGCs. Controlling for market conditions, I find that the JOBS Act increases the number of public offerings by 24 per year. Furthermore, no supporting evidence is found that the JOBS Act affects the innovation activity of EGCs. Nevertheless, this study shows that EGCs going public are more innovative after the enactment of the JOBS Act.

Keywords: IPO, IPO activity, JOBS Act, innovation, R&D

JEL-codes: G24, G38, K22, O32

Author: Xander Jager | 388558

Programme: MSc Economics and Business | Financial Economics

Supervisor: Dr. S. Gryglewicz

Second assessor: [x]

Publication date: December 28, 2019

Table of Contents

1. Introduction

In the last two decades, the number of US initial public offerings ("IPOs") decreased significantly. The average annual number of public offerings fell from 310 between 1980 and 2000 to 99 IPOs from 2001 to 2012 (Gao, Ritter, and Zhu, 2013). Particularly a decline occurred among companies with annual revenues below $50 million. To illustrate, over this same period, the number of IPOs of small companies dropped by 83%. The drop in IPO volume is remarkable because US real GDP more than doubled between 1980 and 2012 (Worldbank, 2019).

Commentators argue that a drop in IPO activity weakens the economy and lowers job creation. Besides, they assert that a decreasing number of public offerings harms innovation. Innovation is a crucial driver of economic growth and an essential factor in the competitive advantage of countries and companies (Schumpeter, 1934; Solow, 1957; Romer, 1990; Porter, 1998). In 2011, the U.S. Treasury Department formed the "IPO Task Force". The IPO Task Force is a group of industry and business leaders, who investigated the decrease in IPO activity. In addition, the IPO Task Force analysed the link between going public and job creation, as well as the connection of going public and innovation. The IPO Task Force identified multiple reasons for the drop in IPO activity. In particular, the increased "regulatory burden" as a result of, amongst others, the enactment of the Sarbanes-Oxley ("SOX") Act in 2002 is blamed for the drop in IPOs.

In an attempt to revitalise the US IPO market, the Jumpstart Our Business Startups ("JOBS") Act was enacted on April 5, 2012. The JOBS Act establishes a new group of issuers, classified as emerging growth companies ("EGCs") [1]. An issuer has to meet several requirements to elect as EGC, such as revenues below $1 billion as of its most recent fiscal year before the IPO. After the enactment of the JOBS Act, EGCs have improved access to public markets and can benefit from several provisions. For instance, the JOBS Act de-burdens the process of going public because the Act exempts EGCs from certain accounting and disclosure requirements. Further, an EGC can file a draft registration statement on a confidential basis with the SEC. Confidentially filing allows companies to avoid disclosing information to their competitors and other stakeholders in the starting phase of the IPO process, which is important since approximately 20% of the companies that file for an IPO withdraw their registration (Boeh and Dunbar, 2013).

Previous JOBS Act studies examine different effects of the JOBS Act. First, Ritter (2012) argues that the JOBS Act does not result in an increasing number of public offerings. Second, contradictive to Ritter (2012), Dambra, Field, and Gustafson (2015) posit that the JOBS Act accomplished its goal to reenergise the IPO market. Third, Gupta and Israelsen (2016) find that an increasing number of issuers take advantage of the provisions of the JOBS Act. Fourth, Berdejo (2015)

[1] In line with Dambra et al. (2016), I refer in the remainder of this study to issuers with below (greater) $1 billion in revenue as of the most recent fiscal year before the IPO as EGCs or EGC-eligible companies (NEGCs or EGC-ineligible companies) whether their IPO takes place before or after the enactment of the JOBS Act

finds that an increasing number of smaller companies make use of the various disclosure provisions during their IPOs. Fifth, Chaplinsky, Hanley, and Moon (2017) find that underpricing is significantly higher for IPOs of EGCs than the IPOs of other companies. Further, Chaplinsky et al. (2017) show that the direct costs of legal, accounting, and underwriting fees do not decrease for EGCs, while the IPO Task Force expected that these costs would decrease by 30% to 50% (SEC, 2011). Sixth, Agarwal, Gupta, and Israelsen (2017) investigate the behaviour of the SEC in answering to the draft registration statements of companies and find that the comment letters have a more negative tone after the passage of the JOBS Act. Besides, Agarwal et al. (2017) argue that investors pay more attention to the information disclosed by the SEC when they price a stock. Last, Dambra, Field, Gustafson, and Pisciotta (2016) provide evidence that the JOBS Act results in analyst reports that generate lower market reactions, are less precise, and are more biased.

To summarise, previous academic studies showed several effects of the JOBS Act. So far, the effect of the JOBS Act on IPO activity is rarely touched upon. Further, despite the importance of innovation for the competitiveness of countries and companies, no specific research has examined the impact of the JOBS Act on innovation. Therefore, research is necessary to explore how IPO activity and innovation is affected by the JOBS Act. As a result, the research question is formulated as follows:

How does the enactment of the JOBS Act impact IPO activity and innovation of public companies in the US?

To answer this question, it is key to understand the variations in the IPO market, the JOBS Act, and innovation. Therefore, several sub-questions are elaborated on in this paper:

- *What are the variations in IPO activity of the last decades?*
- *What is the JOBS Act and what purpose does it serve?*
- *Does the JOBS Act revamp IPO activity?*
- *What is the importance of innovation for companies?*
- *How does the JOBS Act impact innovation of EGCs?*

To answer the research question, I use an international sample composed of 895 IPOs from Australia, Canada, Hong Kong, Japan, the UK, and the US that are issued and filed between April 1, 2010, and March 31, 2014. Moreover, I construct a sample that consists of 280 EGC-eligible IPOs and 42 EGC-ineligible IPOs that are issued and filed between April 1, 2010, and March 31, 2014. Following previous JOBS Act studies, I construct three difference-in-differences ("DiD") analyses. The first DiD analysis examines the impact of the JOBS Act on US IPO activity, whereas the second DiD analysis assesses the effect of the JOBS Act on the number of public offerings of EGCs. The third DiD analysis investigates the impact of the JOBS Act on the innovation activities of EGCs.

The results of this study indicate that the JOBS Act positively impacts the IPO activity in the US compared to Australia, Canada, Hong Kong, Japan, and the UK, which represent nations with the

largest stock exchanges as measured by market capitalisation in 2012 US dollars. In addition, I show that the IPO volume of EGCs increased compared to EGC-ineligible companies in the two years after the passage of the JOBS Act. Furthermore, I find evidence that the JOBS Act does not directly affect the innovation activities of EGCs. Nevertheless, EGCs following the JOBS Act are more innovative (as measured by R&D expenditures scaled by total assets) and have higher R&D expenditures compared with EGC-eligible companies in the two years before the Act.

This study contributes to the existing literature in various ways. First, the results of this study add to the growing literature on the effects of the JOBS Act (see, for example, Doidge, Karalyi, and Stulz, 2013; Berdejo, 2015; Zimmerman, 2015; Dambra et al., 2016; Agarwal et al., 2017; Barth, Landsman, and Taylor, 2017; Chaplinsky et al., 2017). Second, I confirm and expand evidence from Dambra et al. (2015) that the JOBS Act increases US IPO activity. Third, I provide evidence that the JOBS Act has no impact on innovation and, therefore, this study contributes to the emerging literature on finance and innovation (Bernstein, 2015; Aggarwal and Hsu, 2013; Gao, Hsu, and Li, 2014; Lerner, Sorensen, and Strömberg, 2011). Last, at a broader level, this study is connected to the role of innovation in economic growth (Solow, 1957). To the best of my knowledge, no specific research examined the effect of the JOBS Act on IPO activity between 2010 and 2014. Furthermore, this is the first study that investigates the impact of the JOBS Act on company innovation.

The findings of this study have important implications for managers, shareholders, the government, and policymakers. I provide evidence that the JOBS Act has accomplished Congress' goal to stimulate the number of US IPOs. However, policymakers should bear watching whether EGCs do not damage the economy by being a stand-alone company instead of obtaining economies of scale and scope as part of a larger organisation.

The remainder of this study is organised as follows: Chapter 2 discusses the theoretical framework and outlines the formulated hypotheses. Chapter 3 contains an introduction of the applied methodology in this study. Chapter 4 provides an overview of the data gathering and the variables that are included in the analyses. Chapter 5 presents the empirical results of the conducted analyses. Chapter 6 concludes the study by answering the research question. Further, Chapter 6 highlights the implications and limitations of this study and provides directions for future research.

2. Theoretical framework

2.1 Introduction

This chapter provides an overview of the existing literature relating to the IPO market, JOBS Act, and innovation. The first section sheds light on the importance of the IPO market and outlines the explanations for variations in US IPO activity. The second section describes the JOBS Act and its characteristics. The third section elaborates on the purpose of innovation, the trade-off that public companies face, and the innovation activity of public and private companies. The last section formulates the hypotheses based on the described literature.

2.2 US IPO activity

This section elaborates on the importance of a vibrant IPO market. Furthermore, this section discusses the causes of the fluctuations in US IPO activity of the last decades.

Since 2000, US IPO activity decreased substantially compared to the number of IPOs before the turn of the century. A drop in US IPO activity could limit GDP growth, damage the job market, weaken the competitiveness of the US, and lower innovation (Weild and Kim, 2009). To illustrate, Ritter (2012) argues that an issuer hires on average 822 employees after its IPO and, therefore, the drop in IPOs between 2001 and 2011 resulted in 1.9 million job losses. Further, IPOs are an important step in the growth cycle of a company and enable companies to innovate (IPO Task Force, 2011). Moreover, companies pursue an IPO to raise capital for further growth of their business and to invent and commercialise new products. Therefore, corporate managers, researchers, policymakers, and bankers agree that something must be done to offset the decline in IPOs of the last decades.

Many researchers attempt to explain the variations in IPO activity of recent years. Previous research suggests two particular explanations, referred to as the "regulatory overreach hypothesis", for the decline in IPO activity (Gao et al., 2013). The first explanation for the drop in IPO activity is the enactment of the SOX Act in 2002, which significantly increased compliance costs for public companies, in particular for smaller companies. Especially Section 404 of the SOX Act is held accountable for the inflated compliance costs. Engel, Hayes, and Wang (2007) claim that the number of companies going private increased following the enactment of the SOX Act.

However, inconsistent with the first explanation and thus with the regulatory overreach hypothesis, it is observed that the number of US IPOs was already low before the enactment of the SOX Act (Doidge et al., 2013). Further, in 2007, small companies are relieved from the requirements of Section 404, which did not increase the number of small company IPOs. Admittedly, the financial crisis in 2008 impeded the increase, but in 2010, 2011, and 2012, there were fewer IPOs of small companies than between 2004-2007 (Gao et al., 2013).

The second explanation regarding the decrease in IPO activity focuses on the drop in the "ecosystem" of underwriters. In recent years, fewer underwriters deal with small companies. In

particular, less underwriters provide analyst coverage on a small company IPO. Hence, a decrease in small company IPOs should occur due to the drop in the ecosystem of underwriters that focus on small companies or a lower amount of analyst coverage on small company IPOs. However, Gao et al. (2013) find no decline in analyst coverage on small companies after an IPO, and thus the second explanation is also considered inconsistent with the regulatory overreach hypothesis.

Gao et al. (2013) introduce another explanation for the low number of US IPOs in the last few decades, which is called "the economies of scope hypothesis". The economies of scope hypothesis states that small stand-alone companies, with a focus on organic growth, have lower profits than the profits they can obtain as part of a larger organisation. Innovation can quickly vanish valuable growth opportunities. Therefore, it is crucial for small companies to scale-up fast because as part of a larger organisation, small companies can rapidly introduce a product to the market and achieve economies of scale and scope. Thus, if the economies of scope hypothesis holds, small stand-alone companies are more likely to be acquired than to pursue an IPO. In line with the economies of scope hypothesis, Gao et al. (2013) find evidence that the increased importance of economies of scope and scale causes a drop in IPO activity, especially in the IPOs of smaller companies. Nevertheless, despite the evidence in favour of the economies of scope hypothesis, the theory fails to explain why the number of non-US IPOs of small companies remained constant, while the number of small companies IPOs in the US dropped significantly (Doidge et al., 2013).

To summarise, the average annual number of US IPOs dropped substantially in the last decades. The economies of scope and regulatory overreach hypotheses have fundamentally different explanations for the decline in US IPOs. The regulatory overreach hypothesis posits that the drop in IPO activity is a result of the passage of the SOX Act and a decrease in the ecosystem of underwriters. The economies of scope hypothesis asserts that many small stand-alone companies could obtain higher profits as part of a larger organisation. Nonetheless, commentators agree that the drop in US IPO activity must be resolved.

2.3 Jumpstart Our Business Startups Act

This section elaborates on the JOBS Act, the provisions of the JOBS Act, and the companies that are eligible for these provisions.

The JOBS Act[2] is introduced in Congress on December 8, 2011, and five months later, on April 5, 2012, President Barack Obama signed the JOBS Act into law to reenergise the IPO market. Title 1 of the JOBS Act, known as "IPO on-ramp", is designed to increase the number of public offerings with the aim of spurring economic growth, job creation, and innovation through improved methods of raising capital and by reducing the increased regulatory cascade. In particular, the JOBS Act is entitled to EGCs, which is a new category of issuers. The SEC defines an EGC as an issuer with total revenues

[2] See *H.R. 3606 "Jumpstart Our Business Startups Act"*

below $1 billion as of its most recent fiscal year before the IPO, is not a large accelerated filer[3] under SEC regulations, and has not issued more than $1 billion in non-convertible debt securities over a rolling three-year period (SEC, 2011). An issuer loses its EGC status if they do not continue to meet these requirements and automatically after five years from the issue date of the IPO. Contrary to the SOX Act, the JOBS Act became valid immediately after the enactment without additional rulemaking necessary by the SEC. The JOBS Act offers EGCs the possibility to take advantage of several provisions, which are classified into two categories: de-risking and de-burdening provisions.

