2021

Are Investment Banks Helpful or Hurtful? An Analysis of Intraday Volatility in the Direct Listing Process as Compared to Investment Bank-Involvement in Traditional IPOs

Alexis Paff

Are Investment Banks Helpful or Hurtful?

An Analysis of Intraday Volatility in the Direct Listing Process as Compared to Investment Bank-Involvement in Traditional IPOs

Alex Paff

In partial fulfillment of a Bachelor of Arts Degree in Economics, Scripps College, Claremont, California.

Professor Sean Flynn
Professor Nishant Dass
Professor Patrick Van Horn

December 4th, 2020

Acknowledgements

I would like to thank my family and professors for their hours of commentary and revision-work.

Without their support, this would have been a lesser paper.

Table of Contents

Abstract

In this paper, I carry out an empirical analysis of the pricing volatility of direct listings as compared to traditional IPOs. Direct listings solve an efficiency problem in the US going-public market, in which well-funded, late-stage firms lack incentives to pursue a public listing, which would create liquidity for preexisting shareholders and allow for a more diverse body of public shareholders. Direct listings have been allowed on the New York Stock Exchange since early 2018, and four firms, Spotify, Slack, Asana, and Palantir, have gone public through this new listing mechanism. While underwriters are heavily involved in the IPO process, serving the role as price-stabilizers after the issue goes public, direct listings do not require a formal underwriter. Investment banks are often regarded as a necessity for stabilization in the going-public process, but this paper analyzes whether or not the overallotment option and lockup agreement in traditional IPOs actually leads to greater swings in price volatility for the first 60 days after an issue goes public.

Introduction

In the history of public markets, listing and trading on an exchange has been *the* ultimate marker of a successful firm. Underwriters serve as the gatekeepers to a public listing, and firms with a reputable financial track record are able to hire underwriters to launch an IPO in order to raise capital. In recent years, the exceptional amount of funding available in private markets, especially for tech companies, has dissuaded firms from going public. With ample amounts of cash available privately, firms have very little incentive to pay for the expensive IPO process and comply with Securities and Exchange Commission regulations. It can be argued that staying private under these circumstances is not socially optimal. There is no liquidity for insiders that have held shares privately for many years, and the ownership of the firm remains closely concentrated.

A means of addressing this market inefficiency is the direct listing process, a public listing option which has been allowed on the London Stock Exchange since 1995 and the New York Stock Exchange since 2018. In a direct listing, a firm's shares that have been privately held are listed on an exchange under their preexisting ownership, at which point the shareholders (and greater market) may buy or sell at will. By definition, there is no set open price determined by underwriters--it is a perfect example of inceptive market-driven price discovery.

As mentioned, the crux of the direct listing under current market regulations is that firms cannot list new shares and therefore cannot raise capital. Demand for this type of listing has therefore been limited. The firms that pursue direct listings have tended to be more mature and are interested in providing their shareholders with liquidity. In the US, there have been only four direct listings since 2018: Spotify ('18), Slack ('19), Asana ('20), and Palantir ('20) (the latter two went public on the same day). Nevertheless there is growing domestic interest in direct listings,

which may be fueled by recent regulatory appeals to permit firms to list new shares, and therefore raise capital, in direct listings on the NYSE. Although this regulation is being challenged as of 9/2/20 by the Council of Institutional Investors, the simple fact that firms potentially have the opportunity to list new shares and start trading on an exchange without going through the underwriting "gatekeeper" has significant implications for the future of public markets.

By the numbers, direct listings are not as "exciting" as their peer IPOs. Using the London Stock Exchange as a reference (which has an almost 25-year history of direct listings), firms that pursue direct listing are 215% larger than their IPO counterparts, have 36% lower investment rates, and 53% lower three-year sales growth rates (Zheng, 2020). In the case study of the four firms which have gone public though direct listings in the US, their listed offer amount is over 18 times greater than the average offer amount for IPOs during the same period of time. These statistics are indicative of late-stage firms that do not need to raise new capital, but rather choose to list publicly for the sake of shareholder liquidity.

