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JUSTAS DAUJOTAS

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THE JOBS ACT: IMPLICATIONS FOR U.S. IPO VALUATION

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Student _____

(signature)

Supervisor Junior research fellow Eglė Jakučionytė, PhD

(Scientific degree of the supervisor, academic title, name, surname)

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LIST OF ABBREVIATIONS

Emerging Growth Company	EGC
Initial Public Offering	IPO
Jumpstart Our Business Startups Act	JOBS Act
Price-to-EBITDA	P/EBITDA
Price-to-earnings	P/E
Price-to-sales	P/S
Price-to-value	P/V
Securities and Exchange Commission	SEC
Sarbanes-Oxley Act	SOX
Smaller Reporting Company	SRC

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1. INTRODUCTION

Initial public offerings (hereinafter: IPO) not only fuel firm growth by providing capital and acquisition opportunities, but also boost the overall economy. This is due to increasing firm investments and greater job creation post-IPO (IPO Task force, 2011). However, from the peak of the Dot-Com Bubble in 2000 to 2011 only 192 initial public offerings on average occurred in the United States, while from 1991 to 1999 – 547 companies entered the public markets each year on average (Ritter, 2021). The decline in IPO volume and stagnation of U.S. capital markets resulted in passing the Jumpstart Our Business Startups Act (hereinafter: JOBS Act) on April 5th, 2012. The legislation sought to decrease the regulatory burden for small issuing companies (those with less than $1 billion in total yearly revenue prior to issuance) with the goal to reenergize the market. The offered benefits for these emerging growth companies range from confidential IPO filling to reduced audit requirements. However, papers by Chaplinsky, Hanley, and Moon (2017) and Barth, Landsman, and Taylor (2014) show that the reduced requirements lead to greater asymmetric information problems. Could greater uncertainty in firm quality lead to irrational IPO pricing? Or is the overall IPO market insensitive to regulatory changes as explained by Gao, Ritter, and Zhu (2013)? This thesis seeks to answer these questions by analyzing IPO valuations pre and post JOBS Act. The paper follows the work of Purnanandam and Swaminathan (2004) who use an IPO-publicly traded peer matching technique and test for IPO overvaluation. The authors find that IPOs are generally overvalued in comparison to their publicly traded competitors in the period of 1980-1997. This thesis sheds light on valuation in relation to substantial regulatory changes and contributes to the literature by providing empirical evidence on overvaluation in recent times.

The thesis also explores the relationship between IPO valuation after the JOBS Act and first day stock returns, a phenomenon defined as underpricing. Conventional economic theory based on asymmetric information suggests that most undervalued IPOs would receive greatest underpricing in effective capital markets (Benveniste and Spindt, 1989). However, the results from Purnanandam and Swaminathan (2004) argue that IPO pricing is not efficient in the short run as most overvalued IPOs receive greater initial day returns. The result is more prevalent in “hot” IPO markets that are described by increased IPO volume. It is thus meaningful to test the relationship between in the context of the JOBS Act as it showed substantially greater IPO volume (Dambra, Field, and Gustafson, 2015) in the first few years after it was established. Furthermore, the literature highlights increased underpricing (Chaplinsky, et al. 2017) but some disagree that the increase in underpricing is related to reduced firm disclosures (Gupta and Israelsen, 2015). This thesis seeks to answer whether changes in IPO valuations influenced underpricing. Understanding

the relationship between valuations and initial day returns is also meaningful to firms that base their issuance decision on market-timing theories (Choe, Masulis, and Nanda, 1993 and Hsieh, Lyandres, and Zhdanov, 2011). Thus, the empirical analysis can be used in perspective of further regulatory changes in the U.S. IPO market.

The novelty of the research is the application of IPO valuation methods to a period with substantial policy changes. Preceding the JOBS Act only Sarbanes-Oxley Act (hereinafter: SOX) of 2002 could compare in the magnitude of regulatory changes introduced for public market participants. There is noticeably less research on IPOs in the second decade of the 21st century compared to the first, after the SOX was passed. This is the primary reason for the choice of the topic. Furthermore, the JOBS Act and its implications to the U.S. capital markets is explored by only several academic papers. The range of literature that covers the JOBS Act focuses on changes in underpricing, volume, information uncertainty and changes in costs for issuers (Dambra et al., Barth et al. (2014), Gupta and Israelsen (2015), and Chaplinsky et al. (2017). There are no known papers known to the author that empirically test IPO valuation after 2008. This might be due to the difficulties in obtaining thorough data. The research cannot be done relying only on public databases and requires additional sources. In this paper S&P Compustat and Bloomberg databases are used. Furthermore, the analysis largely focuses on the matching technique between IPOs and their peers that requires substantial precision. Resulting valuation multiples and their relationship with initial IPO returns is also a novelty in the JOBS Act literature. Articles of Barth et al. (2014), Gupta and Israelsen (2015), and Chaplinsky et al. (2017) all test for underpricing after the JOBS Act was passed, yet none do it considering changes in issuer valuation.

The aim of the work is to reveal whether regulatory changes of the JOBS Act resulted in overvaluation (undervaluation) in IPOs and if there was a change in quality identify the implications for the U.S. stock market.

Objectives:

a) Evaluate the valuations of U.S. IPOs during the “hot market” after the 2012 JOBS Act to 2015 with respect to their industry peers.
b) Analyze whether the JOBS Act legislation driven changes in the U.S. IPO market valuation in comparison to pre-Act and latter post-Act periods.
c) Test the relationship between underpricing and valuation, link findings to existing theories.

Firstly, comparative analysis and synthesis of academic literature on the topic is performed. Furthermore, data is collected, cleaned and synthesized from the S&P Compustat, Bloomberg and Professor Jay Ritter’s (Ritter, 2021) databases. The data is transformed and

matched by methodology of Purnanandam and Swaminathan (2004). Data analysis consists of quantitative statistical methods such as descriptive and inferential analysis. More precisely, non-parametric tests and multiple regressions under several specifications are used.

The results yield that IPOs are overvalued looking at the whole sample from 2008 to 2020. Such result is consistent with Purnanandam and Swaminathan (2004) and is achieved both with matched and unmatched data. Secondly, IPOs in the initial JOBS Act period are overvalued with high significance when measured by net income. However, in the pre-JOBS Act period IPOs are overvalued when measured by sales and EBITDA. IPOs are generally fairly valued in the period between 2016-2020. Tests for differences in distributions between the periods yield no significant results, thus the JOBS Act did not provide substantial changes in IPO overvaluation. Furthermore, pre-JOBS Act underpricing is inversely related to overvaluation. Consequently, in the period of 2016-2020 post-JOBS Act the relationship is slightly positive, but almost neutral. The results suggest that introduction of the JOBS Act did not introduce substantially greater overvaluation and it did not lead to greater underpricing, compared to the pre-JOBS period.

The thesis is structured as follows. Firstly, extensive literature review on the topic is provided. In the section general background in initial public offerings process, motivation to pursue IPOs and trade-offs faced by initial shareholders are discussed. Furthermore, IPO pricing theories and findings on the underpricing phenomenon are summarized. Changes introduced in the U.S. by the JOBS Act and further development complete the section. Secondly, the data and methodology of analysis is presented following the paper of Purnanandam and Swaminathan (2004). Thirdly, statistical tests are applied to evaluate IPO valuation in the period of interest and link findings to underpricing. Lastly, the thesis is summarized and recommendations for further policy improvements are provided.

2. ANALYSIS OF SCIENTIFIC LITERATURE

An initial public offering occurs when a private company offers to sell its primary shares to new investors which then are subsequently traded on a public market. In this section I succinctly introduce the IPO process and motivation for firms to go public. Secondly, I discuss IPO valuation and its importance to the performance of companies as well as implications to the market. Furthermore, I summarize the findings on the changes in IPOs caused by the JOBS Act. Lastly, theories on U.S. IPO market decline are presented and linked to previous subsections.

2.1. The IPO Process

The procedure of an initial public offering condensed from Lowry, Michaely, and Volkova (2017) is as follows. First, the company that wishes to go public chooses an investment bank to lead the IPO and act as the underwriter. IPO underwriters work with the issuing firm to assess the value of its shares, ensure compliance to regulation, use their network to quantify the demand and assure issuers of minimum shares sold at an agreed initial price range. The two parties agree on the degree of commitment from the underwriter regarding the issuance of shares. The underwriter may buy the entire offer, undertake a "best efforts agreement" to restrain from guarantees of IPO size or even suggest a syndicate of underwriters to reduce the risk of IPO by distributing proportions of shares to be issued between several investment banks. After the due diligence and IPO strategy decisions are made, legal documents are drafted and sent for approval to the Securities Exchange Commission (hereinafter: SEC). Once the SEC permits the IPO the exact date is chosen. One day prior to the effective date the underwriter and issuer decide on the number of shares and their value to be issued. After the IPO happens underwriters still have responsibilities in providing analyst recommendations, market making (for liquidity) and stabilizing the price to limit downward movements. After the 25 day "quiet period" enforced by the SEC the underwriter and other investment bank analysts can provide their equity research to their clients and publicly share their future target price for the stock. This concludes the IPO process after which the firm integrates into the public market.

2.2. Why Firms Choose the IPO Route

Firms choose the IPO route for several key reasons. Firstly, firms might raise public equity capital for business expansion, or acquisitions. Secondly, IPOs provide a simple way for early investors such as venture capital funds and angel investors to realize gains by selling their shares.

There are less barriers to exchange the stock in the public markets, thus IPOs provide liquidity for the initial shareholders to realize their gains on the growth of the company. Lastly, there are indirect benefits that the additional attention of the IPO process brings such as marketing, branding and improved human resource pool. However, the benefits for companies come with a cost of additional regulatory requirements in providing periodical public information on their financials as well as greater accountability for investors. Theoretical explanations are summarized by Ritter and Welch (2002) who categorize IPO theories in two primary groups: life cycle and market-timing.

Life cycle theories suggest that firms go public when they reach a point of maturity when the benefits of staying private are less than alternative costs. Chemmanur and Fulghieri (1999) provide a model with an entrepreneur who has two options: raise capital from a single large investor (such as a venture capital firm) or go public and raise capital from multiple smaller investors. The advantage of the first option is that it is easier to convince a smaller number of investors about the firm's quality and raise the necessary capital, however, it comes with a price of reduced bargaining power for the founder. In the second case, many investors in the public market have lesser bargaining power but a larger cost of information production. The authors find, that in equilibrium the decision to go public is undertaken in a later life cycle as more information about the quality of the company is revealed. In addition, businesses that require larger capitalization and rely on new technologies tend to IPO earlier. This is due to the cost increase in evaluating a firm for the venture capitalist, resulting in lower price per share in the private market. Furthermore, the private market also expects greater risk premium for technological uncertainty incentivizing to raise capital from the public markets earlier. Maug (2001) extends the idea and combines it with the underpricing phenomenon. It is described as the difference between the offer price of the IPO company and the close price of the first trading day. Large underpricing is costly to the firm as it could have raised more capital during the IPO. The model suggests that as the firm grows the cost of underpricing is outweighed by the benefit of receiving information from the public stock market to implement strategic decisions. Further implications of underpricing to valuation will be discussed in later subsections.