The de-risking provisions of the JOBS Act consist of the possibility for EGCs to confidential file a draft registration statement with the SEC. By allowing EGCs to offer a draft IPO registration statement for confidential review, an issuer can obtain comments and make modifications before publicly filing its registration statement. If the issuer eventually decides to go public, the registration statement accompanied by the required alterations of the SEC must be publicly filed no later than 21 days before the start of the roadshow. Contrary, if an EGC decides not to go public, it does not have to disclose any information publicly to competitors and other stakeholders.

Furthermore, the de-risking provisions permit EGCs to gauge the interest of investors in the potential IPO, which is known as testing-the-waters ("TTW"). Before the enactment of the JOBS Act, issuers were not allowed to communicate with investors before the IPO filing. After the passage of the Act, TTW allows an EGC and underwriter to participate in oral or written communication with investors before publicly filing a registration statement. The communication enables issuers to reveal information to qualified investors only when the IPO has a significant chance of success. TTW especially favours issuers with high disclosure costs, such as biotechnology and pharmaceutical companies (Dambra et al., 2015).

The de-burdening provisions of the JOBS Act relieve EGCs from various accounting and disclosure requirements. First, reduced financial statement disclosure allows EGCs to report two years of audited financial statements and selected financial data instead of three and five years. Second, before the JOBS Act, companies were forced to disclose the compensation of five named executives and a complete compensation discussion and analysis section. Currently, the JOBS Act reduces the compensation disclosure for EGCs. The Act requires EGCs to disclose the compensation of three executives and the director compensation and outstanding equity awards table. Third, de-burdening provisions exempt EGCs from auditor attestation of internal controls, as defined under Section 404 of the SOX Act, up to five years after going public instead of two years. Fourth, EGCs are allowed to delay compliance from new or revised accounting requirements of the Financial Accounting Standard Board until the rules become effective for private companies, which is often at a later date than for public companies. Fifth, under the JOBS Act, EGCs can delay compliance from future public

[3] A large accelerated filer is defined by the SEC as "an issuer with an aggregate worldwide public float of $700 million or more" (§240.12b-2 of the Securities Exchange Act 1934)

accounting standards of the Public Company Accounting Oversight Board. Last, executive compensation opt-outs allow EGCs to exempt from requirements of the Dodd-Frank Act, such as Say-on-Pay, Say-on-Frequency, or advisory votes on golden parachutes. Appendix 1 provides a detailed overview of the de-risking and de-burdening provisions from Title 1 of the JOBS Act.

To summarise, after the JOBS Act was signed into law, EGCs can take advantage of the de-risking and de-burdening provisions. Hence, EGCs can benefit from TTW, are allowed to offer a draft IPO registration statement, and are relieved from various accounting and disclosure requirements.

2.4 Innovation activity

This section examines the importance of innovation, the trade-off that public companies face, and discusses the findings of research about the innovation activity of public and private companies.

As discussed in the previous section, the JOBS Act is enacted with the aim of offsetting the decline in IPO activity of the last decades. IPO activity is necessary for economic growth, job creation, and innovation. Innovation is an important factor in the competitive advantage of countries and companies. A country should have a vibrant IPO market because public equity markets represent a valuable source of external capital, which is especially of interest to stimulate a country's innovation. Further, successful innovation increases the long-term profitability of a company and consequently expands the market value of a company (Griliches, 1981; Hall, Jaffe, and Trajtenberg, 2005). Hence, it is important for companies to invest in innovation, as well as for policymakers to encourage innovation. However, for public companies, there exists a trade-off to invest in innovation. On the one hand, capital markets pressure managers to meet short-term stock market expectations, which provides incentives for managers to choose for short-term goals over long-term projects, such as innovation (Holmstrom, 1989). The preference of choosing short-term goals over long-term projects is known as managerial myopia.

Three potential explanations arise that could result in managerial myopia. First, when the reported earnings of a company decrease, the company's stock may become undervalued, which makes it an interesting target. To avoid being acquired, managers boost current earnings by refusing to invest in long-term projects (Stein, 1988). Graham, Harvey, Rajgopal (2005) surveyed 401 financial executives and find that 80% would lower innovation spending (as measured by R&D expenditures) to satisfy the short-term earnings targets of investors and analysts. The results of the survey is in line with the study of Edmans, Fang, and Lewellen (2014), who find that managerial myopia reduces R&D expenditures. Second, a combination of short-term managerial incentives, such as incentive schemes, and information asymmetry could lead to underinvestment in long-run projects (Bebchuk and Stole, 1993). Third, public companies may prefer the exploitation of existing ideas over long-term investments in innovation, because these ideas have a greater probability of quick success, investors desire high probability of short-term returns, and stock prices react to good news (Ferreira, Manso, and Silva, 2012).

On the other hand, financing constraints impede innovation. Access to public markets could

stimulate innovation because it relaxes financial constraints (Stein, 2003). For example, the initial proceeds of an IPO provide direct access to capital, which alleviates short-term constraints. Accordingly, improved access to capital incentivises managers to spur innovation (Arrow, 1962).

In addition to the trade-off for investing in innovation, there are several other explanations for variations in the innovation activity of public companies. For example, institutions have better capabilities to monitor companies compared to regular investors and institutions provide reassurance to managers who are worried about their careers. Consequently, institutional ownership in public companies encourages innovation and the actual productivity of innovation (Aghion, Reenen, and Zingales, 2013). Furthermore, since blockholders trade on private information, the entry of blockholders disciplines managers and, therefore, leads to more efficient stock prices (Edmans and Manso, 2010). As a result of efficient prices, managers are more willing to invest in innovation and refrain themselves from short-term goals (Fang, Tian, and Tice, 2014). In addition, short selling increases a company's innovation by reducing agency conflicts and information asymmetry problems that are deep-rooted in the process of innovation (He and Tian, 2014). Last, the size of a company positively affects the number of R&D expenditures and, therefore, larger companies are more likely to invest in R&D compared to small companies (Shefer and Frenkel, 2005). Alternatively, the probability that investments in R&D increase a company's future productivity is small, which provides fewer incentives for companies to invest in innovation, especially for smaller companies (Baumann and Kritikos, 2016).

Various researchers investigated whether the innovation activity of public and private companies differs. They find evidence that public companies are more innovative than private companies. To illustrate, Gao et al. (2014) claim that public companies are more innovative than private companies (measured by patent citations and counts) by using a sample of US public and private companies between 1997-2008. Bernstein (2015) finds that a company's R&D expenditures and R&D scaled by size both increased in the five years following their issuance. Acharya and Xu (2017) find that public companies in external finance dependent industries allocate more money to R&D and have a more advanced patent portfolio compared to private companies.

Besides, there is evidence that public companies are less innovative in specific cases. For example, the innovation activity of venture-capital funded US biotechnology companies drops after an IPO (Aggarwal and Hsu, 2013).

To summarise, it is evident that innovation is an essential condition for economic growth, the competitive advantage of countries and companies, and company value. For public companies, investing in innovation is subject to a trade-off between managerial myopia and the improved access to capital after an IPO. In addition, this section illustrates various other reasons for differences in innovation activity of public companies. Last, this section describes the debate amongst researchers on whether public companies innovative more compared to private companies.

2.5 Hypotheses

The previous sections outlined the variations of IPO activity in the last decades, discussed the characteristics of the JOBS Act, and elaborated on the innovation activity of public companies. This section formulates the hypotheses that lay the foundation for the methodology and empirical analyses in the subsequent chapters. Based on theory, previous academic research, and own reasoning, I construct multiple hypotheses to answer the research question of this study:

"How does the enactment of the JOBS Act impact IPO activity and innovation of public companies in the US?"

The first hypothesis focuses on the IPO activity of US companies and EGCs surrounding the JOBS Act. To examine the effect of the JOBS Act on US and EGC IPO activity, I divide the first hypothesis into two sub hypotheses. The first sub hypothesis focuses on US IPO activity surrounding the JOBS Act. The number of US IPOs decreased significantly during 1980-2012, which had a substantial effect on economic growth, job creation, and innovation. To revitalise the IPO market, the JOBS Act is signed into law on April 5, 2012. According to Dambra et al. (2015), the JOBS Act stimulates US IPO activity. Therefore, I expect that after the enactment of the JOBS Act, the number of US IPOs increases.

Furthermore, the second sub hypothesis focuses on EGC IPO activity. The JOBS Act is implemented to offset the decline in US IPOs by allowing EGCs to take advantage of de-risking and de-burdening provisions. EGCs can now benefit from TTW and are able to offer a draft registration statement with the SEC. Besides, the de-burdening provisions relieve EGCs from various disclosure and accounting requirements and thus reduce the increased regulatory burden of the IPO market. Since only EGCs benefit from de-risking and de-burdening provisions, it is expected that a possible increase in US IPOs caused by the JOBS Act must be concentrated in the IPOs of EGCs. Ergo, I formulate the following sub hypotheses:

$H_{1,A}$: The JOBS Act increases the number of US IPOs

$H_{1,B}$: The JOBS Act increases the number of EGC IPOs

The second hypothesis focuses on whether the JOBS Act accomplished one of its goals to spur innovation. Even though Aghion and Tirole (1994) posit that innovation must be an essential topic of public policy for governments, as of yet, no specific research has examined the effect of the JOBS Act on company innovation. The effect of the JOBS Act on company innovation is not only of particular relevance for managers and shareholders but also for governments and policymakers.

In the absence of prior research on how the JOBS Act affects a company's innovation activities, this study depends on my own reasoning and other relevant research regarding innovation. For public companies, investing in innovation is subject to a trade-off. Capital markets stimulate managers to choose for short-term earnings expectations over innovation, while simultaneously improved access to

capital after an IPO provides incentives for managers to spur innovation. Bernstein (2015) finds that companies are more innovative following the IPO and Gao et al. (2014) posit that public companies are more innovative compared to private companies. Therefore, I predict that the JOBS Act stimulates the innovation activities of EGCs. Hence, the second hypothesis is stated as follows:

H_2: The JOBS Act increases the innovation activity of EGCs

3. Methodology

This chapter describes the applied methodology and corresponding reasoning that enables empirical examination of the formulated hypotheses. I separately elaborate on the methodology to assess hypotheses *1A*, *1B*, and *2*.

In this study, I conduct three difference-in-differences analyses to provide insight into the differential effect of the JOBS Act on US IPO activity, EGC IPO activity, and innovation. The enactment of the JOBS Act provides a unique environment to analyse these effects before and after the JOBS Act. According to Abadie (2005), DiD analyses are a popular tool to estimate causal relationships of public interventions on relevant variables and are frequently used in economics since the work by Ashenfelter and Card (1984). A DiD analysis evaluates the impact of a program or law by examining whether the treatment group diverges from its "baseline mean" to a greater extent than a control group (Somers, Zhu, Jacob, and Bloom, 2013). Subsequently, an essential assumption of the DiD analysis is that in the absence of the treatment, the treatment group should follow a similar trend as the control group. This "parallel trend" assumption may be violated if characteristics in the pre-treatment period, that are expected to be related to the relevant dependent variable, are unequal for the treatment group and control group. However, there is no statistical test for the parallel trend assumption and, therefore, I assume that the parallel trend assumption holds in the DiD analyses of this study.

The first DiD analysis tests hypothesis *1A*. Following Dambra et al. (2015), I use a DiD analysis to compare US IPO activity with the IPO activity of a control group of five developed nations with the largest stock exchanges as measured by market capitalisation in 2012 millions of US dollars. These developed nations are Australia, Canada, Hong Kong, Japan, and the UK. In this setting, I obtain an estimate of the effect from the JOBS Act by comparing the change in US IPOs with the change in IPO activity of the five developed nations between the pre-JOBS and post-JOBS period. Since the five developed nations are not exposed to the effect of the JOBS Act, comparing these nations with the US results in an unbiased estimate of the effect of the JOBS Act on US IPO activity. Further, this setting removes biases in the post-JOBS period that can occur from permanent inequalities between the US and the five developed nations. Besides, the DiD analyses remove biases from common trends over the pre- and post-JOBS period. The regression model for hypothesis *1A* is outlined in Equation (1).

$$IPO\ activity_{i,t} = \alpha + \beta_1 US_i + \beta_2 Post - JOBS_t + \beta_3 US_i\ x\ Post - JOBS_t + \beta_4 Stock\ return_{i,t-1} + \beta_5 GDP\ growth_{i,t-1} + \varepsilon \quad (1)$$

IPO activity is measured by two proxies of IPO activity. On the one hand, *IPO activity* is measured as the number of nation-quarter IPOs scaled by nation's number of listed public companies as of the most recent year before the IPO. On the other hand, *IPO activity* is measured as the sum of nation's quarterly IPO proceeds scaled by nation's total market capitalisation of listed public companies as of the most

recent fiscal year before the IPO. *US* is a dummy variable that is equal to one for US public offerings and zero otherwise. *Post-JOBS* is a dummy variable that equals one for IPOs after the enactment of the JOBS Act and zero otherwise. *US x Post-JOBS* is an interaction term between *US* and *Post-JOBS*. *Stock return* represents nation's monthly return in the year before the beginning of the quarter. *GDP growth* is the annual change in GDP as of the most recent year before the IPO measured in percentage terms, and ε is an error term.

Whether I confirm hypothesis 1_A depends on the main variable of interest, *US x Post-JOBS*. A significant positive coefficient of *US x Post-JOBS* indicates that the US experiences a larger post-JOBS increase in IPO volume compared to the control group. Thus, in line with hypothesis 1_A, I expect that the dummy variable *US x Post-JOBS* shows a positive and statistically significant correlation with *IPO activity*. Further, variable *US* controls for constant differences between the US and the control group with. A significant coefficient of *US* indicates that the IPO activity of US companies differs from the control group. Last, *Post-JOBS* removes biases stemming from common trends over the pre- and post-JOBS period. A positive and significant coefficient *Post-JOBS* implies that IPO activity increases in the post-JOBS period compared to the pre-JOBS period.