Given the small sample size of direct listings on the NYSE, there have not been any empirical studies on the returns of firms following a direct listing. Research on the IPO market, on the other hand, has provided potential investors with important information regarding the initial underpricing of shares, as well as a general trajectory for how newly listed companies will trade on the exchange in the months after they go public.

Two conventional aspects of IPOs that greatly influence the price of the issue (Hong et. Al., 2004) are well-known to investors: lockups and greenshoe options. When firms go public through an IPO, most private shareholders are subject to a lockup agreement, and only 10-20% of shares are issued to the public in advance of the lockup's expiration, which is generally 180 days after listing (Ofek and Richardson, 2000). With massively constrained volume, investors take care

in their decisions to buy or increase their position in a new listing before the lockup expires. If the lockup constrains supply too severely, investment banks have the ability to manipulate the supply of the stock by use of a greenshoe, otherwise known as an overallotment option, as provided for in the company's prospectus. These options allow underwriters to sell up to 15% more shares than the original amount set up by the issue for 30 days after the issue went public (Jenkinson and Jones, 2007). In practice, underwriters will intentionally underprice an offer, let investor demand spike in response to the cheap listing, and then gradually increase the number of shares in the market for 30 days after the listing. If the price of the new offer starts to fall, investment banks are also able to buy back large portions of the newly-listed firm to buoy the price.

Lockups (with the exception of Palantir, as discussed in the literature review) and overallotment options are not used in direct listings. These two components of IPOs are referred to as price stabilization mechanisms (Jenkinson and Jones), but the advent of direct listings on the NYSE may prove that they are anything but successful stabilizers. This paper examines how the pricing volatility of direct listings differs from traditional IPOs during the first 60 days of trading in an effort to determine if the involvement of an underwriter in the going-public process creates more or less pricing volatility in the early days of trading.

Literature Review

The vast amount of literature on going-public markets falls short on the subject of direct listings. While the novelty of the direct listing process on the NYSE has inspired several law-reviews, (Cope et al., 2020; Nickerson, 2019; Jaffe et al., 2018), there has yet to be an empirical study that analyzes any trading differences between firms that go public through direct listings and firms that go public through a traditional IPO. To realize optimal market efficiency, shareholders

and potential buyers of firms that go public through a direct listing should understand trends in initial price discovery and any predicable trading volatility. This paper offers the first comprehensive analysis of the pricing volatility of securities that entered the public market through a direct listing on the New York Stock Exchange.

Direct listings are relevant to study as a mode of understanding the relationship between private and public markets, specifically with regard to the innovations that drive an efficient dynamic between the two. A Morgan Stanley review of private/public market exchanges (Mauboussin and Callahan, 2020) points out that equity markets have become more sophisticated over time to provide investors and issuers with financially-innovative solutions where there was once an inefficiency. Over the past 20 some-odd years, there has been a growing need to find a solution to the issue of providing early investors and insiders with liquidity in firms that have chosen to stay private. Historically, the 1940s through the 1970s saw the birth of thousands of firms with high capital requirements to manufacturer physical products, and the fastest method for these firms to raise capital was the IPO process (Mauboussin and Callahan). Singe the 1970s, the world has experienced a wave of companies that produce intangible assets, which oftentimes have lower capital requirements. More recently yet, private equity and venture capital firms have invested an exceptional amount of private capital which does not incur the cost of complying with the SEC or paying for an IPO, which costs $44 million on average (Zheng, 2020). These factors have disincentivized going public, which leaves shareholders with little liquidity and results in more closely-held firms. Arguments in favor of remaining private suggest that privately held firms are more innovative (Ferreira et al., 2012), and that private equity investment is value-enhancing by providing tax benefits and knowledge of how to exploit arbitrage opportunities (Masulis and

Thomas, 2009). That said, these benefits are not applicable to the well-funded, late-stage companies that exist in today's private markets.