Market-timing theories posit that firms choose the IPO route not based on idiosyncratic factors but rather favorable market conditions. Choe, Masulis and Nanda (1993) extend Myers-Majluf (1984) adverse selection model and show that IPO volume increases as the return on the public stock market increases, adjusted to bond market returns and upswings in the economy. Economic expansions lead to asset price appreciation and decrease in uncertainty. Both factors contribute to reduced adverse selection costs for issuers and lead to periods of increased IPO

volume. Hsieh, Lyandres, and Zhdanov (2011) propose a model in which firms time their IPOs to favorable market conditions to achieve a positive valuation surprise. The model predicts such reduction of valuation uncertainty catalyzes acquisitions which are the end goal of many firms.

How do the theories fare against the explanations of issuing firms? Brau and Fawcett (2006) present results from a survey directly asking 336 CFOs of non-financial U.S. listed companies why those businesses decided to go public. An unexpected result shows that the most mentioned reason is that companies IPO use public shares as an acquisition currency to fuel their growth. Another reason mentioned by more than half responders is that going public provides a market price for the company. This reason is linked to the first as market capitalization serves as a proxy for the value of a future acquisition as proposed by Zingales (1995). When the results are dissected by groups it is seen that younger and older firms differently perceive the benefits of going public. For instance, the importance of the reason to go public stated as: "To create public shares for use in future acquisitions" scored 3.72/5 for young and 3.38/5 for old firms (1 – does not agree, 5 – strongly agree). It confirms conventional logic that older companies with greater capitalization act as the acquirer not the acquiree. The survey also substantiates market-timing theories as 83% found market conditions as the most important factor to proceed with the IPO.

2.3. IPO Pricing

As noted in Ritter and Welch (2002) it is challenging to produce accurate valuation methods for issuers. The authors agree that producing a model that could better explain the intrinsic value of a business would be useful in measuring initial and long-run performance.

The study of Purnanandam and Swaminathan (2004) is replicated by this thesis in terms of analysis methods and definitions of firm valuation. The authors construct ratios of intrinsic IPO value based on comparable firms, matched on industry, size and profitability. With these ratios the authors show that the median IPO is significantly overvalued at its offered price in comparison to peers. Furthermore, more overvalued IPOs provide higher first day returns (a phenomenon called underpricing), meaning the issuers could have set a higher price. The findings are inconsistent with more traditional IPO pricing explanations based on asymmetric information theories. These theories suggest that as more private information is revealed to the public after the issue – undervalued IPOs receive greater short run returns due to initial mispricing. Purnanandam and Swaminathan (2004) argue that the converse happens as overvalued IPOs might be mispriced due to behavioral biases such as overconfidence but revert to the mean or even underperform in the long run (5 years). There are other explanations such as underwriters pricing the IPO with

respect to the maximum value observed during the pre-IPO roadshow. However, such pricing technique is only available to the underwriters based on their previous experience and is based on highly confidential information, not attainable to the public.

Kim and Ritter (1999) provide an early look in IPO valuation based on accounting multiples. The authors use multiples such as price-to-earnings, price-to-sales, price-to-book, and enterprise value-to-sales of comparable firms that executed their IPO in the previous years as proxies for future IPO valuation. The authors find modest ability to value IPOs based on peers' multiples given historical data, and slight improvement with included expected earnings. Kim and Ritter (1999) suggest using enterprise value-to-sales multiple as a multiple that yields smaller valuation error as it adjusts to differences in leverage. The study also finds that earnings forecasts improve valuation accuracy, but errors based on comparable firm multiples are greater for younger firms due to greater uncertainty in future growth prospects. The shortcoming of the analysis is due to sample selection of firms that have positive earnings per share in the 12 months prior to their IPO. Such sample selection is much stricter than more usually used positive EBITDA requirement since many firms with smaller capitalizations do not have positive earnings but have positive EBITDA. Lastly, the authors provide a recommendation for further studies on valuation suggesting future earnings forecasts and higher frequency data for better precision.

Bhojraj and Lee (2002) provide a systematic view on equity valuation based on comparable firm multiples. The authors posit that the selection of peers should be based on "a function of the variables that drive cross-sectional variation in a given valuation multiple". Thus, the authors produce "warranted multiples" as a prediction from annual cross-sectional regressions of enterprise value-to-sales and price-to-book multiples on eight explanatory variables (regarding profitability, growth, leverage). The technique is useful in matching industry peers while controlling for the general market conditions and reducing the effect of the current share price as a determinant of the intrinsic value of a business. This is due to many techniques relying solely on price-to-factor multiples which can be influenced by sudden price shocks after quarterly earnings or investment bank downgrades. Bhojraj and Lee (2002), conversely, offer a more precise matching system and expand to factors that are less sensitive on prevailing market conditions.

2.4. IPO underpricing

One of the most striking phenomenon of IPO literature concerns underpricing. The term is most usually defined as the price increase on the day of the initial public offering. According to statistics compiled by Prof. Jay R. Ritter yearly IPO first day returns in the U.S. stock market have

ranged from 3.7% to 41.6% from 1980 to today (Ritter, 2021). Although beneficial for investors, underpricing means "leaving money on the table" for the issuer since the company does not receive the full amount of public equity capital it could have. A counterpoint on underpricing benefits for issuers is to assure that the IPO occurs successfully and at least the issuance complies to a certain previously agreed range. Nevertheless, the aggregate amount of U.S. dollars left on the table in 2001-2000 reached $101.57 billion. The scale of underpricing of U.S. IPO issuers still puzzles academia. Ljungqvist (2007) groups theories in four branches: asymmetric information, institutional, control and behavioral. The main theories and their connection to IPO valuation is described in the following paragraphs.

The widest range of explanations are based on asymmetric information theories. A group of such models rely on the idea that there are two types of investors: informed and uninformed. Informed investors can determine the quality of an issuing firm and only subscribe to higher quality IPOs, while uninformed investors cannot determine the quality and subscribe to all or none IPOs. In a seminal paper by Rock (1986) the lemon's problem introduced by Akerlof (1970) is applied to the IPO market. In the case of the two investor groups, the uninformed investors have a "winner's curse" – only receiving full bid in IPOs of lower quality, while being crowded out by informed investors in IPOs of higher quality. In the borderline case, uninformed investors only receive allocations in "overpriced" IPOs – in those that have a negative return in the open market. This results in a market with equally informed investors. Extensions to Rock's model are based on current book building practices (process of determining IPO demand by underwriting bank) where investors and underwriters have misaligned incentives. Underwriters seek to understand the demand from investors while setting the price, while investors can signal less positive information in hopes of receiving a lower offer price which could presumably result in higher long-term returns. Benveniste and Spindt (1989) show in an auction model representing book building how misrepresentation of investor demand can result in smaller allocations or none from the underwriter. Edelen and Kadlec (2005) test book building procedures with limited information and link comparable firm returns to IPO underpricing. Based on the theory of revealed preference the authors argue that issuers face a trade-off in pricing between maximizing their proceeds and assuring a high probability of IPO completion. The theoretical model suggests that pricing aggressiveness is inversely related to changes in value of similar firms. In highly priced markets issuers are willing to underprice more and vice versa. This is due to a trade-off between underpricing and successful completion of an IPO in a given offer price range. Firms are willing to give up potential additional capital in return of a higher probability of a successful IPO. Consequently in "hot markets" firms that are similar to the issuing firm tend to have high multiples

and new issuers face comparably lower initial valuations and thus higher underpricing implied by first day returns.

Behavioral explanations are relatively new compared to other theories. These models rely on investor and/or issuer irrationality in pricing new issues. Loughran and Ritter (2002) suggest that prospect theory applied to initial shareholders of IPO firms. The theory posits that issuers care more about change in their wealth compared to overall level of wealth. Prospect theory suggests that when an individual is faces two related outcomes they can be perceived separately or as one. Initial shareholders have value functions based on changes of wealth that are concave in gains and convex in losses. Furthermore, due to risk aversion small gains are valued less than small losses. Thus, initial stockholders integrate the bad news (underpricing) with the good news (large increase in their net wealth after the IPO) and are content with the result. Lastly, Loughran and Ritter (2002) provide U.S. data between 1990-1998 that the majority IPOs leave relatively little money on the table, since the median first day return multiplied by the issue size is $2.3 million while the mean is $9.1 million. Issuers that leave money on the table tend to be those with upward revisions of the issue price relative to the price presented in IPO prospectus. Another type of behavioral model proposed by Welch (1992) concerns sequential learning from irrational investors in IPO investment decisions. In a model where multiple investors have to make decisions on share allocations demanded on a new issuance (i.e. roadshow of proposed issue by an underwriter), latter potential investors condition their decisions not only on financial, market, industry and other information, but also on the demand of former potential investors. Information "cascades" occur as larger initial bids from first potential investors trigger a snowball effect and imply that there is private information that suggests higher valuation compared to information available to latter investors. Current book building practices prevents such inequality between potential investors since the underwriters keep the investor bids confidentially and additional allocation options for all investors that depend on overall issue demand.

2.5. The JOBS Act

The JOBS Act was signed on the 5th of April 2012 with the goal to make more smaller companies go public. A new category of businesses was introduced by the SEC as *emerging growth companies* (hereinafter: EGCs) that could reap new regulatory benefits for their IPOs. To qualify for this category a business must have total gross revenue of under a $1 billion in the most recent fiscal year, has not issued more than $1 billion of non-convertible debt in the past three years, and did not register as an accelerated filler (meaning less than $75 million worth of equity is owned by public investors) for the SEC (Jumpstart Our Business Startups Act, 2012). For such

companies two types of provisions are offered: de-burdening and de-risking. De-burdening provisions reduce previous accounting and reporting requirements for EGC issuers. De-risking provisions relate to the confidentiality of the IPO and allow EGC issuers to disclose less sensitive information to the public and privately approach potential investors. IPO changes for EGC issuers under the JOBS Act are provided in Table 1. Reduced regulatory requirements changed the landscape of U.S. IPO market, although, the implications of policy measures were not thoroughly examined in comparison to topics of underpricing theory or long-run IPO performance. The following paragraphs present the main findings of the JOBS Act effect on the IPO market.