The second DiD analysis examines hypothesis 1_B, which states that if the JOBS Act is successful in increasing US IPO activity, the increase must be concentrated in EGCs. For hypothesis 1_B, I conduct a DiD analysis to compare the IPO activity between EGCs and a control group of non-emerging growth companies ("NEGCs") in the two years before and after the JOBS Act. NEGCs are companies with revenues above $1 billion as of the most recent fiscal year before the IPO. In this analysis, EGCs represent the treatment group and NEGCs form the control group because the provisions of the JOBS Act are not appropriate for NEGCs. The regression model for hypothesis 1_B is defined in Equation (2).

$$
\begin{aligned}
&IPO\ activity_{i,t} \\
&= \alpha + \beta_1 EGC_i + \beta_2 Post-JOBS_t + \beta_3 EGC_i\ x\ Post-JOBS_t + \beta_4 Revenue_{i,t-1} + \beta_5 Proceeds_{i,t} \\
&+ \beta_6 Assets_{i,t-1} + \beta_7 Debt_{i,t-1} + \beta_8 Cash_{i,t-1} + \beta_9 MTB_{i,t-1} + \beta_{10} ShareholdersEquity_{i,t-1} \\
&+ \gamma\ Industry\ FE + \varepsilon \qquad (2)
\end{aligned}
$$

IPO activity is IPO activity measured as the number of nation-quarter IPOs scaled by nation's number of listed public companies as of the most recent year before the IPO or measured the sum of nation's quarterly IPO proceeds scaled by nation's total market capitalisation of listed public companies as of the most recent year before the IPO. *EGC* is a dummy variable that is equal to one for EGC public offerings and zero otherwise. *Post-JOBS* is a dummy variable equal to one if the offer date is after the enactment of the JOBS Act and zero otherwise. *EGC x Post-JOBS* is an interaction term between *EGC* and *Post-JOBS*. *Revenue, Proceeds, Assets, Debt, Cash, Market-to-Book ("MTB"), and ShareholdersEquity* are control variables which I further discuss in Section 4.2.3. *Industry FE* are

industry fixed effects using the 17 industry classifications of Fama and French, and ε is an error term.

I validate hypothesis 1_B if the primary variable of interest, *EGC x Post-JOBS*, has a positive and significant correlation with *IPO activity*. A statistically significant coefficient of *EGC x Post-JOBS* shows that the JOBS Act influences the IPO activity of EGCs compared to NEGCs. Furthermore, with variable *EGC*, I control for constant differences between EGCs and NEGCs. A positive and significant coefficient of *EGC* implies that the IPO activity of companies with revenues below $1 billion is higher compared to NEGCs. Besides, *Post-JOBS* removes biases stemming from common trends over the pre- and post-JOBS period. A significant coefficient *Post-JOBS* indicates that IPO activity differs in the two years following the JOBS Act relative to the two years before.

Last, I conduct a third DiD analysis to assess hypothesis *2*. The third DiD analysis examines the differential effect of the JOBS Act on the innovation activity of EGCS compared to a control group of NEGCs. I use a control group of NEGCs, because, similar to the second DiD analysis, NEGCs are not affected by the JOBS Act. The regression model for hypothesis *2* is displayed in Equation (3).

$$
\begin{aligned}
&Innovation\ activity_{i,t} \\
&= \alpha + \beta_1 EGC_i + \beta_2 Post-JOBS_t + \beta_3 EGC_i\ x\ Post-JOBS_t + \beta_4 Revenue_{i,t-1} + \beta_5 Proceeds_{i,t} \\
&+ \beta_6 Assets_{i,t-1} + \beta_7 Debt_{i,t-1} + \beta_8 Cash_{i,t-1} + \beta_9 MTB_{i,t-1} + \beta_{10} ShareholdersEquity_{i,t-1} \\
&+ \gamma\ Industry\ FE + \varepsilon \qquad (3)
\end{aligned}
$$

Innovation activity is innovation activity measured as R&D expenditures scaled by total assets. *EGC* is a dummy variable that is equal to one for EGC IPOs and zero otherwise. *Post-JOBS* is a dummy variable that equals one if the offer date is after the enactment of the JOBS Act and zero otherwise. *EGC x Post-JOBS* is an interaction term between *EGC* and *Post-JOBS*. *Revenue, Proceeds, Assets, Debt, Cash, MTB, and ShareholdersEquity* are control variables, which I further discuss in Section 4.2.3. *Industry FE* are industry fixed effects using the 17 industry classifications of Fama and French, and ε is an error term.

I confirm hypothesis *2* if the JOBS Act increases innovation for EGCs in the post-JOBS period. Ergo, if the main variable of interest, *EGC x Post-JOBS*, is positive and statistically significant, I indicate that the JOBS Act is successful in increasing innovation for EGCs relative to NEGCs. In addition, in the third DiD analysis, *EGC* assesses whether innovation activities differ amongst EGCs and NEGCs. *Post-JOBS* shows whether innovation differs before and after the JOBS Act.

To conclude, I use three DiD analyses to examine the impact of the JOBS Act on US IPO activity, EGC IPO activity, and innovation. Section 4.2 further elaborates upon the variables included in this chapter.

4. Data

This chapter elaborates on the data used to test the hypotheses. The first section describes the construction of data and covers the sources of the used data. The second section discusses the variables that are used in the DiD analyses. The last section provides an overview of the descriptive statistics to obtain a fundamental understanding of the data structure.

4.1 Data sources

This section describes the sources from which the data is obtained. To determine whether the JOBS Act has affected US IPO activity, EGC IPO activity, and innovation, I construct two samples. The first sample is an international sample, which consists of IPOs of Australia, Canada, Hong Kong, Japan, the UK, and the US that are issued and filed between April 2010 and March 2014. The second sample consists of US IPOs issued and filed in the two years before and two years after the JOBS Act, which is furthered referred to as the "EGC sample". The requirement that IPOs are issued and filed in the pre- and post-JOBS period guarantees that both periods are equal in duration. Further, the samples consist of IPOs two years before and after the JOBS Act to mitigate any confounding effects of the financial crisis (Gupta and Israelsen, 2016). To construct the international and EGC sample, I use data from multiple databases: Thomson Reuters Securities Data Company ("SDC") Platinum database, Electronic Data Gathering Analysis and Retrieval ("EDGAR") database, Worldbank[4], Ken French's website[5], and Datastream.

From the SDC database, I obtain the IPOs of the international sample. The international sample consists of US IPOs and a control group of IPOs of five other developed nations (Australia, Canada, Hong Kong, Japan, and the UK) that are issued and filed between April 1, 2010, and March 31, 2014, which symbolises two years before and after the enactment of the JOBS Act. The nations of the control sample are similar to the study of Dambra et al. (2015) and represent the nations with the largest stock exchanges as measured by market capitalisation in 2012 US dollars. In line with previous IPO studies, I use SDC filters to exclude fillings of financial institutions (SIC code 6000-6999), real estate investment trusts ("REITs"), limited partnerships, non-original IPOs[6], foreign IPOs[7], unit issues, and IPOs with proceeds below $5 million. For the nations Japan and the UK, I include unit issues. Otherwise, the number of IPOs for these nations is insufficient.

For each IPO in the international sample, the following data is obtained from SDC: ISIN, SEDOL and SIC codes, IPO proceeds, and the issue date of the IPO. Thereafter, I manually exclude non-initial public offerings and companies without identifiers (either ISIN or SEDOL codes). As a result, the international sample consists of 895 IPOs in Australia, Canada, Hong Kong, Japan, the UK,

[4] See *https://data.worldbank.org*
[5] See *https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html*
[6] Issuers that are already listed on another exchange
[7] Issuers listed on a foreign exchange without being listed in their country of origin

and the US. Appendix 2 presents a detailed overview of the selection process for the international sample.

The second sample in this study is the EGC sample. From the SDC database, I obtain the IPOs of the EGC sample. For the EGC sample, issuers are required to both issue and file an IPO between April 1, 2010, and March 31, 2012, for the pre-JOBS period or both issue and file an IPO between April 1 2012, and March 31, 2014, for the post-JOBS period. Similar to the international sample, the EGC sample uses filters from SDC to exclude fillings of financial institutions, REITs, limited partnerships, non-original IPOs, foreign IPOs, unit issues, and IPOs with proceeds below $5 million.

Furthermore, for each IPO in the EGC sample, I obtain the following data from SDC: ISIN, SEDOL and SIC codes, IPO proceeds, and the issue date. Thereafter, I manually eliminate non-initial public offerings, companies with non-US identifiers (but including British Virgin Islands, Guernsey, or the Cayman Islands), companies without identifier (either ISIN or SEDOL codes), companies without REIT SIC Code but classified as REIT in their prospectus, and companies without a prospectus (424B4 filing) in the EDGAR database. Moreover, I verify mistakes in the sample with the reported corrections on the website of Jay Ritter[8], who is a professor of Finance at the University of Florida and has written about IPOs for over 30 years.

Subsequently, I manually identify whether issuers in the pre- and post-JOBS periods are eligible or ineligible as EGC because there is no data available that reports this status. In the pre-JOBS period, issuers are eligible as EGC when they report revenues in their prospectus of less than $1 billion as of the most recent fiscal year before the IPO. In the post-JOBS period, I derive EGC eligibility from the first page of an issuer's prospectus since EGCs are required to disclose their contingent "emerging growth company" election on the first page. The prospectuses are obtained from the EDGAR database. After applying all of the criteria mentioned above, the EGC sample consists of 116 pre-JOBS EGC-eligible, 19 pre-JOBS EGC-ineligible (NEGC) IPOs, 164 post-JOBS EGC-eligible, and 23 post-JOBS EGC-ineligible (NEGC) IPOs.

The World Bank database is used to obtain data of GDP growth, the number of listed domestic companies[9], and the market capitalisation of listed domestic companies (as measured in current US dollars). For the UK, data of the market capitalisation of listed domestic companies remains incomplete from 2009 onwards. Since market capitalisation data of the Euro area is available, I use the compound annual growth rate of the Euro area from 2008 till 2014 for the UK. Accordingly, the market capitalisation of listed domestic companies for the UK is affected by this adjustment and, therefore, cause noise. In addition, I collect data of national stock returns from Ken French's website.

For each public offering in the EGC sample, I use the Datastream database to obtain the following annual accounting data: revenue, R&D expenditures, total assets, total debt, shareholders'

[8] See *https://site.warrington.ufl.edu/ritter/files/2019/04/SDC-corrections.pdf*

[9] Includes nation's listed domestic companies as of the end of the fiscal year and exclusively listed foreign companies. Excludes investment funds, unit trusts, REITs, and other investment companies

equity, cash, and book value of equity. If any of the data is missing, I hand collect the accounting data from IPO prospectuses.

4.2 Variables

This section describes the construction of variables used for the DiD analyses. The variables outlined in this section are based on previous IPO, JOBS Act, and innovation studies. The first subsection discusses the dependent variables of this study. The second subsection examines the independent variables. The last subsection explains the control variables. Appendix 4 provides a descriptive list of the dependent, independent, and control variables covered in this section.

4.2.1 Dependent variables

In line with Dambra et al. (2015), I construct two dependent variables to test hypotheses 1_A and 1_B. These dependent variables are measures of quarterly IPO activity for the international sample and EGC sample. The first measure of *IPO activity* for nation *i* at quarter *t* is shown in Equation (4).

$$IPO\ activity_{i,t} = \frac{IPOs_{i,t}}{Public\ companies_{i,t-1}} x\ 100 \tag{4}$$

where $IPOs_{i,t}$ depicts the number of IPOs for nation *i* at quarter *t* and $Public\ companies_{i,t-1}$ characterises the number of listed domestic companies of nation *i* as of the most recent year before the IPO $t-1$.

The second dependent variable is the sum of nations' quarterly IPO proceeds scaled by nation's total market capitalisation of listed domestic companies:

$$IPO\ activity_{i,t} = \frac{IPO\ proceeds_{i,t}}{Total\ market\ capatalisation_{i,t-1}} x\ 100 \tag{5}$$

where $IPO\ activity_{i,t}$ is the IPO activity for nation *i* at quarter *t*, *IPO proceeds* represents the sum of IPO proceeds of nation *i* in quarter *t*, and *total market capitalisation* denotes the total market capitalisation of listed domestic companies of nation *i* as of the most recent year before the IPO $t-1$.

To test hypothesis *2*, a good proxy for innovation is needed. However, finding a good proxy for innovation is complicated. Previous academic literature already indicated the challenges regarding the measurement of innovation (see, for example, Dodgson and Hinze, 2000; Smith, 2005). Commonly-used measures of innovation in academic literature include expenditure data (R&D expenditures), count-based data (patent citations and patent counts), and qualitative assessments (surveys) (Jensen and Webster, 2009). For patent data, the NBER database is generally used, but this database does not incorporate data after 2006. The Harvard Business School patent database is another frequently used database for patent information. However, this database consists of patent information no later than 2010. Hence, since I investigate time periods after 2010, patent data is not suitable for this study.

Furthermore, qualitative assessments often result in non-response and sample selection biases (Jensen and Webster, 2009). Therefore, in this study, I use expenditure data to measure innovation. While academic literature acknowledges that R&D expenditures are not a perfect measure of innovation, the use of R&D scaled by the book value of total assets as a proxy for innovation activity is widely accepted (Hall et al., 2005; Lantz and Sahut, 2005; Lin, Lee, and Hung, 2006). Further, although the extent to which R&D expenditures affect innovation differs across academic literature, one uniform finding is that the probability of being an innovative company is positively related with the number of R&D expenditures (Baumann and Kritikos, 2016).

Taking the aforementioned into account, I use R&D expenditures over the book value of total assets as a proxy for innovation, as shown in Equation (6).

$$Innovation\ activity_{i,t} = \frac{R\&D\ expenditures_{i,t-1}}{Assets_{i,t-1}} \tag{6}$$

where $Innovation\ activity_{i,t}$ is the innovation activity for issuer *i* at year *t*, $R\&D\ expenditures_{i,t-1}$ are the R&D expenditures of issuer i as of the most recent fiscal year before the IPO $t-1$, and $Assets_{i,t-1}$ characterises total assets of company *i* as of the most recent fiscal year before the IPO $t-1$.

4.2.2 Independent variables

In the first DiD analysis, the main variable of interest is *US x Post-JOBS* based on the study of Dambra et al. (2015). *US x Post-JOBS* captures the variation in IPO activity between the US and the control group of five developed nations (Australia, Canada, Hong Kong, Japan, and the UK) after the enactment of the JOBS Act. The first DiD analysis examines hypothesis 1_A, which asserts that the introduction of the JOBS Act increases US IPO activity.

In the second DiD analysis, I use *EGC x Post-JOBS* as the main variable of interest to assess the effect of the JOBS Act on EGC IPO activity compared to the control group of NEGCs (Dambra et al., 2016; Barth et al., 2017; Chaplinsky et al., 2017). *EGC x Post-JOBS* identifies the post-JOBS change in EGC IPO activity because this variable isolates the effects for EGCs after controlling for any differences in market conditions that impact both EGCs and NEGCs. In the third DiD analysis, I also use *EGC x Post-JOBS* to measure whether innovation activity differs between EGCs and NEGCs after the enactment of the JOBS Act.

Furthermore, in line with previous JOBS Act research, I use *US* and *Post-JOBS* as dummy variables for the first DiD analyses, and *EGC* and *Post-JOBS* for the second and third DiD analyses (Dambra et al., 2016; Barth et al., 2017; Chaplinsky et al., 2017). *US* is a dummy variable that is equal to one for US public offerings and zero otherwise. *EGC* is a dummy variable that is equal to one for EGC-eligible companies (issuers with below $1 billion in revenue as of the most recent fiscal year

before the IPO) and zero otherwise. *Post-JOBS* is a dummy variable equal to one if the public offering occurs after the passage of the JOBS Act (zero otherwise).

4.2.3 Control variables

Control variables are added to account for the possibility that other variables may cause the relationship between the independent and dependent variable. The control variables in this study are included after a thorough inspection of its theoretical relevance, an examination of the Pearson correlation matrices, and the evaluation of initial regression results.

In the first DiD analysis, two control variables are developed to control for nation-specific economic conditions between the US and the control group (Dambra et al., 2015). The control variables are *GDP growth* and *Stock return. GDP growth* denotes the annual per cent change in GDP of a given nation as of the end of its most recent calendar year.

Loughran and Ritter (2004) argue that the level of the stock market influences IPO activity and thus when the level of the stock market is higher, the number of IPOs increases. There are several explanations for this phenomenon (Lowry, 2003). For example, market returns can increase due to the rise in investments opportunities. Besides, market returns may soar as optimism amongst investors increases. Both reasons could foster companies to go public. To control differences in the level of the stock market, I use *Stock return* as a control variable. *Stock return* represents the monthly stock return for a given nation a year before the beginning of the quarter of the IPO.

In the second and third DiD analyses, I control for variables that are found to be important in previous JOBS Act studies (Dambra et al., 2015; Barth et al., 2017; Chaplinsky et al., 2017). Accordingly, the second and third DiD analyses consist of the following control variables: *Revenue, Proceeds, Assets, Debt, Cash, MTB, and Shareholders' equity.*

I assume that these variables are normally distributed if the values of skewness and kurtosis are between minus two and two (George, 2011). I find that all control variables have a skewness value above 2 and thus are not normally distributed. Therefore, I take the natural logarithm plus 1 of *Revenue, Proceeds, Assets,* and *Debt*. Since *MTB* is a ratio, I winsorise this variable at 2% and 98% level to improve statistical efficiency and increase the robustness of statistical inferences. Finally, since *Shareholders' equity* represents positive and negative values and, therefore, it is impossible to take the natural logarithm, I winsorise *Shareholders' equity* at 2% and 98% level.

The definitions of the control variables for hypothesis 1_B and *2* are as follows: *Revenue* is the natural logarithm of 1 plus revenue from issuer *i* as of its most recent fiscal year before the IPO. *Proceeds* is the natural logarithm of 1 plus total IPO proceeds from issuer *i* as of the issue date of the IPO. *Assets* is the natural logarithm of 1 plus total assets from issuer *i* as of its most recent fiscal year before the IPO. *Debt* is the natural logarithm of 1 plus total liabilities from issuer *i* as of its most recent fiscal year before the IPO. *Cash* is the natural logarithm of 1 plus cash from issuer *i* as of its most recent fiscal year before the IPO. *MTB* is the market-to-book ratio constructed as the market capitalisation

based on the proceeds of the IPO of issuer *i* scaled by the book value of equity of issuer *i* as of its most recent fiscal year before the IPO. *Shareholders' equity* is total shareholders' equity of issuer *i* as of its most recent fiscal year before the IPO.

4.3 Descriptive statistics

This section provides an overview of the international and EGC sample. Furthermore, this section discusses the fundamental descriptive statistics of the samples.

Table 1 illustrates the number of IPOs in the US and the control group (Australia, Canada, Hong Kong, Japan, and the UK) between April 2010 through March 2014. First, it is evident that the US has the highest number of IPOs compared to the other nations. Moreover, Table 1 shows that the aggregate quarterly IPO activity of the US is at its highest level in the second and third quarter. This could be explained by the fact that Wall Street is practically closed between Christmas and New Year's Day, which decreases the number of IPO filings in the first and fourth quarter (Lowry, 2003).

Noteworthy, the average annual number of US IPOs between 2011 and 2013 is 98 and thus significantly lower than 310 IPOs per year between 1980 and 2000, as shown in the study of Gao et al. (2013). Appendix 5 provides an overview of the descriptive statistics of the international sample.

Table 1: International initial public offering activity

This table provides an overview of the international sample. The table segments initial public offerings ("IPOs") per country, year, and quarter and illustrates IPOs that are issued and filed in Australia, Canada, Hong Kong, Japan, the UK, and the US between April 1, 2010, and March 31, 2014. The sample consists of 895 IPOs from Australia, Canada, Hong Kong, Japan, the UK, and the US. The sample excludes financial industries, real estate investment trusts ("REITs"), limited partnerships, unit issues (not applicable for Japan and the UK), non-original IPOs, foreign issues, and IPOs with proceeds below $5 million.

	Country																								
	Australia				**Canada**				**Hong Kong**				**Japan**				**UK**				**US**				
Year \ **Quarter**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**N**
2010	-	12	15	17	-	8	6	5	-	3	8	4	-	5	2	6	-	4	5	4	-	30	31	6	**171**
2011	11	13	14	6	2	13	5	0	2	11	7	4	6	7	7	9	2	9	4	1	17	37	14	7	**208**
2012	3	7	3	3	1	0	5	3	8	2	6	0	6	8	9	9	3	7	3	2	31	33	22	2	**176**
2013	6	4	3	13	0	4	4	1	5	7	10	6	11	7	9	12	2	4	15	4	18	47	57	8	**257**
2014	2	-	-	-	0	-	-	-	4	-	-	-	10	-	-	-	16	-	-	-	51	-	-	-	**83**
N	**22**	**36**	**35**	**39**	**3**	**25**	**20**	**9**	**19**	**23**	**31**	**14**	**33**	**27**	**27**	**36**	**23**	**24**	**27**	**11**	**117**	**147**	**124**	**23**	**895**

Next to the overview of the international sample in Table 1, Figure 1 illustrates the IPO activity of the US and control group over time. From Figure 1, it is evident that the number of IPOs in the US and control sample decreased substantially in the quarters before and after the collapse of Lehman Brothers on September 15, 2008[10]. In 2008, US IPO volume decreased by 86% compared to 2007, and this

[10] Many researchers, policymakers, and professionals argue that the fall of Lehman Brothers is the start of the financial crisis (Cochrane and Zingales, 2009)

occurred since IPO volume correlates with peaks in the stock market (Lougran, Ritter, and Rydqvist, 1994). Further, less irrational investors are active in "cold markets". As a result of this reduced activity, corporate managers have fewer incentives to go public (Loughran and Ritter, 1995; Lerner, 1994). Furthermore, Figure 1 shows that US and international IPO activity both increased between 2003 and 2004. Figure 1 also indicates that between 2007 and 2008, and 2016 and 2017, US IPO activity as well as international IPO activity both decreased.

The increase in US IPO activity after the enactment of the JOBS Act indicates in favour of the Act. However, the number of international IPOs also increased after the passage of the JOBS Act. Therefore, without further empirical research, I cannot eliminate other effects, for example, a favourable economic climate, to which the JOBS Act affects US IPO activity.

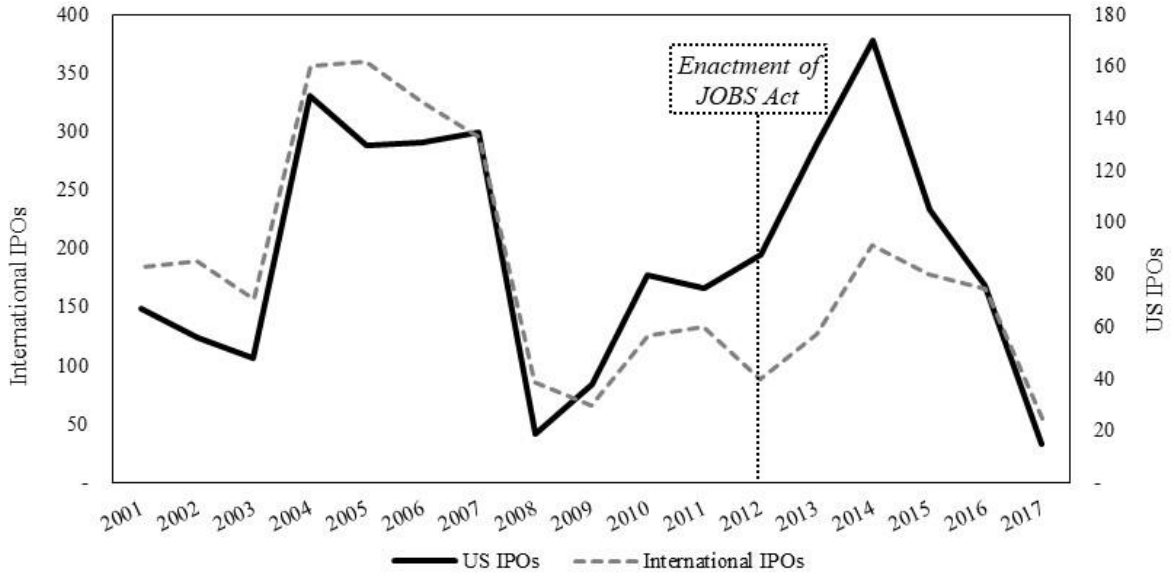

Figure 1: US and international initial public offering activity
This figure presents the initial public offering ("IPO") activity surrounding the Jumpstart Our Business Startups ("JOBS") Act. On the left vertical axis, the dashed line plots annual combined IPO activity of Australia, Canada, Hong Kong, Japan, and the UK. On the right vertical axis, the solid line presents annual IPO activity of the US.

Table 2 provides an overview of US IPOs before and after the JOBS Act. The table shows that 164 companies that file an IPO after the JOBS Act elect the EGC status on the first page of their prospectus. Further, the table indicates that 23 issuers have revenues above $1 billion as of the most recent fiscal year before the IPO and, therefore, are considered as NEGC. After the JOBS Act, the number of EGC and NEGC issuances increase by 41% and 21%, respectively. The descriptive statistics indicate that if something different from the JOBS Act is accountable for the increase in IPO activity of EGCs, it should be something that alters EGCs more than NEGCs. In addition, the increase in IPOs of EGCs indicates that the JOBS Act may achieve its goal to stimulate the IPO activity of EGCs.

Table 2: US initial public offering activity

This table presents an overview of US initial public offering ("IPO") activity two years before and after the Jumpstart Our Business Startups ("JOBS") Act, and indicates whether the issuers are eligible (EGC) or ineligible (NEGC) as an emerging growth company. EGC-eligibility (EGC-ineligibility) is derived by whether issuers have less (more) than $1 billion in revenue as of the most recent fiscal year before the IPO. The sample consists of 322 IPOs that are issued and filed in the pre- or post-JOBS period. The sample excludes financial industries, real estate investment trusts ("REITs"), limited partnerships, unit issues, non-original IPOs, foreign issues, rights issues, and IPOs with proceeds below $5 million.

EGC eligibility	**Pre-JOBS Act** *(01/04/2010 – 31/03/2012)*	**Post-JOBS Act** *(01/04/2012 – 31/03/2014)*	**Growth rate**
EGC (<$1 billion in revenue)	116	164	41%
NEGC (>$1 billion in revenue)	19	23	21%
Difference in growth rates			*20%*

To detect the variations amongst EGCs, Table 3 presents the descriptive statistics of the 116 pre-JOBS EGCs and 164 post-JOBS EGCs. Table 3 shows that in the two years before the JOBS Act, EGCs have a median revenue of $87 million per year. In the post-JOBS period, the annual median revenue of EGCs is $57 million, which indicates a significant decline of 35% compared to the pre-JOBS period. In addition, Table 3 shows that post-JOBS EGCs have fewer total assets and shareholder's equity compared to EGCs in the pre-JOBS period.

Noteworthy, EGCs in two years after the JOBS Act are smaller in size as measured by total assets. This finding that EGCs are smaller is remarkable since it is contradictive to the economies of scope hypothesis. According to the economies of scope hypothesis, smaller stand-alone companies could obtain higher profits as part of a larger organisation and, therefore, filing for an IPO is unfavourable (Gao et al., 2013). Besides, the descriptive statistics indicate that in post-JOBS period EGCs are more innovative (as measured by R&D expenditures scaled by total assets), which is consistent with hypothesis *2*. Notably, the descriptive statistics are before the adjustments of the variables as discussed in Section 4.2.3.

Table 3: Descriptive statistics emerging growth companies

This table presents descriptive statistics of emerging growth companies ("EGCs") two years before and after the Jumpstart Our Business Startups ("JOBS") Act of the EGC sample. The sample consists of 116 initial public offerings ("IPOs") that are issued and filed in the pre-JOBS period (from 01/04/2010 through 31/03/2012) and 164 IPOs that are issued and filed in the post-JOBS period (from 01/04/2012 through 31/03/2014). The sample excludes financial industries, real estate investment trusts ("REITs"), limited partnerships, unit issues, non-original IPOs, foreign issues, rights issues, and IPOs with proceeds below $5 million. $m denotes millions of US dollars. T-tests examine the difference in mean, whereas Wilcoxon rank-sum tests analyses the difference in median of EGCs in the pre- and post-JOBS period. *, **, *** indicate the difference in mean or median significant at the 10%, 5%, and 1% level, respectively.