There is empirical evidence that the JOBS Act did increase IPO volume shortly following its initiation. Dambra, Field, and Gustafson (2015) find statistical significance that the U.S. IPO market was more active compared to other most active stock exchanges worldwide for the following few years after 2011. The authors find that the de-risking provisions such as testing-the-waters best explain the growth in IPO volume. The findings rely on a multiple regression framework with five probit models that regress post-JOBS and pre-JOBS IPOs on multiple explanatory variables. The main finding is a result from the final specification that controls the differences between pre-Act and post-Act issuers, industry returns, proprietary disclosure costs and firm size. Costs of disclosure are measured by R&D spending and Herfindahl index which describes market competition and firm power. The authors also use 12 month industry returns, log revenue, a dummy variable for profitability, and three variables for firm size: log assets, log number of employees and cash-to-assets ratio. The regression yields that smaller firms are not more likely to pursue an IPO after the JOBS Act, while proprietary costs and previous year market returns are significant for the increase in IPOs several years after the Act. The findings support the hypothesis of decrease of de-risking provisions that concern confidentiality of the firm wishing to go public. The authors also test which firms receive the largest benefit from policy changes. They conclude that in the following two years the increase in IPO activity which is directly linked to the act itself was the most prominent in biotechnology and pharmacy companies. The increase of IPOs of these companies compared to others is 16 to 5. The findings were substantiated by showing that there is a direct link between cost of research and development to sales ratio and increase in ex post IPO activity. The authors agree that even though the JOBS Act incentivized more EGCs to go public there is doubt where these growth companies increase the quality of IPOs and present good opportunities to their IPO investors.

Table 1.

Changes in issuer provisions introduced by the JOBS Act

De-burdening provision	**Explanation**
Testing-the-waters	The provision permits issuers to engage in oral or written communication with potential investors prior to or following the filling of a registration statement. The rule was adopted to all companies by the SEC on the 26th of September 2019.
Confidential Filling	Companies can confidentially file the draft for their IPO registration statement for SEC approval. When the firm decides to proceed with the IPO registration statement and amendments must be made public at least 21 days before the road show begins.
De-risking provision	**Explanation**
Reduced Financial Disclosure	Firms can opt for 2 instead of 3 years of audited financial statements and 2 instead of 5 years of selected financial data to file with SEC in the IPO registration statement.
Reduced Compensation Disclosure	No compensation, discussion and analysis section in the IPO registration statement and following reports. Required compensation disclosure for three instead of five executive officers. Exemption of shareholder advisory votes on executive compensation as previously required by the Dodd-Frank Act from 2010.
Internal control audit exemption	Issuers can opt-out of internal controls audit requirements mandated by Sarbanes-Oxley Act
New Accounting Standards Opt-out	Issuers can opt-out of complying to new or revised accounting standards until they apply to non-issuers.
Public Company Accounting Oversight Board (PCAOB) Rullings Opt-out	Firms can choose to opt-out of mandatory auditor rotation and auditor analysis in their statements.

Source: Compiled by the author based on Dambra et al., 2015; Chaplinsky et al., 2017

Chaplinsky, Hanley, and Moon (2017) test whether the JOBS Act of 2012 reduced direct costs for EGC issuers. To understand the effect of the act post-JOBS issuers are split into subsamples of smaller reporting companies (hereinafter: SRCs) and non-SRCs. SRCs are defined

by the SEC as companies with a public float of $25 million before 2008 and $75 million after 2008. The authors use several methodologies such as propensity score matched OLS regression, difference-in-difference regressions and regression discontinuity design. Thus, the control group is comprised of 757 public companies that issued their shares between 2003 and 2012 April 4th and could have used EGC benefits had the JOBS Act been present at the time. The treatment group contains 312 EGC companies that issued shares in the three-year period after the JOBS Act. To ensure adequate representation of the post-JOBS sample the authors match pre-JOBS issuers on firm size, revenue, profitability, age, growth prospects, asset intensity, and the Fama French 17 industry classification, among several other descriptive variables. Using this propensity score matching system the authors use five models with legal fees, gross spread, total direct costs, initial returns and total costs as the dependent variables in each case. The independent variables are binary variables if the firm is an SRC, if it issued post-JOBS, and an interaction term between the two with additional control variables. The differences-in-differences approach shows that the JOBS Act did not reduce direct costs and even increased the indirect costs of going public for non-SRC firms. The direct costs are measured by accounting, legal and underwriting fees while the indirect costs are measured by first day underpricing. Indirect costs measured by underpricing for non-SRC EGCs is 11% greater than SRC EGCs issued post-JOBS. Chaplinsky et al. also analyze the choices of disclosure EGCs choose because of the JOBS Act. They find that over the sample of more than 300 EGCs most choose to reduce the disclosure of executive compensation and confidentially file their registration (both over 90%), while slightly less EGC companies opt to test-the-waters (over 70%). Such reductions in information disclosure relate to asymmetric information problems which suggest a decrease in quality of EGC IPOs.

In a related paper of Gupta and Israelsen (2015) evaluate the indirect costs measured by underpricing of EGC firms after the JOBS Act. In addition to the same results of increased underpricing for EGC firms, the authors analyze the factors of risk that firms disclose. The authors do not use differences-in-differences approach as Chaplinsky, Hanley, and Moon (2017) but instead choose a topic modeling technique to find links between risk disclosures and underpricing. The technique is used to analyze text in S-1 form of IPO fillings for the SEC. The exact topic model is Latent Dirichlet Allocation (LDA) that uses Bayesian statistics to "uncover" latent topics in documents and topic-word distributions. The technique uncovers risk factors disclosed by EGC firms in their prospectuses. EGC companies post-JOBS disclose more accounting, financial markets, regulatory product approval risks and less demand, market competition or supply chain uncertainties. The authors then examine a subset of EGC issuers whether less disclosure is associated with greater underpricing. They regress first-day underpricing on six independent variables: confidential filling, no executive compensation discussion, extended use of private

accounting standards, less than 3 years of audited financial statements, less than 5 years of selected financial data disclosure and less than 5 executives compensation disclosure. In addition, other dependent variables are firm age, lagged assets and lagged revenues with several addition dummy variables. Regression results from the 215 firms show that none of the changes in disclosure separately is sufficient to explain underpricing measured by first day returns. The paper concludes that further analysis of direct costs to EGC issuers is needed in order to understand the net benefits of the JOBS Act.

Barth, Landsman, and Taylor (2014) examine the changes in IPO information uncertainty as a consequence of the JOBS Act. The authors compare two samples of firms: EGCs and NEGCs (firms that went public prior to the JOBS Act but would have qualified for EGC status). Information uncertainty is measured by the level of underpricing which increases significantly for EGC firms – 7.09% after the first trading day and 12.93% after 30 days from the IPO date. Such increases in underpricing are mostly related to confidential S-1 statement filling and reduced executive compensation disclosures. Post-JOBS Act investors have less information to make decisions. The mechanism results in less initial institutional investor demand in IPO allocation and larger first day underpricing in the case of positive reaction in the open market. Changes in provisions of the JOBS Act provide managers with a trade-off between "money left on the table" and increase in personal wealth e.g. exercisable stock options. Another reason for changes in information uncertainty is related to firms with high proprietary costs – information that could weaken its market position if disclosed. The explanation is consistent with the finding of larger underpricing in research intensive businesses. Barth, Landsman, and Taylor (2014) challenge Chaplinsky et al. (2017) and Gupta and Israelson (2015) who both do not find substantial justification of elevated underpricing due to decreased mandatory provisions of accounting data and executive compensation. Barth, Landsman, and Taylor (2014) also finds even larger 30 day underpricing that latter papers do not evaluate. Lastly, the paper substantiates previous findings by showing how uncertainty increased as measured by post-IPO volatility and wider share bid-ask spread.

2.6. The Decline of the US IPO Market

In 2011 the U.S. Treasury Department formed the IPO Task force to evaluate the conditions of the U.S. IPO market. According to the group of professionals that were part of the task force (venture capitalists, investment bankers, CEOs, academicians, lawyers, public investors), the number of small companies (defined as ECGs) choosing the IPO route "plummeted relative to historical norms" in the 21st century (IPO Task Force 2011). This was deemed

detrimental to the U.S. job market as employment growth in companies was substantially larger post-IPO. The task force reacted by suggesting many of the established JOBS Act provisions seeking to decrease the regulatory burden introduced by the Sarbanes-Oxley Act. After passing the JOBS Act on April 5th, 2012 the number of total IPOs in U.S. peaked in 2014 with 206 listings, however, it dropped again as in 2015-2016 there were 193 IPOs combined (Ritter, 2021). Further paragraphs present theories on the decline of the IPO market and evaluate whether the changes introduced by the JOBS Act tackled problems presented by academic literature.

Rose and Solomon (2016) summarize small IPO (defined as a company with a market capitalization of less than $75 million) decline theories. The authors agree that the most well-known explanation concerns Section 404 of the Sarbanes-Oxley Act (Sarbanes-Oxley Act, 2002) which focuses on internal audit controls. Another key part of the document is Section 906 which introduces fines of $1 million and up to ten years of imprisonment for chief executives that certify financial statements while knowing that such statements do not truthfully represent actual financial conditions. Both changes increased audit costs for issuers. In contrast to what is usually assumed, the median audit fees for small capitalization companies peaked in 2008 and declined in 2012 to similar levels as of pre-SOX Act. In 2001 the median fees for smaller capitalizations IPOs amounted to roughly $165 thousand while in 2012 the figure was about $200 thousand, according to CRSP and Audit Analytics data. For large capitalization companies mean audit fees were $396 thousand in 2001 and $1.2 million in 2012. Such data implies that on a relative basis larger companies had a greater increase in audit fees, thus the explanation that increased costs resulted in the decrease of small IPOs is not fully plausible. Another theory presented by the authors is called the market ecosystem theory. It suggests that new regulations affected small IPO firms the most. Among these burdens is Regulation FD which prohibits disclosure of material non-public information to key stakeholders and Global Research Analyst Settlement which restricts investment banker influence on equity research analysts and restricts "spinning" practices. "Spinning" is defined as a practice of investment banks that provide larger IPO allocations to preferred customers in order to agree on further business. According to the paper, both measures reduced incentives to provide analyst coverage which then negatively affected small IPO prospects. The authors provide such reasoning: "Regulation FD affects analyst coverage by discouraging the transmission of information through analysts, which affects the value of analyst coverage. The Global Research Analyst is thought to have decreased analyst coverage by severing a crucial funding source for analysts". Demiroglu and Ryngaert (2010) show that stocks that have been trading for over a year without any analyst coverage have 4.86% abnormal returns in the following three days after first coverage is initiated. Thus, firms benefit from coverage at least in the short term, however, providing equity research has been burdensome due to tighter regulation.