Company characteristic	**Pre-JOBS Act**		**Post-JOBS Act**		**Increase in mean**	**Increase in median**
	Mean	Median	Mean	Median		
IPO proceeds ($m)	142.69	94.30	137.45	84.97	-4%	-10%
Revenues ($m)	154.21	87.20	129.13	56.57	-16%	-35%**
R&D ($m)	12.83	7.81	13.98	10.68	9%	37%*
Assets ($m)	261.01	104.40	231.46	60.79	-11%	-42%***
R&D/Assets	0.37	0.08	0.62	0.23	68%	188%***
Debt ($m)	103.72	15.14	105.99	7.81	65%	-64%
Shareholders' equity ($m)	31.12	38.33	51.40	13.82	65%	-64%**
Cash ($m)	29.72	5.76	20.57	10.43	-31%	81%
Market-to-book	2.21	0.93	24.16	1.25	993%	34%

4.4 Robustness checks

This section reports the robustness checks conducted in this study. Robustness checks are an essential component to ensure that the findings are reliable.

First, I test for multicollinearity of the variables to prevent any misleading interpretations of the results. In order to do so, I inspect the Pearson correlation matrices and variance inflation factors ("VIF") analyses to identify correlations between variables of three DiD analyses. In this study, I assume that a value above 0.85 in the Pearson correlation matrix indicates a positive relationship between two variables and, as a result, are considered to be prone to multicollinearity issues (Booth, Niccolucci, and Schuster, 1994). Moreover, I presume that when a VIF is above 10.0, multicollinearity is likely to be a problem (Lin, 2008). As shown in Appendix 6, Appendix 7, and Appendix 8, none of the variables in the DiD analyses demonstrate a value above 0.85 in the correlation matrices. Besides, none of the variables (except the interaction term) are above 10.0 in the VIF analyses. As expected, the interaction term *EGC x Post-JOBS* indicates a high correlation and I assume this is not a multicollinearity problem. Hence, the variables of the three DiD analyses are not subject to multicollinearity issues.

Second, I test for heteroskedasticity among the variables in the DiD analyses. I conduct the Breusch-Pagan/Cook-Weisberg test to detect heteroskedasticity. In all three DiD analyses, heteroskedasticity is present and, therefore, standard errors are biased. To obtain unbiased standard errors, I use Huber-White robust standard errors in the DiD analyses. Appendix 9 presents the results of the Breusch-Pagan/Cook-Weisberg test.

Last, in the first DiD analysis, I test for the robustness of the results using nation fixed effects and year-quarter fixed effects instead of independent variables *US* and *Post-JOBS.* In the second and third DiD analyses, I examine the reliability of the results through controlling for year-quarter fixed effects as an alternative for independent variable *Post-JOBS.* Further, I check whether the results of the DiD analyses are robust for different measures of IPO activity (IPOs/Public companies and IPO proceeds/Total market capitalisation) and various sample periods. Finally, I conduct placebo tests to determine the uniqueness of the results.

5. Empirical results

In this chapter, I discuss the empirical results of the DiD analyses. The first section reports the results of the first DiD analysis of international IPO activity, whereas the second section provides the findings of the second DiD analysis of EGC IPO activity. The third section addresses the outcomes of the third DiD analysis of innovation activity. The last section compares the results with previous research.

5.1 International IPO activity

This section provides the results of the first DiD analysis of international IPO activity. Table 4 shows the results of the first DiD analysis that tests hypothesis 1_A. Model (1), (2), and (3) examine the effect of the JOBS Act on IPO activity based on the first measure of dependent variable *IPO activity*, the number of nation-quarter IPOs scaled by nation's number of listed domestic companies as of the most recent year before the IPO. Model (1) shows the effect of the JOBS Act on the dependent variable *IPO activity* using independent variables *US x Post-JOBS, US,* and *Post-JOBS,* while model (2) also controls for economic conditions. Model (3) examines the effect on *IPO activity* controlling for year-quarter fixed effects and nation fixed effects instead of independent variables *US* and *Post-JOBS.*

Consistent with hypothesis 1_A, in model (1), (2), and (3), the coefficients of *US x Post-JOBS* are positively significant at the 1% level. The coefficient *US x Post-JOBS* in model (1) corroborates that the US experiences an increase in IPO activity after the JOBS Act compared to the control group of five developed nations (Australia, Canada, Hong Kong, Japan, and the UK). The increase in IPO activity is also robust controlling for economic conditions in model (2) and controlling for economic conditions and nation's time series in model (3). Further, the results are robust for different sample periods. For example, in untabulated results, I find that the coefficients of *US x Post -JOBS* are positive and significant in a sample period of US and control IPOs that are issued and filed between 2001 and 2017. Moreover, *US x Post-JOBS* in model (1) and (2) shows that favourable economic conditions explain approximately 2.3% of the increase in US IPO activity since the coefficient decreases from 0.41 to 0.39 after controlling for economic conditions.

Furthermore, *US* in model (1) and (2) is significantly positive, which implies that the IPO activity of US companies increases compared to Australia, Canada, Hong Kong, Japan, and the UK. In model (2), *Post-JOBS* is positive and significant and thus indicates that IPO activity increased in the two years after the enactment of the Act relative to two years before.

Models (4) to (6) examine the impact of the JOBS Act on IPO activity based on the second measure of dependent variable *IPO activity*, the sum of nation's quarterly IPO proceeds scaled by nation's total market capitalisation of listed domestic companies as of the most recent year before the IPO. The coefficients of *US x Post-JOBS* in model (4), (5), and (6) are all insignificant. The insignificant results could indicate that *IPO proceeds/Total market capitalisation* is an inappropriate measure for IPO activity and, therefore, the results of model (4), (5), and (6) may be inadequate.

As final robustness check, I conduct a placebo test for the first DiD analysis with different time period indicators. In the placebo test, the time period indicators are periods before the enactment of the JOBS Act and serve as a replacement for *Post-JOBS* in the *US x Post-JOBS* interaction term. As expected, none of the interaction terms in the placebo test is positively significant at the 10% level and, therefore, the increase in US IPO activity between 2010 and 2014 is unique.

Noteworthy, the findings of the first DiD analysis could be overestimated if the analysis fails to control completely for different economic conditions in the considered nations. Besides, since the composition of industries differs between nations, I cannot control for favourable conditions in specific industries. For example, Dambra et al. (2015) find that biotechnology and pharmaceutical companies experience the largest increase in IPO activity after the enactment of the JOBS Act.

To conclude, based on the significant coefficients of *US x Post-JOBS* in model (1), (2), and (3), I find evidence that the JOBS Act increases US IPO activity compared to a control group of developed nations. Thus, I cannot reject hypothesis 1_A.

Table 4: Difference-in-differences analysis of international initial public offering activity

This table reports the results of the difference-in-differences ("DiD") analysis of international initial public offering ("IPO") activity. The dependent variables are *IPOs/Public companies*, the number of nation-quarter IPOs scaled by nation's number of listed domestic companies as of the most recent year before the IPO, and *IPO proceeds/Total market capitalisation*, the sum of nation's quarterly IPO proceeds scaled by nation's total market capitalisation of listed domestic companies as of the most recent year before the IPO. The independent variables are *US*, *Post-JOBS*, and *US x Post-JOBS. US* is a dummy variable equal to one if the public offering is issued in the US and zero otherwise. *Post-JOBS* is a dummy variable equal to one if the public offering occurred after the enactment of the JOBS Act and zero otherwise. *US x Post-JOBS* is the interaction term between *US* and *Post-JOBS*. The control variables are *Stock return* and *GDP growth*. Appendix 4 defines the dependent, independent, and control variables. The sample consists of 895 IPOs that are issued and filed between April 2010 and March 2014 in Australia, Canada, Hong Kong, Japan, the UK, and the US. The sample excludes offerings of financial industries, real estate investment trusts ("REITs"), limited partnerships, non-original IPOs, foreign IPOs, unit issues (not for Japan and the UK), and IPOs with proceeds below $5 million. Robust standard errors are in parentheses below the coefficients. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	IPOs/ Public companies			**IPO proceeds/ Total market capitalisation**		
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
US x Post-JOBS	0.412***	0.389***	0.273***	-0.010	-0.010	-0.009
	(0.040)	(0.034)	(0.031)	(0.009)	(0.009)	(0.007)
US	0.183***	0.194***		0.011*	0.0104	
	(0.023)	(0.022)		(0.010)	(0.010)	
Post-JOBS	-0.032	0.062***		0.011	0.015	
	(0.022)	(0.022)		(0.010)	(0.010)	
Stock return		2.600***	2.542***		0.117**	0.190***
		(0.213)	(0.224)		(0.058)	(0.046)
GDP growth		1.157	-0.304		-0.227	-0.407
		(0.737)	(0.970)		(0.150)	(0.278)
Nation FE	N	N	Y	N	N	Y

Year x Quarter FE	N	N	Y	N	N	Y
Observations	895	895	895	895	895	895
R^2	0.446	0.517	0.681	0.008	0.013	0.275

5.2 EGC IPO activity

This section provides the results of the EGC DiD analysis, which compares the IPO activity between EGCs and NEGCs two years before and after the JOBS Act. Table 5 presents the results of the second DiD analysis to assess hypothesis 1_B. Model (1), (2), and (3) report the effect of the JOBS Act on EGC IPO activity based on the first measure of dependent variable *IPO activity*, nation's quarterly IPO activity as a percentage of the number of listed domestic companies as of the most recent year before the IPO. Model (1) shows the effect of the JOBS Act on *IPO activity* without controlling for company characteristics, industry fixed effects, and year-quarter fixed effects, while model (2) controls for industry fixed effects using 17 industry classifications of Fama and French. Model (3) controls for company characteristics, industry fixed effects. Besides model (3) controls for year-quarter fixed effects instead of independent variable *Post-JOBS*.

In model (1), (2), and (3), the variable of interest, *EGC x Post-JOBS*, is significantly positive. Hence, the analyses are robust, controlling for company characteristics, industry-specific conditions, and year-quarter fixed effects. In line with hypothesis 1_B and descriptive evidence of Table 2, the positive and significant coefficients of *EGC x Post-JOBS* imply that EGCs experience a significantly larger increase in IPO activity compared to NEGCs in the post-JOBS period. Furthermore, model (3) indicates that *EGC* is negative and significant at the 1% level, which suggests that the IPO activity of EGCs is lower relative to NEGCs. Last, in model (1) and (2), *Post-JOBS* is significantly positive and, therefore, suggests that the number of public offerings in the two years following the JOBS Act increased compared to the pre-JOBS period.

Model (4), (5), and (6) analyse IPO activity based on the second measure of dependent variable *IPO activity*, the sum of nation's quarterly IPO proceeds scaled by nation's total market capitalisation of listed domestic companies as of the most recent year before the IPO. Besides, model (5) controls for company characteristics and industry fixed effects, whereas model (6) also controls for year-quarter fixed effects.

In model (4), (5), and (6) the coefficients of *EGC x Post-JOBS* are insignificant and, therefore, the increase of EGC IPO activity is not robust for both measures of *IPO activity*. In addition, in model (5) *EGC* is positive and significant at the 5% level. This outcome suggests that EGC IPO activity is higher compared to NEGCs. Nevertheless, as mentioned in the previous section, *IPO proceeds/Total market capitalisation* may be an inappropriate measure for IPO activity.

Similar as in Section 5.1, I conduct a placebo test as a robustness check. I rerun the second DiD

analysis with *Post-JOBS* representing time period indicators before the passage of the JOBS Act in the *US x Post-JOBS* interaction term. None of the interaction terms are positively significant at the 10% level

To gain a deeper understanding of the impact from the JOBS on IPO activity, I use the following formula to estimate the quarterly increase in IPO activity in absolute terms (as in Dambra et al., 2015):

$$Quarterly\ IPO\ activity\ increase = \frac{(1-percentage\ explained\ by\ market)*(\Delta EGC\ IPO\ activity)}{Number\ of\ post-JOBS\ quarters} \quad (7)$$

First, I obtain an estimate of the percentage explained by the market from model (1) and (2) in Table 4, because these models show the difference in IPO activity with and without controlling for economic conditions. The percentage explained by the market is 2.3%. Second, the change in EGC IPO activity is 48, derived from Table 2. Third, the number of post-JOBS quarters in the EGC sample is eight. As a result, from Equation (7), I estimate that IPO activity increases by approximately 6 IPOs per quarter and 24 IPOs per year following the JOBS Act. Notably, the short time period of the EGC sample and the bull market following the JOBS Act makes these findings preliminary. For instance, the effect of the JOBS Act on EGC IPO activity could be different in a bear market.

Conclusively, model (1), (2), and (3) of the second DiD analysis show that the JOBS Act increases EGC IPO activity relative to NEGCs. Moreover, I find that the JOBS Act increases US IPO activity by 24 IPOs per year. Hence, I cannot reject hypothesis 1_B.