Gao, Ritter, and Zhu (2013) provide a counter argument for the regulatory overreach and market ecosystem theories. The authors find that the regulatory overreach hypothesis does not fully explain the decrease in IPOs after 2000. Instead, they provide economies of scope hypothesis which is based on the idea that small firms became relatively less profitable after 2000 due to larger companies being more able to collect surplus of faster technological advancement. Gao, Ritter, and Zhu (2013) believe that it is more profitable for small firms to be acquired than to grow organically. The authors define small companies as companies with twelve month sales prior to an IPO less than $50 million. The authors find from applied time series regressions estimated at the aggregate level that introduction of SOX is not statistically significant to changes in IPO volume. The paper suggests that a de-burdening policy will not revive the IPO market. This is not due to SOX or other legislation, but rather linked to the objective of small firms that is acquisition-oriented, not intended to maximize profits. Furthermore, smaller companies have underperformed a benchmark by an average of 17.3% in the following three years after an IPO. A strategy with sooner exit opportunities provide larger wealth gain for current shareholders of small private companies compared to poor returns in the stock market.

3. SAMPLE SELECTION AND RESEARCH METHODOLOGY

This section introduces the methodology of the main empirical part. The section thoroughly follows actions of Purnanandam and Swaminathan (2004) as well as explains restrictions, benefits and shortcomings of the matching and valuation process. Several key procedures that are not explicitly explained in the aforementioned paper are discussed and their rationale is explained. The section contains subsections on sample selection, explanation on IPO matching technique, valuation methods and technical challenges.

3.1. Sample selection criteria

The thesis seeks to evaluate the impact of the JOBS Act of 2012. For this reason the sample is selected from 2008.04.05 to 2020.04.05, splitting it in year periods ad-hoc around the hypothesized changes the JOBS act introduced: pre-Act (2008.04.05-2012.04.05), initial JOBS Act (2012.04.06-2016.04.05) and latter JOBS Act (2016.04.06-2020.04.05). Looking at periods and not only years is an extension from Purnanandam and Swaminathan (2004). The primary sources of collecting data for this thesis are S&P Compustat database provided by Refinitiv and Bloomberg database. The primary database is different from the original paper which uses CRSP database, however, it was not attainable for the author due to Vilnius University not having the subscription to the CRSP database. Such change does not limit the universe of U.S. listed companies as both databases provide all key financial information. These sources are also complimented with Professor Jay Ritter's collected IPO data and SEC company fillings collected via Bloomberg terminal (Ritter, 2021). Following Purnanandam and Swaminathan (2004), I apply these selection rules to construct the IPO sample:

a) The IPO is present on the S&P Compustat database.
b) The IPO occurred between 2008.04.05-2020.04.05 in a U.S. stock exchange, such as: NYSE, NASDAQ, and AMEX.
c) The IPO is of a common stock type and excludes preferred shares, depository receipts, warrants, units, real estate investment trust shares, exchange traded fund shares and others.
d) The IPO must have information on revenue, EBITDA and net income of the prior fiscal year with respect to its IPO as well as the IPO date.
e) The IPO must have positive EBITDA in order to obtain value multiples based on this financial metric.
f) The industry of an IPO should be non-financial.
g) The IPO has an issue price higher than $5 to restrict small offerings.

Selection of IPOs from S&P Compustat database based on the listed rules yielded a sample of 334 IPOs. However, after cross-checking the data via Bloomberg, SEC fillings and applying matching, a sample of 304 IPOs matched with their peers was left for analysis. The refined sample is substantially smaller than of U.S. listed common stock IPOs in the period of 2008-2020 which amounted to 1401. The difference between the sample and universe is best explained by the positive EBITDA restriction and difficulty in finding appropriate peers in later matching. This is due to an increase in IPOs with lower levels of revenue compared to industry peers and a decrease in IPOs with positive EBITDA. This is illustrated by Professor Jay Ritter's compiled statistics (Ritter, 2021). The largest share of IPOs with negative earnings per share in a given year in the period of 1980-1997 (analysed by Purnanandam and Swaminathan (2004)) was 41% and in only 5 of 18 years the fraction exceeds 25%. While in the period of 2008-2020 the largest share of IPOs with negative EPS is 81% and in 12 out of 13 years the fraction exceeds 40%.

3.2. Matching procedure

The matching procedure follows Purnanandam and Swaminathan (2004). First, the sample of IPO firms and the universe of potential matching firms are complimented with data from Kenneth R. French's library on the Fama-French 48 (French, 2021a) and 12 (French, 2021b) industry classifications. Each firm is assigned an industry number based on its four digit SIC code that is a broader measure of industry classification. All of the IPOs are first and foremost matched on Fama-French 48 criteria that covers all of the factors concerning industry factors. Secondly, firms are matched on their EBITDA profit margin, calculated as:

$$EBITDA\ margin = \frac{Revenue}{EBITDA}$$

Matching on EBITDA profit margin provides comparability on profitability. EBITDA profit margin only concerns operational profit which is the direct measure of firm's ability to generate profit. This measure is thus more robust than other available profit margins. Finally, to select comparable firms in general size the matches were selected according to the closest available fiscal year revenue. As noted in Purnanandam and Swaminathan (2004) it is difficult to obtain extensive financial data for the previous fiscal year to the IPO.

Thus, each IPO is matched first with a publicly traded firm listed for at least 30 months in one of the U.S. stock exchanges. Such criterion is less restrictive than the three year public trade history required by the replicative paper. A shorter timeframe was chosen to improve the matching accuracy. The second criterion is the Fama-French 48 industry classification – each pair shares the same classification. In addition, almost all pairs share the Fama-French 12 industry

classification. Matching on Fama-French 12 industry classification was mindfully done for the relatively small sample of 304 companies into larger portfolios compared to the Fama-French 48 classification. The 48 classification is more granular yet splitting the small sample into fewer industries can provide meaningful sector comparison in the data analysis. After the firms are matched on industry then they are matched on EBITDA profit margin and prior fiscal year sales with respect to the IPO date. The goal of the matching procedure is to minimize the error of both variables trading off 100 basis points (1%) change in EBITDA profit margin for 2500-5000 basis points and more reduction of revenue difference. A borderline example: if the EBITDA margin of the matching firm is equal to the IPO but revenue is 10000 basis points greater, then up to 300 basis points of EBITDA margin could be given up to reduce the difference of sales to less than 2000 basis points. It is important to note that there are very few firms with nearly identical level of sales, thus a trade-off between EBITDA margin and level of revenue had to be implemented. Such precision was chosen arbitrarily by the author, motivating that slight changes in profitability can meaningfully change the size of the match firms. For example, RE/MAX Holdings Inc which issued shares on the 1st of October 2013 has prior fiscal year sales of 143.68 million USD and its matching firm has prior fiscal year sales of 134.13 million USD. The difference between the two EBITDA profit margins is 170 basis points. If matching was performed with only minimizing EBITDA margin errors then Prime Global Capital Group would have been chosen with only 89 basis point error. However, 2012 fiscal year revenue of the aforementioned company amounted to 3.05 million USD and is more than 47 times smaller compared to the issuer. This illustration seeks to emphasize the need to trade of profitability and growth to achieve economically meaningful matches. Lastly, it is important to note that all matching firms are unique. This was not the case in the paper of Purnanandam and Swaminathan (2004) but was achieved with only trading off no more than 200 basis points of EBITDA margin in several cases so that each IPO would have its unique match. This feature is useful in the Mann-Whitney U test where unique matches assure that an IPO company would not be compared to itself in a later period of time when it is matched as a peer to a future IPO.

The selection criteria are highly restrictive and eliminate worse quality companies, as measured by profitability and size. Table 2 provides descriptive statistics for issuing and matching firms. It is important to note that both revenue and EBITDA measures are slightly smaller for matching firms based on mean values but are larger based on the median. Preliminary data screening suggests that there are more outliers in the IPO firm sample. Relative difference in net income in the sample is consistent with Purnanandam and Swaminathan (2004) as matching firms generate more profits. Net income in the summary statistics is calculated for the full sample of 304 firms and does not restrict firms that obtained a loss in the prior fiscal year to the IPO.

Table 2.
Summary statistics of sample IPO and matching firms

	IPO firms				Matching firms			
Characteristics	Mean	1st quartile	Median	3rd quartile	Mean	1st quartile	Median	3rd quartile
Revenue, USD millions	1229.67	108.399	312.51	1131.99	1278.67	121.79	344.55	939.32
EBITDA, USD millions	165.48	14.339	50.84	158.27	155.61	14.16	53.33	153.86
Net income, USD millions	19.20	-2.18	8.79	30.36	57.53	3.20	18.80	65.29

Source: Compiled by the author based on data from S&P Compustat and Bloomberg

3.3. Valuation methods

The three primary firm valuation multiples follow Purnanandam and Swaminathan (2004) and include Price-to-Sales (hereinafter: P/S), Price-to-EBITDA (hereinafter: P/EBITDA), and Price-to-Earnings (hereinafter: P/E). P/S is the most widely accessible metric for firms as all firms generate sales. P/EBITDA is also available for all firms due to imposed positive EBITDA sample restriction. As presented before the share of profitable firms in the research period declined substantially as compared to the period pre-2000. This is evident as only 225 matched pairs have a positive P/E ratio out of the 34 sample – 74.01%. Calculation of ratios as used in Purnanandam and Swaminathan (2004) is described in below. There are some changes due to available data sources that is using S&P Compustat instead of CRSP database.