Table 5: Difference-in-differences analysis of emerging growth company initial public offering activity

This table reports the results of the difference-in-differences ("DiD") analysis of emerging growth company ("EGC") initial public offering ("IPO") activity. The dependent variables are *IPOs/Public companies*, the number of nation-quarter IPOs scaled by nation's number of listed domestic companies as of the most recent year before the IPO, and *IPO proceeds/Total market capitalisation*, the sum of nation's quarterly IPO proceeds scaled by nation's total market capitalisation of listed domestic companies as of the most recent year before the IPO. The independent variables are *EGC, Post-JOBS,* and *EGC x Post-JOBS. EGC* is a dummy variable equal to one for EGC-eligible companies and zero otherwise. *Post-JOBS* is a dummy variable equal to one if the IPO occurs after the enactment of the JOBS Act and zero otherwise. *EGC x Post-JOBS* is the interaction term between *EGC* and *Post-JOBS.* Appendix 4 defines the dependent, independent, and control variables. The sample consists of 322 IPOs that are issued and filed between April 2010 and March 2014. The sample excludes financial industries, real estate investment trusts ("REITs"), limited partnerships, unit issues, non-original IPOs, foreign issues, rights issues, and IPOs with proceeds below $5 million. Robust standard errors are in parentheses below the coefficients. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	IPOs/ Public companies			**IPO proceeds/ Total market capitalisation**		
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
EGC x Post-JOBS	0.235**	0.276**	0.406***	-0.004	-0.002	-0.007
	(0.113)	(0.116)	(0.040)	(0.010)	(0.009)	(0.004)

EGC	-0.034 (0.058)	-0.069 (0.081)	-0.232*** (0.072)	0.005 (0.080)	0.020** (0.009)	0.006 (0.005)
Post-JOBS	0.226** (0.107)	0.189* (0.110)		-0.004 (0.008)	-0.005 (0.008)	
Ln(Revenue)		0.001 (0.016)	-0.001 (0.014)		0.000 (0.002)	-0.000 (0.001)
Ln(Proceeds)		0.024 (0.033)	0.042 (0.029)		0.004 (0.003)	0.001 (0.002)
Ln(Assets)		-0.019 (0.022)	-0.037** (0.019)		-0.001 (0.002)	0.000 (0.001)
Ln(Debt)		0.005 (0.012)	0.013 (0.011)		0.002*** (0.001)	0.000 (0.001)
Ln(Cash)		0.017 (0.012)	0.010 (0.011)		-0.000 (0.001)	-0.000 (0.001)
MTB		0.000 (0.002)	0.002* (0.001)		0.000 (0.000)	0.000 (0.000)
Shareholders' equity		0.000 (0.000)	0.000 (0.000)		0.000 (0.000)	0.000 (0.000)
Industry FE	N	Y	Y	N	Y	Y
Year x Quarter FE	N	N	Y	N	N	Y
Observations	322	322	322	322	322	322
R^2	0.306	0.329	0.482	0.017	0.098	0.692

5.3 Innovation activity

This section provides the results of the innovation DiD analysis, which examines the effect of the JOBS Act on innovation activity of EGCS compared to NEGCs. Table 6 illustrates the results of the third DiD analysis to evaluate hypothesis *2*. Models (1) to (3) report the effect of the JOBS Act on innovation based on the dependent variable *Innovation activity*, R&D expenditures scaled by total assets as of the most recent fiscal year before the IPO. Model (1) shows the effect of the Act on *Innovation activity* without using control variables, industry fixed effects, and year-quarter fixed effects, whereas model (2) includes control variables and industry fixed effects using the 17 industry classifications of Fama and French. Model (3) shows the effect the JOBS Act on innovation controlling for different company characteristics, industry fixed effects. Besides, model (3) controls for year-quarter fixed effects instead of independent variable *Post-JOBS.*

Consistent with hypothesis *2*, model (1) shows that *EGC x Post-JOBS* is positive and significant. This result indicates that the innovation activity of EGCs compared to NEGCs is significantly positively affected by the JOBS Act. However, this explanation is only partial because the coefficients of *US x Post-JOBS* are insignificant after controlling for company characteristics, industry fixed effects, and year-quarter fixed effects in model (2) and (3). Hence, the increase in innovation

activity is not robust, controlling for industry characteristics and year-quarter fixed effects.

Further, *EGC* in model (1) is significant at the 1% level without controlling for company characteristics or industry fixed effects. Model (2) shows that *EGC* is significantly negative, which suggests that controlling for fixed effects the innovation activity of EGGs is lower compared to NEGCs at the 1% level. *EGC* in model (3) is also negative at the 5% level after controlling for industry fixed effects and year-quarter fixed effects. The dissimilarity of the coefficients of *EGC* in model (1), (2), and (3) is puzzling.

To summarise, in model (1), I find evidence that the JOBS Act increases the innovation activity of EGCs relative to the innovation of NEGCs in the post-JOBS period. However, after controlling for company characteristics, industry fixed effects, and year-quarter fixed effects, I find no evidence that the JOBS Act increases innovation of EGCs in contrast to NEGCs. Accordingly, I reject hypothesis *2*.

Table 6: Difference-in-differences analysis of innovation activity

This table reports the results of the difference-in-differences ("DiD") analysis of innovation activity. The dependent variable is *Innovation activity*, R&D expenditures scaled by total assets as of the most recent fiscal year before the initial public offering ("IPO"). The independent variables are *EGC*, *Post-JOBS*, and *EGC x Post-JOBS*. *EGC* is a dummy variable equal to one for EGC-eligible companies and zero otherwise. *Post-JOBS* is a dummy variable equal to one if the IPO occurs after the enactment of the JOBS Act and zero otherwise. *EGC x Post-JOBS* is the interaction term between *EGC* and *Post-JOBS.* Appendix 4 defines the dependent, independent, and control variables. The sample consists of 322 IPOs that are issued and filed between April 2010 and March 2014. The sample excludes financial industries, real estate investment trusts ("REITs"), limited partnerships, unit issues, non-original IPOs, foreign issues, rights issues, and IPOs with proceeds below $5 million. Robust standard errors are in parentheses below the coefficients. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

	Innovation activity		
Variable	**(1)**	**(2)**	**(3)**
EGC x Post-JOBS	0.254*** (0.081)	0.111 (0.112)	-0.008 (0.082)
EGC	0.229*** (0.052)	-0.331*** (0.109)	-0.234** (0.098)
Post-JOBS	-0.0130 (0.011)	-0.091 (0.088)	
Ln(Revenue)		0.034 (0.028)	0.030 (0.0276)
Ln(Proceeds)		0.160*** (0.061)	0.151** (0.062)
Ln(Assets)		-0.300*** (0.055)	-0.303*** (0.054)
Ln(Debt)		0.048** (0.019)	0.052*** (0.020)
Ln(Cash)		0.001 (0.010)	0.005 (0.011)

MTB		-0.010** (0.004)	-0.010** (0.004)
Shareholders' equity		0.000 (0.000)	0.000 (0.000)
Industry FE	N	Y	Y
Year x Quarter FE	N	N	Y
Observations	322	322	322
R^2	0.063	0.520	0.541

5.4 Discussion

This section elaborates on the results of the previous sections and sheds light on potential explanations for these findings. Moreover, this section discusses the link between the results of the conducted analyses and previous academic studies.

In the first DiD analysis, I examine the impact of the JOBS Act on IPO activity in the US compared to other developed nations. In line with previous research, I find that US IPO activity increases in the post-JOBS period compared to the control group. Furthermore, the second DiD analysis investigates whether the JOBS Act accomplishes its goal to increase the number of public offerings. In particular, I examine the impact of the JOBS Act on EGC IPO activity, which are issuers that are most likely to benefit from the Act. As expected, I show that the JOBS Act positively impacts the IPO activity of EGCs compared to NEGCs after the passage of the Act.

Thus, in line with hypotheses 1_A and 1_B, the first and second DiD analyses indicate that the JOBS Act increases US and EGC IPO activity. Besides, I show that IPO volume increases by 24 IPOs per year following the JOBS Act, which is line with Dambra et al. (2015) who find that IPO volume increases by 21 IPOs per year.

The increase in IPO activity is contradictive to the findings of Ritter (2012) and Gao et al. (2013). Ritter (2012) posits that the JOBS Act does not impact the number of public offerings and Gao et al. (2013) argue that regulatory reforms aimed to revitalise the IPO market have a limited impact on IPO activity when the economies of scope hypothesis hold. Hence, the results of this study contradict the research of Ritter (2012) and the economies of scope hypothesis.

Moreover, in line with the second DiD analysis, descriptive statistics in Table 2 show that the IPOs of EGCs increases by 41% in the two years following the JOBS Act compared to the pre-JOBS period, while in the same period the IPO volume of NEGCs increases by only 21%. In addition, in untabulated results, I find that in the pre-JOBS period, 11 companies have not generated any revenue in the most recent fiscal year before the IPO. In the post-JOBS period, 31 companies fail to present any revenue, which reflects a significant increase of 181%. Therefore, I support the result of Dambra et al.

(2015), who indicate an increase in EGC IPO activity of almost 150% in the bottom revenue quartile.

A potential explanation for the increase in issuances from companies with no revenue after the JOBS Act is that these companies generally have high proprietary costs of disclosure and, therefore, benefit from TTW. For example, companies in the biotechnology and pharmaceutical industry have high disclosure costs. These companies are not likely to generate any revenue in the near future until a developed or commercialised product succeeds[11]. As a result, companies that have not generated any revenue are more likely to take advantage of the de-risking provisions of the JOBS Act, such as TTW (Dambra et al., 2015). TTW reduces the costs associated with the withdrawal of an IPO and avoids disclosing private information to competitors.

Although the increase in IPOs of companies without revenue accomplishes the goal of the JOBS Act to stimulate the number of public offerings, the outlook of issuers without any revenue at issuance is highly uncertain. Consequently, the JOBS Act may further increase the already existing information asymmetry in the IPO process. As a result of the increase in information asymmetry, the Act could contribute to underinvestment in long-run projects and moral hazard problems (Bebchuk and Stole, 1993; Zimmerman, 2015). Notwithstanding, the implications for the increased number of IPOs of companies that have not generated any revenue and the differences in IPO activity per revenue quartile or industry are beyond the scope of this study.

Besides the first and second DiD analysis, the third DiD analysis assesses whether the innovation activity of EGCs increases compared to NEGCs after the enactment of the JOBS Act. As opposed to my prediction, I find no evidence that the JOBS Act increases the innovation activity of EGCs compared to NEGCs in the post-JOBS period. Moreover, in model (2) and (3) of Table 6, I show that the innovation activity of EGCs is lower compared to NEGCs. Since NEGCs have revenues above $1 billion, this result could be explained since larger companies are more innovative compared to smaller companies (Shefer and Frenkel, 2005). Contrary to these results of model (2) and (3), model (1) shows that EGCs are more innovative than NEGCs. The dissimilarity of these results remains puzzling.

Furthermore, even though the JOBS Act does not directly affect innovation, descriptive evidence of Table 3 shows that the proxy for innovation (as measured by R&D expenditures scaled by total assets) significantly increases by 188% for EGCs that go public following the passage of the Act. Furthermore, in line with Bernstein (2015), Table 3 indicates that R&D expenditures of EGCs post-JOBS significantly increase by 37%. The increase in R&D expenditures could be explained by the fact that a growing number of biotechnology and pharma companies go public after the passage of the JOBS Act, which have substantial higher R&D expenditures to develop new products (Dambra et al., 2015).

Noteworthy, the findings of this study are prone to certain limitations. First of all, I show that the composition of companies going public after the JOBS Act changes and, as a result, the EGC sample

[11] For example, NuPathe (issued at July 6, 2010) disclosed the following in their prospectus: "Our ability to generate revenues in the near term is substantially dependent on our ability to develop and commercialize Zelrix".

may be prone to self-selection bias. For example, in line with Dambra et al (2015), I find an increase in issuers with no revenue, while in the absence of the JOBS Act these companies may remain private. Second, I could overstate the impact of the JOBS Act if I fail to control completely for economic conditions amongst the different nations in the first DiD analysis. Third, essentially all companies in the EGC sample elect the EGC status (87%), whereas 42 companies consider as NEGC (13%). Ergo, the results of the second and third DiD analyses depend on few observations of NEGCs and, therefore, should be interpreted with caution. Last, the results could be overstated due to the bull market following the enactment of the JOBS Act and the short time period of the EGC sample.

To summarise, based on the first and second DiD analyses, I find that US and EGC IPO activity increased following the JOBS Act and, therefore, I cannot reject hypotheses 1_A and 1_B. Furthermore, descriptive evidence indicates that EGCs going public after the JOBS Act are more innovative compared to EGCs two years before the enactment of the Act. To indicate the extent to which the JOBS Act is responsible for this increase in the innovation of EGCs, I investigate the difference in innovation activity of EGCs compared to NEGCs in the two years before and after the Act. Contradictive to my expectation, I find no evidence that the JOBS Act is responsible for an increase in the innovation of EGCs. Accordingly, I reject hypothesis *2*.

6. Conclusion

This chapter concludes the research of this study. The first section answers the research question and provides a summary of the hypotheses, methodology, data, and results. The second section discusses the limitations and shortcomings of this study. The last section provides directions for future research.

6.1 Conclusion

This study examines the effect of the JOBS Act on IPO activity and innovation. The research question was formulated as follows:

"How does the enactment of the JOBS Act impact IPO activity and innovation of public companies in the US?"

Following previous JOBS Act studies, I assess whether the JOBS Act increases US IPO activity compared to other developed nations. Moreover, since only EGCs can take advantage of the JOBS Act, I examine the impact of the JOBS Act on the IPO activity of EGCs. Last, I investigate the effect of the JOBS Act on the innovation activities of EGCs.

To determine the effect of the JOBS Act on US IPO activity, EGC IPO activity, and innovation, I conduct three DiD analyses with two unique data sets. By using an international sample, the first DiD analysis compares US IPO activity with the IPO activity of a control group of developed nations (Australia, Canada, Hong Kong, Japan, and the UK) before and after the enactment of the JOBS Act. The international sample consists of 895 IPOs from Australia, Canada, Hong Kong, Japan, the UK, and the US that are issued and filed between April 2010 and March 2014. The second and third DiD analyses test the impact of the JOBS on EGC IPO activity and innovation through an EGC sample. The EGC sample includes 280 EGC-eligible and 42 EGC-ineligible IPOs that are issued and filed two years before or after the enactment of the JOBS Act.

The results of these analyses indicate that the JOBS Act increases the number of public offerings in the US compared to the IPO activity of the control group. Besides, I show that the JOBS Act increases the IPO activity of EGCs compared to NEGCs. Further, I find that the US experiences an increase of 24 IPOs per year In addition, I provide evidence that the JOBS Act does not impact the innovation activity of EGCs. Last, even though the JOBS Act is not directly responsible for an increase in innovation, I find that EGCs that go public in the post-JOBS period are more innovative (as measured by R&D expenditures scaled by total assets) and have higher R&D expenditures compared to EGCs before the enactment of the JOBS Act.

This study contributes to the existing literature on the consequences of the JOBS Act in various ways. First, the increase of 24 IPOs per year supports previous research of inflated IPO volume after the JOBS Act (Dambra et al., 2015). Conversely, this study contradicts prior literature that the JOBS Act does not affect IPO volume (Ritter, 2012). Further, since the economies of scope hypothesis of Gao

et al. (2013) posits that regulatory reforms have a limited effect on revitalising the IPO market, the significant increase in post-JOBS IPO activity is inconsistent with the economies of scope hypothesis. Second, in untabulated results, I find a significant increase of IPOs of companies without revenue, which corresponds with existing literature that the IPO volume of companies in the lowest revenue quartile increases following the passage of the JOBS Act (Dambra et al., 2015). Finally, the descriptive statistics indicate an increase in innovation (as measured by R&D expenditures scaled by total assets) and R&D expenditures amongst EGCs that go public after the JOBS Act, which is in line with prior literature (Bernstein, 2015).

The findings of this study have important implications for managers, shareholders, the government, and policymakers. The JOBS Act has succeeded Congress' goal to stimulate US IPO activity, in particular, the IPO volume of EGCs. However, if emerging growth companies create higher value as part of a larger organisation, policymakers must bear watching whether the increase in IPOs of EGCs is not harming the US economy. Besides, a large number of EGCs do not generate any revenue at issuance and, therefore, have a limited short-term outlook. For the JOBS Act to achieve its ultimate goal of stimulating economic growth, job creation, and innovation, EGCs must mature and survive the turmoil of public markets.

6.2 Limitations and shortcomings

The results of this study are subject to various limitations and shortcomings. First, I assume that companies with below $1 billion in revenues are eligible as EGC in the two years before and after the passage of the JOBS Act. However, in this study, I show an increase of 188% in the number of IPOs from companies that have not generated any revenue after the JOBS Act. In addition, Dambra et al. (2015) find that the JOBS Act encourages IPOs of biotechnology and pharmaceutical companies. Accordingly, different companies go public after the JOBS Act, while otherwise, they would remain private. Hence, this study may be prone to self-selection bias. A potential solution to remove the self-selection bias is using the propensity score matching method.

Second, in the EGC sample, 87% of the companies are eligible as EGC, whereas 13% is considered as NEGC. Thus, the results based on the EGC sample depend on a few observations of NEGCs and, therefore, should be interpreted with caution. Besides, the results of the EGC sample may be overstated due to the short time period of the sample and the bull market that occurs in the two years after the JOBS Act. The results of this study could, therefore, differ in a bear market.

Third, in this study, I use R&D expenditures scaled by total assets as a proxy for innovation. However, there exists a longstanding debate amongst researchers regarding the measurement of innovation. Each proxy of innovation suffers from various limitations and, therefore, must be interpreted with care. For example, Dogdson and Hinze (2000) argue that R&D expenditures comprise only a proportion of the expenses spend on innovation. As a result, the proxy of innovation used in this study demonstrates only a partial aspect of innovation.

Last, for Japan and the UK in the international sample, I included unit issues, whereas for the other nations in the sample unit issues are excluded. Moreover, I made manual adjustments in the international and EGC sample. For example, I excluded non-initial public offerings and companies without identifiers. Besides, for the UK in the international sample, market capitalisation data was missing in the World Bank database and, as a result, I made assumptions to resolve this. For the EGC sample, I manually obtained missing R&D expenditures and other accounting data from prospectuses. These manual adjustments and data gathering certainly cause noise and thus influences the results.

6.3 Directions for future research

This study examines different effects of the JOBS Act. Nevertheless, future research is necessary to examine several other aspects of the JOBS Act, IPO activity, and innovation.

For example, this study does not examine IPO activity in Europe. The decrease in IPO activity is less severe in Europe compared to the US, but there is still a negative trend in the annual number of public offerings (Ritter, Signori, and Vismara, 2013). Future research might explore whether the economies of scope hypothesis is responsible for the decline in European IPOs.

In addition, this study shows that the IPO volume of companies without any revenue increased significantly. More recently, there is another trend in the IPO market., namely an increasing number of unprofitable companies goes public. The number of these unprofitable IPOs surged to dotcom bubble levels (Financial Times, 2019). The public offerings of Uber, Lyft, and Pinterest are examples of companies that have no path to profitability. Therefore, future research should be undertaken to explore the long-term effect of IPOs of companies that have not generated any revenue, as well as the effect of unprofitable IPOs.

Besides Congress' goal to spur innovation, the JOBS Act is also enacted to stimulate economic growth and increase job creation. This study lacks evidence on these purposes of the Act and, therefore, future research is required to investigate the impact of the JOBS Act on economic growth and job creation.

Last, I find that EGCs in the post-JOBS period are more innovative (as measured by R&D expenditures scaled by total assets) compared to the pre-JOBS period. However, companies with high levels of R&D expenditures are not automatically good innovators (Adams, Bessant, and Phelps, 2006). Future research would be of great help to examine the innovation efficiency of public companies. For example, future research might explore how R&D spending converts into the sales of new products.

References

Abadie, A. (2005). Semiparametric difference-in-differences estimators. *The Review of Economic Studies*, *72*(1), 1-19.

Acharya, V., & Xu, Z. (2017). Financial dependence and innovation: The case of public versus private firms. *Journal of Financial Economics*, *124*(2), 223-243.

Adams, R., Bessant, J., & Phelps, R. (2006). Innovation management measurement: A review. *International journal of management reviews*, *8*(1), 21-47.

Agarwal, S., Gupta, S., & Israelsen, R. D. (2017). Public and private information: Firm disclosure, SEC letters, and the JOBS act. *Georgetown McDonough School of Business Research Paper*, (2891089), 17-4.

Aggarwal, V. A., & Hsu, D. H. (2013). Entrepreneurial exits and innovation. *Management Science*, *60*(4), 867 887.

Aghion, P., & Tirole, J. (1994). The management of innovation. *The Quarterly Journal of Economics*, *109*(4), 1185-1209.

Aghion, P., Van Reenen, J., & Zingales, L. (2013). Innovation and institutional ownership. *American economic review*, *103*(1), 277-304.

Arrow, K.J., 1962, Economic welfare and the allocation of resources for invention, in *The Rate and Direction of Inventive Activity* (Princeton University Press, Princeton, NJ (for NBER)).

Ashenfelter, O. C., & Card, D. (1984). Using the longitudinal structure of earnings to estimate the effect of training programs.

Barth, M. E., Landsman, W. R., & Taylor, D. J. (2017). The JOBS Act and information uncertainty in IPO firms. *The Accounting Review*, *92*(6), 25-47.

Baumann, J., & Kritikos, A. S. (2016). The link between R&D, innovation and productivity: Are micro firms different?. *Research Policy*, *45*(6), 1263-1274.

BDO. (2015). *U.S. IPOs to maintain pace over remainder of year*. Retrieved from https://www.bdo.com/getattachment/f1f2cf52-e305-4657-9fef-1e10870d079c/attachment.aspx

Bebchuk, L. A., & Stole, L. A. (1993). Do short-term objectives lead to under-or overinvestment in long-term projects?. The Journal of Finance, 48(2), 719-729.

Berdejó, C. (2015). Going Public After the JOBS Act. *Ohio St. LJ*, *76*, 1.

Bernstein, S. (2015). Does going public affect innovation?. The Journal of Finance, 70(4), 1365-1403.

Boeh, K. K., & Dunbar, C. G. (2013). Post IPO withdrawal outcomes. Available at SSRN 2135772.

Booth, G. D., Niccolucci, M. J., & Schuster, E. G. (1994). Identifying proxy sets in multiple linear regression: an aid to better coefficient interpretation. Research paper INT (USA).

Chaplinsky, S., Hanley, K. W., & Moon, S. K. (2017). The JOBS Act and the costs of going public. *Journal of Accounting Research*, *55*(4), 795-836.

Cochrane, J. H., & Zingales, L. (2009). Lehman and the financial crisis. *The Wall Street Journal, 15.*

Dambra, M., Field, L., & Gustafson, M. (2015). The JOBS Act and IPO volume: Evidence that disclosure costs affect the IPO decision. *Journal of Financial Economics*, 121-143.

Dambra, M., Field, L., Gustafson, M., & Pisciotta, K. (2016). Pre-IPO communications and analyst research: Evidence surrounding the JOBS Act. *Available at SSRN*.

Dodgson, M., & Hinze, S. (2000). Indicators used to measure the innovation process: defects and possible remedies. Research Evaluation, 9(2), 101-114.

Doidge, C., Karalyi, G. A., & Stulz, R. (2013). The U.S. left behind? Financial globalization and the riseof IPOs outside the U.S. *Journal of Financial Economics*, 546-573.

Edmans, A., & Manso, G. (2010). Governance through trading and intervention: A theory of multiple blockholders. *The Review of Financial Studies*, *24*(7), 2395-2428.

Edmans, A., Fang, V. W., & Lewellen, K. (2014). Equity vesting and managerial myopia.

Engel, E., Hayes, R. M., & Wang, X. (2007). The Sarbanes–Oxley Act and firms' going-private decisions. *Journal of Accounting and Economics*, 116-145.

EY. (2013). *The JOBS Act: One-year anniversary*. Retrieved from https://www.ey.com/Publication/vwLUAssets/The_JOBS_Act:_Oneyear_anniversary/$FILE/JOBSAct Anniversary_CC0368_9April2013.pdf

Fang, V. W., Tian, X., & Tice, S. (2014). Does stock liquidity enhance or impede firm innovation?. *The Journal of Finance*, *69*(5), 2085-2125.

Ferreira, D., Manso, G., & Silva, A. C. (2012). Incentives to innovate and the decision to go public or private. *The Review of Financial Studies*, *27*(1), 256-300.

Financial Times. (2019, 27 januari). *Another tech bubble could be about to burst*. Retrieved from https://www.ft-com.eur.idm.oclc.org/content/43d5e972-2098-11e9-b2f7-97e4dbd3580d

Gao, F., Wu, J. S., & Zimmerman, J. (2009). Unintended Consequences of granting small firms exemptions from securities regulation: Evidence from the Sarbanes-Oxley Act. *Journal of Accouting Research, 47(2),* 459-506.

Gao, H., Hsu, P. H., & Li, K. (2014). Managerial short-termism and corporate innovation strategies. *Unpublished working paper, University of British Columbia*.

Gao, X., Ritter, J., & Zhu, Z. (2013). Where have all the IPOs gone? Journal of Financial and Quantitative Analysis, 1663-1692.

George, D. (2011). *SPSS for windows step by step: A simple study guide and reference, 17.0 update, 10/e*. Pearson Education India.

Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of accounting and economics*, *40*(1-3), 3-73.

Griliches, Z. (1981). Market value, R&D, and patents. *Economics letters*, *7*(2), 183-187.

Gupta, S., & Israelsen, R. D. (2016). *Hard and Soft Information: Firm Disclosure, SEC Letters, and the JOBS Act*. Working paper, Indiana University.

Hall, B. H., Jaffe, A., & Trajtenberg, M. (2005). Market value and patent citations. *RAND Journal of economics*, 16-38.

He, J., & Tian, X. (2014). Short sellers and innovation: Evidence from a quasi-natural experiment. *Unpublished Manuscript*.

Holmstrom, B. (1989). Agency costs and innovation. *Journal of Economic Behavior & Organization*, *12*(3), 305-327.

IPO Task Force. (2011). *Rebuilding the IPO on-ramp, putting emerging companies and the job market back on the road to growth* . Issued by the IPO Task Force and presented to the U.S. Department of the Treasury.

Jensen, P. H., & Webster, E. (2009). Another look at the relationship between innovation proxies. Australian Economic Papers, 48(3), 252-269.

Lantz, J. S., & Sahut, J. M. (2005). R&D investment and the financial performance of technological firms. *International Journal of Business*, *10*(3), 251.

Lerner, J. (1994). Venture capitalists and the decision to go public. *Journal of financial Economics*, *35*(3), 293 316.

Lerner, J., Sorensen, M., & Strömberg, P. (2011). Private equity and long-run investment: The case of innovation. *The Journal of Finance*, *66*(2), 445-477.

Lin, B. W., Lee, Y., & Hung, S. C. (2006). R&D intensity and commercialization orientation effects on financial performance. Journal of business research, 59(6), 679-685.

Lin, F. J. (2008). Solving multicollinearity in the process of fitting regression model using the nested estimate procedure. *Quality & Quantity*, *42*(3), 417-426.

Loughran, T., & Ritter, J. (1995). The new issues puzzle. *The Journal of finance*, *50*(1), 23-51.

Loughran, T., & Ritter, J. (2004). Why has IPO underpricing changed over time?. *Financial management*, 5-37.

Loughran, T., Ritter, J. R., & Rydqvist, K. (1994). Initial public offerings: International insights. *Pacific Basin Finance Journal*, *2*(2-3), 165-199.

Lowry, M. (2003). Why does IPO volume fluctuate so much?. *Journal of Financial economics*, *67*(1), 3-40.

Porter, M. E. (1998). *Clusters and the new economics of competition* (Vol. 76, No. 6, pp. 77-90). Boston: Harvard Business Review.

Worldbank (n.d.). Real GDP United States. Retrieved 1 December 2019 from https://data.worldbank.org/indicator/NY.GDP.MKTP.KN?locations=US

Ritter, J. R. (2012). Re-energizing the IPO market. *Available at SSRN 2184961*.

Ritter, J. R., Signori, A., & Vismara, S. (2013). Economies of scope and IPO activity in Europe. *Handbook of research on IPOs*, 11-34.

Romer, P. M. (1990). Endogenous technological change. *Journal of political Economy*, *98*(5, Part 2), S71-S102.

Schumpeter, J. A. (1934). The Theory of Economic Development, 13th Printing 2007.

Shefer, D., & Frenkel, A. (2005). R&D, firm size and innovation: an empirical analysis. *Technovation*, *25*(1), 25-32.

Securities and Exchange Commission. (2011). Rebuilding the IPO On-Ramp.

Smith, K. H. (2005). Measuring innovation.