Valuation multiples for issuing firms are computed by multiplying the offer price of an IPO by all shares outstanding on the day of the IPO. Primary source for the data is S&P Compustat, however, some IPOs do not have data in S&P Compustat, so for them Bloomberg database is used. The numerator is divided by prior fiscal year sales, EBITDA and net income for each of the valuation multiples:

$$\left(\frac{P}{S}\right)_{IPO} = \frac{IPO\ offer\ price\ x\ Compustat\ (Bloomberg)\ shares\ outstanding}{Prior\ fiscal\ year\ sales}$$

$$\left(\frac{P}{EBITDA}\right)_{IPO} = \frac{IPO\ offer\ price\ x\ Compustat\ (Bloomberg)\ shares\ outstanding}{Prior\ fiscal\ year\ EBITDA}$$

$$\left(\frac{P}{E}\right)_{IPO} = \frac{IPO\ offer\ price\ x\ Compustat\ (Bloomberg)\ shares\ outstanding}{Prior\ fiscal\ year\ earnings}$$

Same procedure is applied for matching firms for which three multiples are obtained:

$$\left(\frac{P}{S}\right)_{Match} = \frac{Close\ price\ on\ IPO\ day\ x\ Compustat\ (Bloomberg)\ shares\ outstanding}{Prior\ fiscal\ year\ sales}$$

$$\left(\frac{P}{EBITDA}\right)_{Match} = \frac{Close\ price\ on\ IPO\ day\ x\ Compustat\ (Bloomberg)\ shares\ outstanding}{Prior\ fiscal\ year\ EBITDA}$$

$$\left(\frac{P}{E}\right)_{Match} = \frac{Close\ price\ on\ IPO\ day\ x\ Compustat\ (Bloomberg)\ shares\ outstanding}{Prior\ fiscal\ year\ earnings}$$

First the multiples for issuing firms are computed, unavailable data from S&P Compustat is complemented by Bloomberg. Then IPO firms are matched on Fama-French 48 and Fama-French 12 industry classifications, EBITDA margin and prior fiscal year sales (with respect to the IPO) level. After firms are matched price-to-value ratios are calculated as a ratio of issuing firm valuation and matching firm valuation. A ratio of one implies "fair" value for the issuer based on selected accounting multiples. While a ratio higher than one implies that a certain IPO firm is overvalued on a selected accounting multiple basis, and vice versa when the valuation ratio is lower than one. Summary of three valuation multiples:

$$\left(\frac{P}{V}\right)_{Sales} = \frac{\left(\frac{P}{S}\right)_{IPO}}{\left(\frac{P}{S}\right)_{Match}}$$

$$\left(\frac{P}{V}\right)_{EBITDA} = \frac{\left(\frac{P}{EBITDA}\right)_{IPO}}{\left(\frac{P}{EBITDA}\right)_{Match}}$$

$$\left(\frac{P}{V}\right)_{Earnings} = \frac{\left(\frac{P}{E}\right)_{IPO}}{\left(\frac{P}{E}\right)_{Match}}$$

Calculated valuation multiples are then used in obtaining descriptive statistics and applying non-parametric tests to evaluate valuation of the IPO firms. Data analysis and results are presented in the following section.

4. DATA ANALYSIS AND RESULTS

The last section of the main part provides the results of the thesis. First, IPO valuations are tested with Mann-Whitney U (Wilcoxon rank-sum), matched sample median sign test and Kruskal-Wallis equality-of-populations rank test. The first test is used by Purnanandam and Swaminathan in testing overall overvaluation. However, the test is used for unmatched data and can be improved. Median sign test can be applied for matched data – P/V multiples that match IPO firms and their peers. Kruskal-Wallis test is used to test for P/V valuation differences between three periods. I also check the relationship between IPO valuations and first day returns. This is done by forming P/V portfolios and analyzing the variation in underpricing. Lastly, in the regression analysis I apply a multiple regression with dummy variables for the three time periods and fit a model for the relationship between first day IPO abnormal returns and P/V multiples.

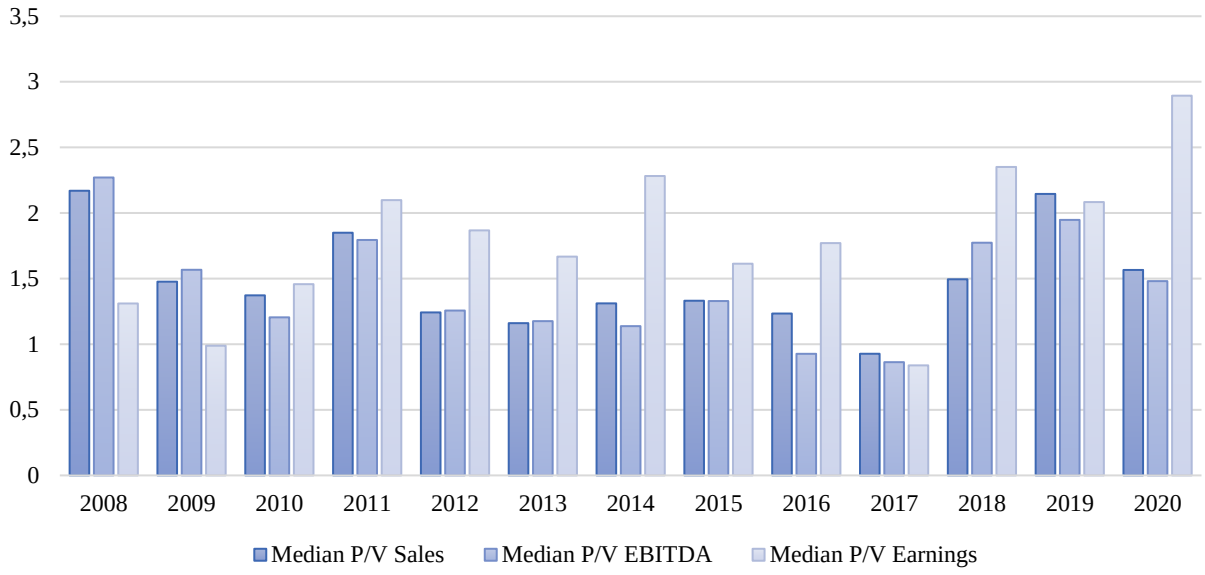
4.1. IPO valuation results

Median P/V multiples are presented in Figure 1 grouped by issuance year. P/V ratios based on sales and EBITDA have similar tendencies, while P/V based on earnings is greater than other P/V multiples for all years except 2008, 2009, 2017 and 2019 compared to P/V of sales. In most years P/V ratios exceed the fair value of 1 meaning that IPOs are more generously valued compared to their peers. Looking at different periods it seems that IPO valuations were rising in several years preceding the JOBS Act. Only in 2014 IPO valuations measured by net income surpassed level of 2011. For P/V ratios measured by sales and EBITDA 2018-2019 are years with similar levels compared to 2011. Generally, the figure suggests that initial post JOBS Act valuations (for years 2012-2015) are not substantially greater than other periods. In fact, median P/V multiples measured by sales and EBITDA are even lesser than in the pre-JOBS Act period and the latter JOBS Act period, especially compared to 2018-2020. It is important to note that in 2020 only 4 IPOs issued before 2020.04.05, thus the graph bar values consist of data of only few companies. The graph also suggests testing whether the change in issuance requirements from 2012 influenced possible mean reversion in valuation in the following few years. This is later done by using the Kruskal-Wallis test.

I also compute value multiples for 4 year samples and present them in Figure 2. All cases except median P/V computed by EBITDA for the 2016-2020 period are higher than 1 and suggest that IPOs are overvalued. P/V multiples computed from sales and EBITDA show that implied overvaluation would be larger in the period before the JOBS Act. They suggest undervaluation for

the period of 2016-2020. P/V multiples measured by earnings display similar levels of overvaluation throughout all periods.

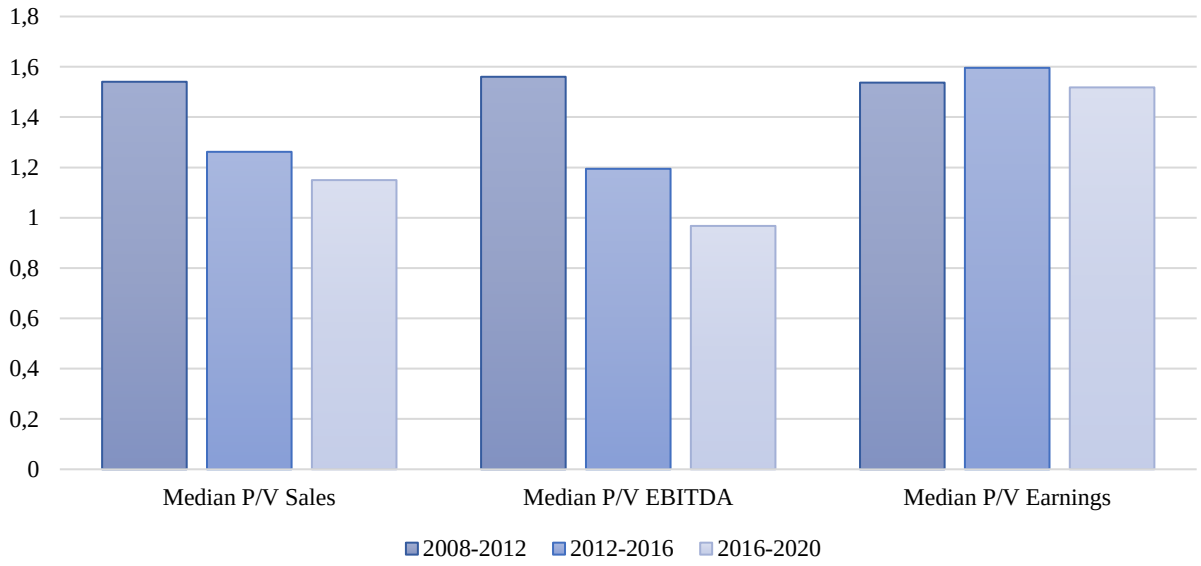
Figure 1.
Median P/V Multiples by Issuance Year (2008-2020)



Source: Compiled by the author based on data from S&P Compustat and Bloomberg

Figure 2.

Median P/V Multiples by Sample



Source: Compiled by the author based on data from S&P Compustat and Bloomberg

The hypothesis that IPOs are generally overvalued is tested as in Purnanandam and Swaminathan (2004). The authors use Wilcoxon rank-sum test for the null hypothesis "that the median P/V is equal to 1". An extension of this test, the Mann-Whitney U test is used to test under/overvaluation of IPOs in the three samples. It is a non-parametric test between two independent random variables. There are four assumptions for the test (Mann and Whitney, 1947 and Stata, 2021a):

1) The dependent variable is measured on an ordinal or continuous scale;
2) The independent variable consists of two independent categorical groups;
3) Observations of the two groups are independent;
4) Observations between the two groups follow the same distribution.