Somers, M. A., Zhu, P., Jacob, R., & Bloom, H. (2013). The Validity and Precision of the Comparative Interrupted Time Series Design and the Difference-in-Difference Design in Educational Evaluation. *MDRC*.

Solow, R. M. (1957). Technical change and the aggregate production function. *The review of Economics and Statistics*, 312-320.

Stein, J. C. (1988). Takeover threats and managerial myopia. *Journal of political economy*, *96*(1), 61-80.

Stein, J. C. (2003). Agency, information and corporate investment. In *Handbook of the Economics of Finance* (Vol. 1, pp. 111-165). Elsevier.

US House of Representatives. (2012). Jumpstart Our Business Startups Act. Public Law 112-106 [HR 3606].

Weild, D., & Kim, E. (2009). A wake-up call for America. *Grant Thornton: Capital*.

Zimmerman, A. B. (2015). The JOBS Act disclosure exemptions: Some early evidence. *Research in Accounting Regulation*, *27*(1), 73-82.

Appendix

Appendix 1: Provisions of Title 1 of the Jumpstart Our Business Startups Act

This table provides an overview of the de-risking and de-burdening provisions from Title 1 of the Jumpstart Our Business Startups ("JOBS") Act.

Before enactment of the JOBS Act	After enactment of the JOBS Act
De-risking provisions	
Confidential filing:	
Allowed to publicly disclose a registration statement at the time of filing with the SEC	Benefit of confidentially submitting draft IPO registration statement with the SEC for non-public review
Testing the waters:	
Issuers and underwriters are prohibited to communicate with potential investors before issuing an IPO registration statement	Engage in oral or written communication with qualified investors before publicly filling a registration statement
De-burdening provisions	
Reduced financial statement disclosure:	
Three years of audited financials and five years of selected financial data are permitted in the registration statement	Two years of audited financials and two years of selected financial data are required in the registration statement
Reduced compensation disclosure:	
Full compensation discussion and analysis and compensation of at least five named executives are required	Summary compensation table for three executives and no compensation discussion and analysis are required
Auditor attestation opt-out:	
Issuers need to provide auditor attestation of internal controls (Section 404 of the SOX Act)	No auditor attestations of internal controls are needed
Future accounting standards opt-out:	
Required to comply with new or revised Financial Accounting Standards Board accounting requirements	Allowed to delay compliance from new or revised accounting requirements of the Financial Accounting Standards Board unless these requirements become required for private companies
PCAOB rulings opt-out:	
Required to comply with future rules by the Public Company Accounting Standards Board	Allowed to delay compliance from future public accountings standards of the Public Company Accounting Standards Board
Executive compensation opt-out:	
Required to comply with Dodd-Frank requirements, such as Say-on-Pay, Say-on-Frequency, and advisory votes on golden parachutes	Exempted from Say-on-Pay, Say-on-Frequency, and advisory votes on golden parachutes

Source: The JOBS Act: One-year anniversary, EY April 2013

Appendix 2: Sample selection process international sample

This table provides an overview of the sample selection process of the international sample. The sample is obtained from Thomson Reuters Securities Data Company Platinum ("SDC") database and consists of 895 IPOs that are issued and filed between April 1, 2010, and March 31, 2014. For the nations Japan and the UK, unit issues are included.

Selection criteria	**Observations**
Issue Type: IPO	504,696
Issuer/Borrower Nation: Australia, Canada, Hong Kong, Japan, United Kingdom, United States	40,628
Dates: Issue Date and Filing Date: 04/01/2010 to 03/31/2014	4,413
Transaction Status: Live	2,766
Issuer/Borrower Macro Industry: Exclude Financials	1,732
Issuer/Borrower Mid Industry: Exclude REITs	1,608
No Limited Partnership	1,560
Original IPO Flag: Yes	1,560
No Foreign Issue	1,538
No Unit Issue	1,481
Proceeds Amount This Market (US$ Mil): $5m to HI	1,060
Manual adjustments:	
Exclude manually verified non-initial public offerings and companies without identifier	895
Final sample	**895**

Appendix 3: Sample selection process emerging growth company sample

This table provides an overview of the sample selection process of the emerging growth company ("EGC") sample. The sample is obtained from Thomson Reuters Securities Data Company ("SDC") Platinum database and consists of 280 EGC-eligible IPOs and 42 EGC-ineligible IPOs that are issued and filed between April 1, 2010, and March 31, 2014.

Selection criteria	**Pre-JOBS observations**	**Post-JOBS observations**
Issue Type: IPO	83,889	83,889
Issuer/Borrower Nation: United States	20,496	20,496
Dates: Issue Date and Filing Date: pre-JOBS: 04/01/2010 to 03/31/2012, post-JOBS: 04/01/2012 to 03/31/2014	977	950
Transaction Status: Live	903	840
Issuer/Borrower Macro Industry: Exclude Financials	298	364
Issuer/Borrower Mid Industry: Exclude REITs	208	279
No Limited Partnership	197	260
No Unit Issue	184	235
Original IPO Flag: Yes	184	235
Proceeds Amount This Market (US$ Mil): $5m to HI	184	235
No Foreign Issue	151	208
No Rights Issue	151	208
Manual adjustments: Exclude manually verified financial industries and REIT issuers, non-initial public offerings, limited partnerships, unit issues, foreign issues, rights issues, companies with non-US identifier, companies without identifier, and companies without prospectus	135	187
Final sample	**135**	**187**

Appendix 4: Overview of the dependent, independent, and control variables

Variable	Description *(Sources)*
Dependent	
IPO activity	The number of nation-quarter IPOs scaled by nation's number of listed domestic companies as of the most recent year before the IPO *(SDC/Worldbank)*
IPO activity	The sum of nation's quarterly IPO proceeds scaled by nation's total market capitalisation of listed domestic companies as of the most recent year before the IPO *(SDC/Worldbank)*
Innovation activity	R&D expenditures scaled by total assets as of the most recent fiscal year before the IPO *(Datastream/Hand-collected)*
Independent	
US x Post-JOBS	Interaction term between *US* and *Post-JOBS (SDC)*
US	Dummy variable that equals one if the IPO issued in the US *(SDC)*
Post-JOBS	Dummy variable that equals one if the IPO issued after the passage of the JOBS Act *(SDC)*
EGC x Post-JOBS	Interaction term between *EGC* and *Post-JOBS (SDC)*
EGC	Dummy variable that equals one for EGC-eligible companies *(Hand-collected)*
Control	
GDP growth	Annual per cent change in GDP of a given nation as of the most recent year before the IPO*(Worldbank)*
Stock return	Monthly stock return for a given nation a year before the beginning of the quarter before the IPO *(Fama-French website)*
Revenue	Revenue as of the most recent fiscal year before the IPO *(Datastream/Hand-collected)*
Proceeds	Proceeds as of the issue date of the IPO *(Datastream/Hand-collected)*
Assets	Total assets as of the most recent fiscal year before the IPO *(Datastream/Hand-collected)*
Debt	Total liabilities as of the most recent fiscal year before the IPO *(Datastream/Hand-collected)*
MTB	Market capitalisation based the proceeds of the IPO scaled by the book value of equity as of the most recent fiscal year before the IPO *(Datastream/Hand-collected)*
Shareholders' equity	Shareholders' equity as of the most recent fiscal year before the IPO *(Datastream/Hand-collected)*

Appendix 5: Descriptive statistics international sample

This table presents descriptive statistics of the international sample. The sample consists of 895 initial public offerings ("IPOs") that are issued and filed in Australia, Canada, Hong Kong, Japan, the UK, and the US between April 1, 2010, and March 31, 2014.. The sample excludes offerings of financial industries, real estate investment trusts ("REITs"), limited partnerships, non-original IPOs, foreign IPOs, unit issues (not for Japan and the UK), and IPOs with proceeds below $5 million.

	By nation-quarter					
	IPOs/ Public companies			IPO proceeds/ Total market capitalisation		
Country	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**
Australia	16	0.43	0.33	16	0.05	0.01
Canada	16	0.09	0.09	16	0.04	0.01
Hong Kong	16	0.38	0.38	16	0.01	0.01
Japan	16	0.33	0.31	16	0.03	0.01
UK	16	0.27	0.19	16	0.03	0.01
US	16	0.61	0.60	16	0.05	0.03

	By nation-quarter					
	Stock return			GDP growth		
Country	**N**	**Mean**	**Median**	**N**	**Mean**	**Median**
Australia	16	0.04	0.04	16	0.03	0.02
Canada	16	0.03	0.03	16	0.03	0.03
Hong Kong	16	0.04	0.04	16	0.04	0.03
Japan	16	0.02	0.02	16	0.01	0.01
UK	16	0.03	0.03	16	0.02	0.02
US	16	0.03	0.07	16	0.02	0.02

Appendix 6: Pearson correlation matrix international sample

This matrix presents the Pearson correlation matrix of the dependent, independent, and control variables of the international sample. The sample consists of 895 initial public offerings ("IPOs") that are issued and filed in Australia, Canada, Hong Kong, Japan, the UK, and the US between April 1, 2010, and March 31, 2014. *IPOs/Public companies* and *IPO proceeds/Total market capitalisation* are the dependent variables that represent IPO activity. *US x Post-JOBS*, *US*, and *Post-JOBS* are independent variables, whereas *Stock return* and *GDP* growth are control variables. Appendix 4 provides an overview of the definitions of the variables. * denotes statistical significance at the 5% level.

	Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	*IPOs/Public companies*	1.000						
2	*IPO proceeds/ Total market capitalisation*	0.285*	1.000					
3	*US x Post-JOBS*	0.635*	0.058	1.000				
4	*US*	0.569*	0.064	0.653*	1.000			
5	*Post-JOBS*	0.273*	0.067*	0.580*	0.112*	1.000		
6	*Stock return*	0.164*	0.033	-0.187*	-0.021	-0.386*	1.000	
7	*GDP growth*	-0.062	-0.051	-0.120*	-0.185*	-0.122*	0.073*	1.000

Appendix 7: Pearson correlation matrix emerging growth company sample

This matrix presents the Pearson correlation matrix of the dependent, independent, and control variables of the EGC sample. The sample consists of 322 initial public offerings ("IPOs") that are issued and filed in the US between April 1, 2010, and March 31, 2014. *IPOs/Public companies* and *IPO proceeds/Total market capitalisation* are the dependent variables that represent IPO activity, whereas *R&D/Assets* is a dependent variable that represents innovation activity. *EGC x Post-JOBS*, *EGC*, and *Post-JOBS* are independent variables. *Ln(Revenue)*, *Ln(Proceeds)*, *Ln(Assets)*, *Ln(Debt)*, *Ln(Cash)*, *MTB*, and *Shareholders' equity* are control variables. Appendix 4 provides an overview of the definitions of the variables. * denotes statistical significance at the 5% level.

	Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1	*IPOs/Public companies*	1.000												
2	*IPO proceeds/ Market capitalisation*	0.237*	1.000											
3	*R&D/Assets*	0.107	0.001	1.000										
4	*EGC x Post-JOBS*	0.529*	-0.099	0.226*	1.000									
5	*EGC*	0.095	0.037	0.189*	0.395*	1.000								
6	*Post-JOBS*	0.538*	-0.123*	0.157*	0.866*	0.026	1.000							
7	*Ln(Revenue)*	-0.110*	0.062	-0.489*	-0.348*	-0.615*	-0.133*	1.000						
8	*Ln(Proceeds)*	-0.055	0.051	-0.329*	-0.249*	-0.540*	-0.043	0.675*	1.000					
9	*Ln(Assets)*	-0.127*	0.047	-0.572*	-0.363*	-0.630*	-0.141*	0.833*	0.788*	1.000				
10	*Ln(Debt)*	-0.082	0.088	-0.272*	-0.307*	-0.639*	-0.071	0.646*	0.590*	0.724*	1.000			
11	*Ln(Cash*	0.045	-0.017	-0.168*	-0.074	-0.240*	-0.002	0.263*	0.388*	0.375*	0.192*	1.000		
12	*MTB*	0.004	-0.042	-0.169*	0.009	0.018	0.018	0.025	0.046	-0.022	-0.064	-0.018	1.000	
13	*Shareholders' equity*	-0.093	0.027	-0.190*	-0.215*	-0.453*	-0.059	0.381*	0.498*	0.510*	0.353*	0.212*	-0.031	1.000

Appendix 8: Variance inflation factors difference-in-differences analyses

This table presents the variance inflation factor ("VIF") of the independent and control variables from the three difference-in-differences ("DiD") analyses. VIF is a measure of multicollinearity in regression variables. This study assumes that a VIF above ten indicates multicollinearity among the variables.

International DiD		**EGC DiD**		**Innovation DiD**	
Variable	**VIF**	**Variable**	**VIF**	**Variable**	**VIF**
GDP growth	2.97	*EGC x Post-JOBS*	10.73	*EGC x Post-JOBS*	10.73
US x Post-JOBS	2.22	*Post-JOBS*	9.25	*Post-JOBS*	9.25
Stock return	1.61	*Ln(Assets)*	6.30	*Ln(Assets)*	6.30
		Ln(Revenue)	5.44	*Ln(Revenue)*	5.44
		EGC	3.90	*EGC*	3.90
		Ln(Proceeds)	3.19	*Ln(Proceeds)*	3.19
		Ln(Debt)	2.73	*Ln(Debt)*	2.73
		Shareholders' equity	1.78	*Shareholders' equity*	1.78
		Ln(Cash	1.35	*Ln(Cash*	1.35
		MTB	1.04	*MTB*	1.04
Mean VIF	**2.23**		**4.57**		**4.57**

Appendix 9: Breusch-Pagan/Cook-Weisberg test

This table presents the findings of Breusch-Pagan/Cook-Weisberg test for heteroskedasticity. The Breusch-Pagan/Cook-Weisberg test the null hypothesis that the error variances are equal. The null hypothesis indicates that standard errors are homoscedastic at the 5% level. As H_0 is rejected, heteroskedasticity appears to exits in the variables. * denotes statistical significance at the 5% level.

	International DiD	**EGC DiD**	**Innovation DiD**
$Chi^2(1)$	14.350*	48.69*	417.920*
$Prob > Chi^2(1)$	0.000	0.000	0.000