P/V ratios are measured on a continuous scale, thus the first assumption is fulfilled. There are two independent groups as measured by the Chi-squared test (as the data is non-normal) split into groups of P/V values of more and less than 1. Independence of observations requirement is fulfilled as one groups sales, EBITDA or net income does not directly influence financial results of another group. The test procedure is as follows. Observations from both samples are ranked according to their P/S, P/EBITDA, and P/E ratio values in the three tests completed. Then the sum of ranks for each sample are calculated. Mann-Whitney U test statistics are obtained by summing:

$$U = \left(\sum_{i=1}^{n_j} R_{ji} \right) - \frac{n_j \left(n_j + 1 \right)}{2}$$

Where j = 1, 2 (IPO group and peer group), R_{ji} is the rank of i-th member of j-th group and n_j is the sample size of j-th group. The test is then performed under such hypotheses:

H_0: The medians of the IPO group and peer group are equal

H_1: The medians of the two groups are not equal

Table 3 presents the P/V ratio distribution and Mann-Whitney U test results. Obtained results on the unmatched data by the Mann-Whitney U test show that the selected overall sample does not exhibit same overvaluation tendencies as the sample between 1980-1997 analyzed by Purnanandam and Swaminathan (2004). Overvaluation is implied by the Mann Whitney U test p-value which is significant at the 5% level for all sample IPOs when their valuations are based on sales and net income. On the contrary, IPOs measured by EBITDA show no overvaluation. In the original paper IPOs were overvalued in all periods and measured by each metric (sales, EBITDA, net income). Looking at different periods there are only two cases where IPOs are overvalued in certain periods. Firstly, the 2008-2012 IPOs are overvalued at the 10% significance level. The

median value for P/V (Sales) ratio for the pre-JOBS Act sample is greater than for the other two periods. Another similar finding to the aforementioned article is that the distributions of the P/V ratios are positively skewed – the mean is greater than the median in every instance.

Table 3.

P/V multiples and sample valuations

Panel A: IPO valuation based on P/V multiples

	P/V ratio based on P/S multiple					
Sample period	No. of issues	1st quartile	Median	3rd quartile	Mean	Mann-Whitney p-value
Pre-JOBS	76	0.5705	1.5181	3.0464	7.1497	0.0563*
Initial JOBS Act	123	0.5933	1.2621	3.6108	5.6021	0.1257
Latter JOBS Act	105	0.423	1.1477	3.7511	3.9698	0.2500
Overall	304	0.5032	1.2876	3.5717	5.4252	0.0108**
	P/V ratio based on P/EBITDA multiple					
Sample period	No. of issues	1st quartile	Median	3rd quartile	Mean	Mann-Whitney p-value
Pre-JOBS	76	0.5337	1.5412	2.847	6.5205	0.1318
Initial JOBS Act	123	0.5572	1.1945	3.3957	7.5833	0.2811
Latter JOBS Act	105	0.413	0.9675	3.1908	4.4923	0.7240
Overall	304	0.4873	1.2091	3.3121	6.25	0.1272
	P/V ratio based on P/E multiple					
Sample period	No. of issues	1st quartile	Median	3rd quartile	Mean	Mann-Whitney p-value
Pre-JOBS	55	0.6255	1.3104	2.603	9.9671	0.1682
Initial JOBS Act	77	0.6919	1.4846	4.0036	4.6814	0.0127**
Latter JOBS Act	62	0.2188	1.2611	3.7918	6.3880	0.7041
Overall	194	0.4987	1.4423	3.4439	6.7253	0.0128**

Panel B: Spearman correlation of P/V ratios

	P/V (Sales)	P/V (Net income)
P/V (Sales)	1.00	0.7131
P/V (EBITDA)	0.988	0.7171

Source: Compiled by the author based on data from S&P Compustat and Bloomberg

The main period of interest – initial JOBS Act sample – shows overvaluation based on net income at 5% significance level. Although IPOs are generally overvalued, the results are inconsistent across different accounting multiples for the pre-JOBS and initial JOBS Act periods. Such results can be explained by the procedure of the test which does not measure IPO overvaluation with respect to their peers but rather compares the two sample groups (IPOs and peers) as whole. Such comparison is not fully plausible as it does not account to time, industry, and market condition differences. Mann-Whitney U test is appropriate for small samples, thus sample size should not be an issue regarding the results. Thus, there should be a more precise test. In Panel B I present pairwise Spearman rank correlations between the three P/V ratios. The Spearman correlation coefficient can take values from -1 to 1, indicating association between the ranks of observations. As seen in Panel B all three variables have strong positive linear relationships – all pairwise correlations exceed 0.7 level. The strongest Spearman rank correlation is between sales and EBITDA (0.988). The results are consistent with Purnanandam and Swaminathan (2004), as they also find the strongest positive relationship between sales and EBITDA metrics.

In addition to the Mann Whitney U test, the sign test was used to test matched samples. After all, the matching procedure was crucial in finding the "fairness" of post-JOBS Act IPO valuation. The sign test is a non-parametric test used to evaluate consistent differences between matched pairs. The test is less strict than the Wilcoxon ranked-sum test since it does not assume that the distribution of the differences in pairs is symmetric. Furthermore, Wilcoxon-rank sum tests discards observations with a zero difference, for example if both the IPO and peer firm has a P/V ratio of 1.1. The sign test tests whether the median difference between the two pairs is zero (Wilcoxon, 1945 and Stata, 2021b). The test procedure is as follows:

1) Each matched pair P/V value is subtracted from the median value of selected period:

$$X_{jik} - m_{jk}\ , where\ i = 1, 2, \dots, N;\ j = 1, 2, 3\ and$$
$$k = 2008 - 2012, 2012 - 2016, 2016 - 2020$$

   Where X denotes i-th observation of j-th P/V ratio (calculated by one of the multiples: Sales, EBITDA or Net Income) in selected period and k equals the sample period.
2) Then the number of negative signs (median is greater than observation) and the sum of positive signs (observation is greater than the median) is calculated for all $X_{ji} - m_{jk}$. These numbers are defined as N- and N+.
3) Hypotheses tests are performed under the null hypothesis that both sums of signs follow binomial distribution, defined as N- ~ b (n, ½) and N+ ~ b (n, ½). Hypothesis of two-sided test is presented:

H_0: The medians of the P/V multiples of matched IPO and Peer firms are equal

H_1: The medians of the P/V multiples of matched IPO and Peer firms are not equal

Results of the matched sample sign test are presented in Table 4. Overall, the results confirm that for the whole period of 2008-2020 IPOs were overvalued in comparison to their peers. The null hypothesis is rejected at 1% significance level for P/V ratio based on P/S multiple and at 5% significance level for P/V ratio based on P/EBITDA and P/E multiples. A more granular representation of the results by period shows that greater overvaluation occurred in the pre-JOBS Act period. In this period the sign test confirms that IPOs were overvalued in comparison to their peers at the 5% level measured by both sales and EBITDA metrics. The main timeframe of interest – initial JOBS Act period (2012-2016) – shows that IPOs were significantly overvalued only when measured by earnings. Furthermore, in the initial JOBS Act period IPOs were overvalued but the matched sample median test shows significance only at the 10%. P/V ratios measured by EBITDA show no overvaluation to the main group of interest. Test results indicate that there is overvaluation initially after the JOBS Act to a certain extent, however, it does not structurally differ from the pre-Act period. The latter JOBS Act period shows no overvaluation in issuers, adding belief that the JOBS Act did not have a long-term negative effect with regards to overvaluation and might have even contributed to undervaluation of issuers. Test results are presented in Table 4 below.

So far both tests indicated that there is overpricing when the sample is tested as whole. However, when it is split into time periods the results differ for each timeframe. In order, to compare the three time periods Kruskal-Wallis test is used. It is a multiple sample generalization of the Mann-Whitney U test. Kruskal-Wallis test is used to understand whether median values of P/V ratios of each group have the same distributions. The procedure is the same as for the Mann-Whitney U test in calculating ranks, yet now for combined groups (Stata, 2021c). The test statistic H is defined as:

$$H = \frac{1}{S^2}\left\{\sum_{j=1}^{m}\frac{R_j^2}{n_j} - \frac{n(n+1)^2}{4}\right\}$$

For overall sample size n, of j groups j = 1, …, m, where the sum of ranks X_{ij} observations of j-th group is R_j and factor S^2 is:

$$S^2 = \frac{1}{n-1}\left\{\sum_{all\ ranks} R(X_{ij})^2 - \frac{n(n+1)^2}{4}\right\}$$

The results of the test failed to reject the null hypothesis thus they are not reported in a separate table. The Kruskal-Wallis test for P/V ratio measured by sales yielded a p-value of 0.42, P/V ratio measured by EBITDA yielded a p-value of 0.35 and P/V ratio measured by earnings yielded a p-value of 0.57. This concludes that the differences in median P/V multiples of different periods are not statistically significant. The findings support the case that there was no significant change in valuation in the initial JOBS Act period.

Table 4.

Matched sample median test

	P/V ratio based on P/S multiple	
Sample period	No. of issues	Median test p-value
Pre-JOBS	76	0.0079***
Initial JOBS Act	123	0.0709*
Latter JOBS Act	105	0.2414
Overall	304	0.0010***
	P/V ratio based on P/EBITDA multiple	
Sample period	No. of issues	Median test p-value
Pre-JOBS	76	0.0286**
Initial JOBS Act	123	0.1488
Latter JOBS Act	105	1.0000
Overall	304	0.0405**
	P/V ratio based on P/E multiple	
Sample period	No. of issues	Median test p-value
Pre-JOBS	55	0.4188
Initial JOBS Act	77	0.0028***
Latter JOBS Act	62	0.8991
Overall	194	0.0118**

Source: Compiled by the author based on data from S&P Compustat and Bloomberg

4.2. IPO valuation and underpricing

The most widespread explanation for IPO underpricing relies on asymmetric information problems. Such theories conclude that IPOs that receive lower valuation in comparison to the general market have greater positive first day returns (underpricing). Behavioral theories, on the other hand, suggest that there are informational cascades of IPO allocation demand. Those issuers that receive greater demand bid their offer price up and receive greater valuations. Furthermore, investors perceive higher demand as a signal of firm quality and thus bid up the price once the IPO starts trading in the open market. Thus, this section provides results from testing the relationship between IPO valuation and underpricing.

To examine whether most overvalued IPOs have the smallest underpricing and vice versa the relationship of P/V ratios and first day returns are tested following the methodology of Purnanandam and Swaminathan (2004). All P/V ratios of IPOs and matching firms were divided into three groups: low P/V, medium P/V and high P/V. The selection was done for each calendar year from 2008.04.05 to 2009.04.05 and so on. The timeframe was chosen to coincide with the date of the JOBS Act on the 5th of April, 2012. The groups were categorized by the quintile of the P/V ratio in a given period. The procedure was done to reduce the possibility of look-ahead bias and that the IPOs would not be clustered in a period where market factors influenced greater under or overvaluation for firms. All three portfolios consist of roughly the same number of firms: 105, 100 and 99. In the following table P/V (measured by EBITDA) groups (low to high) are presented with median and mean first day returns, sales level, EBITDA margin and median size. Median sales are in millions USD and represent prior fiscal year sales to issuance date for IPO firms, median EBITDA margin is for the prior fiscal year and median size represents market capitalization for issuing firms calculated as the product of shares outstanding on the first day of trading multiplied by the market close price of the IPO in the first day of trading. Results are summarized in Table 5 below.

Contrary to the findings of Purnanandam and Swaminathan (2004) in the examined period data complies to traditional theories of IPO underpricing. Firms that receive the lowest valuation have greater mean and median first day returns. Firms that are valued substantially more generously than their peers show smaller underpricing. The low P/V firms can be characterized as firms with smaller market capitalization, larger pre-IPO sales and greater profitability implied by EBITDA margin.

Table 5.

P/V portfolios and first day returns for the whole sample

Portfolios by P/V ratio based on P/EBITDA multiple for whole sample

IPO Portfolio	Median P/V	Median 1st day return	Mean 1st day return	Median sales	Median EBITDA margin	Median size	No. of IPOs
Low P/V	0.2823	10.77%	37.01%	436.92	16.35%	335.997	105
Medium P/V	1.2174	10.03%	14.83%	405.125	14.09%	1133.985	100
High P/V	5.2951	0.18%	22.38%	158.324	10.84%	790.935	99
All IPOs	1.2091	12.14%	24.95%	312.511	14.19%	697.51	304

Source: Compiled by the author based on data from S&P Compustat and Bloomberg

The same analysis is applied to the period of interest (2012-2016) when the JOBS Act had its initial effect. Since the median test shows that IPOs were significantly overvalued when P/V ratios are measured by net income three portfolios of P/V multiple based on this metric are formed. The tendencies of the results are inconsistent with overall sample results. In the sample of the JOBS Act period the lowest P/V portfolio has the smallest underpricing, while the highest P/V portfolio which has a median of 7.25 on average is underpriced by 32.61%. Contrary to the results in Table 5, low P/V IPOs have smaller than median sales in the period, however higher than median EBITDA margin and market capitalization. The results suggest that there might be more factors which change relationship between valuation and underpricing in the initial JOBS Act period. It is worth noting that only 77 IPOs are examined in the period, thus the portion of the sample is small and can lead to inconsistent results. The findings are presented in Table 6.

Table 6.

P/V portfolios and first day returns for the initial JOBS Act period

Portfolios by P/V ratio based on P/E multiple for initial JOBS Act period

IPO Portfolio	Median P/V	Median 1st day return	Mean 1st day return	Median sales	Median EBITDA margin	Median size	No. of IPOs
Low P/V	0.3931	11.83%	16.66%	177.587	18.28%	288.75	27
Medium P/V	1.5959	15.96%	19.66%	600.107	14.43%	1266.424	26
High P/V	7.2507	24.91%	32.61%	154.138	10.87%	1387.95	24
All IPOs	1.4846	18%	22.65%	297.113	14.35%	766.5	77

Source: Compiled by the author based on data from S&P Compustat and Bloomberg

To examine the cross-sectional relationship between IPO valuation and underpricing regression tests are applied. First, I attempted to examine the initial JOBS sample, however, multiple different specifications did not yield meaningful results. This could have been due to a small sample size which amounted to 123 observations for P/V variables based on sales and EBITDA and 77 observations for P/V values based on net income. Secondly, to compare the three different time periods a regression with a constant term, two dummy variables and interaction terms was used. Since a constant was included the two dummy variables for three periods were used to avoid the dummy variable trap. The main idea to regress first day abnormal returns on log-linearized P/V ratios follows the methodology of Purnanandam and Swaminathan (2004). The following base specification for the regression was applied:

$$R_i = \alpha + \beta_1 \ln P/V_i + \beta_2 \ln P/V_i \; JOBS2 + \beta_3 \ln P/V_i \; JOBS3 + \beta_4 JOBS2 + \beta_4 JOBS3 + \ln EM_i + \varepsilon$$

Where R_i is the market adjusted first day abnormal return of IPOs. Initial returns are calculated by $R_i = R_{IPO} - R_{Market}$ where R_{IPO} is the return of IPOs first day of trading and R_{Market} is the U.S. total stock market daily return calculated by the S&P Total U.S. stock market index. The index is weighted by float-adjusted market capitalization of U.S. listed common shares (S&P Dow Jones Indices, 2021). Adjusting for market returns is a more robust measure of underpricing, since it introduces a part of external factors that might have influenced initial return of an IPO. Furthermore, $\ln P/V_i$ is the natural logarithm of P/V multiple measured by P/S, P/EBITDA, and P/E ratios. P/V multiples with JOBS2 and JOBS3 dummy interaction terms are also included. JOBS1 is a dummy variable for the initial IPO period (2012-2016), while JOBS3 represents the latter JOBS Act period (2016-2020). $\ln EM_i$ represents log EBITDA margin for the fiscal year of IPO issuance and ε is the error term. Abnormal returns were not log-linearized due to the fact that for 70 out of 304 observations values are zero or negative. Other variables such as sales level, company size and capital expenditures from the prior fiscal year to the initial offering were used in the regression but none were not significant in alternate specifications. These variables (except CapEx) were used in Purnanandam and Swaminathan (2004).

The regression above achieved highest R^2 value with most coefficients achieving statistical significance at the 5% level. It is important to note that regressions based on initial IPO returns, not accounting for market returns yielded higher overall model fit. Furthermore, each regression was tested for heteroskedasticity of errors. This was done by employing Breusch-Pagan and White

tests. Table 7 below presents regression results for P/V calculated by each value multiple with heteroskedasticity-robust standard errors. The best fit of the models measured by R^2 range from 0.1889 is for P/V measured by P/EBITDA model. Thus, the fit is not ideal but substantially greater than 0.01 R^2 values of the first attempt of regressions done for only the initial JOBS Act sample. It is worth noting that a simple regression for IPO first day returns on P/V ratio measured by P/E yielded R^2 of 0.41. However, it is important to adjust for market factors and heteroskedasticity of standard errors to achieve efficient OLS estimators and account for omitted variable bias.

The results of the regression are similar for P/V based on P/S and P/EBITDA multiples. For P/V based on P/S multiple regression in the pre-JOBS Act period a 10% increase in P/V ratio would result in 1.08% decrease in initial abnormal IPO returns. For the initial JOBS Act period a 10% increase in P/V ratio would result in 0.55% decrease in initial abnormal returns, however, the coefficient is not significant. Lastly, in the later JOBS Act a 10% increase in P/V ratio would result in 0.13% increase in initial abnormal returns. The trend seems to be that IPO valuations had a greater negative relationship with initial returns in the pre-JOBS Act period – post-JOBS there is no evidence of such relationship. The results are consistent with traditional asymmetric information theories (Rock, 1986 and Benveniste and Spindt, 1989). Coneversely, the results differ from those of Purnanandam and Swaminathan (2004). The authors of the paper that is replicated produce results inconsistent with traditional pricing theory, as most overvalued IPOs have the greatest initial returns. Economic logic behind the results in the regression of this thesis is supported by the paper by Gupta and Israelsen (2015). Reduced disclosure on executive compensation or confidential filling of the IPO registration statement are not benefits that would allow to hide firm quality. Small issuers post-JOBS Act still had to provide financial data for the prior fiscal year. Thus, in the first day of trading investors have all of the key information to make the decision whether it is worth paying more than the offer price for the stock. Same conclusions can be drawn from P/EBITDA and P/E multiple based regressions. The slight difference in the last regression is that for the latter JOBS-Act period the returns are also slightly increasing in greater P/V values, contrary to the findings of the first two regression specifications based on P/S and P/EBITDA multiples.

Table 7.

Regression between abnormal IPO returns and valuation multiple

P/V ratio based on P/S multiple			
Independent variables	Coefficient	t-statistic	p-value
ln(P/V)	-1.1875	-3.20	0.002***
	(0.37)		
ln(P/V) x JOBS2	0.5818	1.31	0.192
	(0.44)		
ln(P/V) x JOBS3	1.3339	3.02	0.003***
	(0.38)		
JOBS2	-0.5596	-0.97	0.332
	(0.58)		
JOBS3	-1.1495	-2.09	0.038**
	(0.55)		
ln(EM)	-0.3474	-2.19	0.029**
	(0.16)		
Constant	0.8203	1.83	0.068*
	(0.45)		
Observations	304		
R-squared	0.1839		
P/V ratio based on P/EBITDA multiple			
Independent variables	Coefficient	t-statistic	p-value
ln(P/V)	-1.1951	-3.42	0.001***
	(0.35)		
ln(P/V) x JOBS2	0.6118	1.44	0.15
	(0.42)		
ln(P/V) x JOBS3	1.16	3.29	0.001***
	(0.35)		
JOBS2	-0.5144	-0.94	0.348
	(0.55)		
JOBS3	-1.0763	-2.06	0.04**
	(0.52)		
ln(EM)	-0.3253	-2.12	0.035**
	(0.15)		
Constant	0.7899	1.80	0.073*
	(0.44)		
Observations	304		
R-squared	0.1881		
P/V ratio based on P/E multiple			
Independent variables	Coefficient	t-statistic	p-value
ln(P/V)	-0.8828	-2.43	0.016**
	(0.36)		
ln(P/V) x JOBS2	0.3876	0.78	0.438
	(0.50)		
ln(P/V) x JOBS3	0.8698	2.38	0.018**
	(0.36)		
JOBS2	-0.4921	-0.68	0.498
	(0.72)		
JOBS3	-1.2142	-2.01	0.046**
	(0.61)		
ln(EM)	-0.4129	-1.09	0.278
	(0.38)		
Constant	0.3772	1.17	0.244
	(0.58)		
Observations	194		
R-squared	0.1552		

Source: Compiled by the author based on data from S&P Compustat and Bloomberg

4.3. Summary

The last section of the data analysis part summarizes findings from applied tests. Firstly, median values of P/V ratios are greater than 1 in each sample year from 2008 to 2020, except 2017. Both matched and unmatched median tests confirm overvaluation of all three P/V ratios for the entire sample and are consistent with findings of Purnanandam and Swaminathan (2004). The pre-JOBS Act period overall shows larger P/V median values than other two periods. Implied overvaluation of the pre-JOBS Act period is confirmed by Mann-Whitney U test when P/V is measured by sales and by sign test when P/V is measured both by sales and EBITDA. The main period of interest – initial JOBS Act (2012-2016) displays overvaluation by Mann-Whitney U test when P/V is measured by net income and by sign test when measured by sales and net income. Again, the result is not consistent with Purnanandam and Swaminathan (2004) who find overvaluation in all periods and by P/V measured by all three ratios. Overvaluation in the initial JOBS Act period does not differ greatly from the pre-JOBS Act period but the latter JOBS Act period exhibits fair valuation both by the unmatched and matched tests. This is further confirmed by the Kruskal-Wallis test which rejects the null hypothesis that distributions of the three sample periods are significantly different. The article that is replicated by Purnanandam and Swaminathan (2004) does not test differences between periods, thus even if the result is expected it is complimentary to previous work.

In the whole sample a constructed portfolio of low P/V IPOs (that have a P/V ratio calculated by EBITDA of 0.28) has the greatest first day median returns – 10.77%. The results imply that over a longer period, asymmetric information theories better explain the relationship between valuation and underpricing. On the contrary, the sudden increase in IPO volume after the establishment of the JOBS act fits into a description of a “hot” IPO market. The data matches behavioural theories that suggest that overvalued firms have greater first day returns due to investor irrationality that comply to the findings of Loughran and Ritter (2002) and Welch (1992). In the initial Jobs Act period the high P/V portfolio (that has a P/V ratio of 7.2) has the greatest initial median return of 24.91%. Multiple regression with dummy time period variables and interaction terms shows that in the pre-JOBS Act period IPO valuations had a significant negative relationship with initial abnormal returns. On the contrary, in the later JOBS Act period the relationship between IPO valuations and initial abnormal returns was positive. The initial JOBS Act period dummy does not yield significant results thus it is difficult to conclude precise effect of the period. Conclusions can be drawn by deduction that even though IPOs in the initial JOBS

Act period were significantly overvalued when measured by P/E ratio they did not produce significantly larger initial abnormal returns. The results are in line with Gupta and Israelsen (2015) who fail to find increased underpricing due to increased information uncertainty after the JOBS Act.

5. CONCLUSIONS AND RECOMMENDATIONS

Overall findings of the thesis contest the critique regarding the implied overvaluation of U.S. IPOs after the JOBS Act. Non-parametric tests confirm that IPOs were overvalued in comparison to publicly traded peers in the period of 2008-2020. Overall results match the main finding of the paper that is replicated by Purnanandam and Swaminathan (2004) that IPOs are generally overvalued. Nonetheless, truly significant overvaluation of initial JOBS Act IPOs only occurs when measured by net income. This contrasts the findings of the paper that is replicated by Purnanandam and Swaminathan (2004) who find overvaluation in the U.S. IPO market sample between 1980-1997. The information uncertainty that increases post-JOBS Act (Barth et al.) is not sufficient for greater irrationality in pricing IPOs. The results can be explained that the reduced information disclosure concerns non-primary information. It is true that executive compensation or internal audit requirements add more transparency to the firm. However, the market does not substantially change IPO pricing with absence of such information when the main financial data is available.

This is further confirmed by the fact that higher value multiples assigned to firms that issued between 2012 and 2016 do not significantly differ from pre-JOBS Act and latter JOBS Act periods. The analysis in this thesis did not find significant results from period comparison by non-parametric tests, such as Kruskal-Wallis. The results support the economies of scope hypothesis by Gao et al. (2013) that de-burdening policies will not revive the IPO market in terms of more attractive valuations to investors. However, similar levels of overvaluation in the initial JOBS Act period compared to other periods also confirm that there were no substantial changes. Pre-JOBS Act firms were overvalued when priced by sales and EBITDA, while initially post-JOBS Act firms were overvalued when priced by net income and sales to a certain extent. Reduced provision requirements for small firms did not increase persistent overvaluation since in the 2016-2020 period firms were not overvalued in comparison to their peers.

Lastly, the relationship between IPO valuation and underpricing was tested. Quantile analysis for the overall sample yielded results that confirm traditional IPO underpricing explanations by asymmetric information. The findings support empirical tests by Edelen and Kadlec (2005) that the lowest P/V tercile showed higher first day returns. On the contrary, the initial JOBS Act period had the highest underpricing for the highest P/V tercile. Underpricing in the initial JOBS Act period was higher than in the overall sample. This is in line with existing literature as Dambra et al. (2015) highlight the significance increase in IPO volume while “hot” IPO markets present irrational behavior such as “informational cascades” as noted by Welch

(1992) – largest initial returns generated by most overvalued issues. Robust multiple regression framework, on the contrary, finds little to no relation between initial JOBS Act market-adjusted underpricing and IPO valuations. It is concluded that the provisions of the legislation which eased requirements for small issuers cannot be linked to significantly increased or decreased IPO valuation with regards to their peers. Lastly, after the JOBS Act had been passed IPOs were underpriced as confirmed by Chaplinsky et. al (2017), Gupta and Israelsen (2014) and Barth et. al (2015), however the underpricing is not related to the changes in firm valuation. Conversely, greater overvaluation resulted in greater overpricing present pre-JOBS Act. This finding is new to the literature of the JOBS Act and contests the critique that the legislation was detrimental to the U.S. IPO market.

The last paragraph provides several recommendations for future research in IPO valuation and underpricing. As noted in the previous paragraphs IPOs were overvalued in the initial JOBS Act period in comparison to their peers when measured by net income. Kim and Ritter (1999) propose using earnings growth forecasts to increase IPO pricing accuracy. Such measure would have been helpful in the analysis of the thesis since implied overvaluation by net income in the initial JOBS Act period could be due to priced in earnings growth forecasts. It is true that these forecasts are presented ex-post IPO after the "quiet period" after 25-40 days. However, Purnanandam and Swaminathan (2004) use such analyst consensus recommendation variable in a multiple regression between underpricing and valuation and find the coefficients on the variable significant. Furthermore, an analysis on the firms that have been affected the most by the JOBS Act such as biotechnology and medicine could be more thoroughly examined with looser data matching requirements due to small sample size. Such analysis would provide insights whether de-burdening and de-risking provisions can help certain firms in certain industries issue shares and be successful in the public market.

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THE JOBS ACT: IMPLICATIONS FOR U.S. IPO VALUATION

JUSTAS DAUJOTAS

Bachelor Thesis

Quantitative Economics programme

Faculty of Economics and Business Administration of Vilnius University

Supervisor – junior research fellow Eglė Jakučionytė

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SUMMARY

45 pages, 2 figures, 7 tables, 37 references.

This thesis uses empirical methods of initial public offering valuation to determine the impact of the 2012 JOBS Act to the U.S. IPO market: firm valuations and initial returns. The academic paper follows work by Purnanandam and Swaminathan (2004) and applies IPO and comparable firm matching technique to evaluate overvaluation in the sample period of 2008-2020. The thesis consists of a thorough literature review, research methodology, data analysis and conclusions.

Main topics from IPO literature were presented such as theories on IPO issuance, empirical valuation techniques, phenomenon of positive first day IPO returns – underpricing and IPO cycles. Changes introduced to the market and main articles testing data regarding the JOBS Act were discussed and compared. Matching technique replicated from Purnanandam and Swaminathan (2004) is thoroughly described with caveats and challenges from limited public data.

The main goal is to test whether the period when the JOBS Act reduced regulatory burden for small IPOs shows different valuations than pre-JOBS period. Furthermore, the relationship between IPO valuations and initial returns are tested and analysed in the context of IPO literature. The results reveal that IPOs in the JOBS Act period were significantly overvalued in comparison to their publicly traded peers when valued by net income but not by sales or EBITDA. There was no substantial valuation change in comparison to other periods. Furthermore, higher valuations imply higher initial market-adjusted returns only in the pre-JOBS period under high significance.

The author concludes that decreasing regulatory burdens of U.S. IPOs in the case of the JOBS Act did not have persistent negative effects for the overall IPO market in terms of IPO valuations and increased underpricing.

JAV PIRMINIŲ VIEŠŲJŲ SIŪLYMŲ AKCIJŲ ĮKAINOJIMO NUSTATYMAS: POKYČIAI PO JOBS ĮSTATYMO

JUSTAS DAUJOTAS

Bakalaurinis darbas

Kiekybinės ekonomikos programa

Vilniaus universiteto Ekonomikos ir verslo administravimo fakultetas

Darbo vadovė – jaunesnioji mokslo darbuotoja Eglė Jakučionytė

Vilnius, 2021

SANTRAUKA

45 puslapiai, 2 paveikslėliai, 7 lentelės, 37 šaltiniai.

Šis bakalaurinis darbas naudoja empirinius metodus siekdamas įvertinti JOBS įstatymo įtaką JAV pirminių viešųjų siūlymų (IPO) rinkai: akcijų vertės įkainojimui ir pirmos dienos grąžai. Akademinis darbas replikuoja Purnanandam ir Swaminathan (2004) metodologiją įkainojant IPO, remiantis rinkoje esančių konkurentų verte, 2008-2020 metų periode. Bakalaurinį darbą sudaro literatūros apžvalga, tyrimo metodai, duomenų analizė ir rezultatų pristatymas.

Literatūros apžvalgoje pristatomos pagrindinės IPO temos: IPO priežastys, įkainojimo metodai, pirmos dienos grąža ir IPO rinkos pokyčiai. Lyginami JOBS įstatymo pokyčius analizuojančių straipsnių rezultatai. Empirinė tyrimo technika remiantis Purnanandam ir Swaminathan (2004) išsamiai pristatoma, pažymint iššūkius ir trūkumus pritaikymui bakalauriniame darbe.

Pagrindinis tyrimo tikslas – įvertinti ar po JOBS įstatymo priėmimo sumažėjusi reguliacinė našta pakeitė IPO įkainojimą, lyginant su skirtingais laikotarpiais. Taip pat testuojamas sąryšis tarp IPO įkainojimo ir pirmos akcijų prekybos dienos grąžos, rezultatai vertinami literatūros kontekste. Darbo išvados atskleidžia, jog po JOBS įstatymo pirminių viešųjų siūlymų įkainojimas buvo pervertintas remiantis tik grynuoju pelnu, lyginant su JAV biržose listinguotais konkurentais. Vertinant įkainojimą pagal pajamas ir EBITDA IPO nebuvo pervertinti. Statistiškai reikšmingų įkainojimo pokyčių lyginant su kitais periodais nebuvo rasta. Įvertinus visą imtį „brangesnis“ įkainojimas nulemia didesnę pirmos dienos grąžą tik prieš JOBS įstatymą listinguotiems IPO.

Bendri rezultatai leidžia daryti išvadą, jog po JOBS įstatymo JAV IPO rinka nebuvo įkainota „brangiau“ nei ankstesniame periode. Įstatymo pataisos nenulėmė ilgalaikių įkainojimo pokyčių, kurie darytų įtaką didesnei pirmos dienos grąžai.