As more innovative modes of raising capital and entering public markets surface, the going-public decision becomes more complicated. Literature on going public in the 1980s and 1990s (e.g., Booth and Smith, 1986; Jain and Kini, 1999; Ritter, 1987) broadly concludes that small, underfunded firms oftentimes benefit from the discretion and flexibility of private markets, but there are diminishing returns to staying private as firms mature. Companies that are interested in pursuing future mergers or acquisitions or wish to diversify their shareholder base in a more liquid environment benefit from being publicly traded. In recent years, however, these firms that it seems would best be suited for public markets have oftentimes chosen to stay private. The reasons for this decision are primarily financial, given the inordinate cost of IPOs, and the immediate pricing "pop" of 21% on the first day of trading (for venture-backed firms that went public during the period of 2009-2019) leaves a considerable amount of money on the table (Mauboussin and Callahan). "Money on the table" refers to the additional amount of money that firms could have raised in their IPO if their shares were not underpriced, as the pricing "pop" is money that investors earn, not the firm itself. Money on the table can be simply calculated as the difference between the closing price on the first day of trading and the offer price, multiplied by the number of new shares issued. The result of this deterrent to go public is that fewer companies are listed on exchanges every year, and the range of investors that have access to equity positions in new companies is increasingly exclusive to institutional investors.

Two new modes of going public have emerged in light of recent market disincentives to pursue an IPO: special purpose acquisition companies (SPACs) and direct listings. SPACs are publicly listed shell companies that exist with the sole purpose of acquiring private companies.

SPACs use the capital raised from their IPO to acquire a firm that wants to go public but does not wish to engage in the IPO process due to the high costs and burden on senior management. A firm's CEO typically decides to sell their company to a SPAC if they are otherwise interested in selling the company, making SPACs not necessarily viewed as a "mode of going public" in the eyes of a CEO. A direct listing is a means of going public that is intended to solve the market inefficiency of IPOs. While private placement markets, such as the NASDAQ Private Market, have existed for many years to create better liquidity within privately held firms, they tend to only make markets for institutional investors (Horton, 2019). Like markets for private placements, direct listings are a method by which a firm can list its shares on an exchange without going through the traditional process of an initial public offering. Market makers describe direct listings as supply and demand-driven events that democratize the traditional IPO process (Giacchi, 2020). The legal and practical structure of direct listings differ across exchanges, and for the purpose of this paper, I will focus on direct listings on the New York Stock Exchange. Most literature on the subject of direct listings comes in the form of legal reviews (Nickerson, 2019; Horton, 2019), especially in regard to the differences between IPOs and direct listings. Below, I provide a summary of the major differences between the two listing methods in practice, as well as the bare-minimum requirements of a direct listing on the NYSE, denoted as "Pure." Thus far, no firm has chosen to engage in a minimum-requirement direct listing as the marketing and oversight that investment banks provide has been considered a necessity as investors, firms, banks, and the NYSE alike learn how direct listings work in practice.

Table 1: *Legislative and Practical Differences Between IPOs and Direct Listings**

	IPO	**Direct Listing (SPOT, WORK, ASAN, PLTR)**	**Direct Listing (Pure)**
Purpose	Raise capital, liquidity, consideration for later acquisitions	Liquidity, avoid dilution, consideration for later acquisitions	Liquidity, avoid dilution, consideration for later acquisitions
Required SEC Filings	Securities Act registration statement (S-1), followed by Exchange Act registration statement (8-A)	Securities Act registration statement (S-1), followed by Exchange Act registration statement (8-A)	Exchange Act registration statement (Form 10)
Communication with Investors	Roadshow, quiet period applies	Investor day, limited quiet period	No restrictions
Required NYSE Filings	Listing application	Listing application	Listing application
Role of Investment Banks	Underwriter	Financial advisor	Financial advisor
Cost (Size of Firm)	$130.5 million (exceptionally large) $37 million (large)	$29.5 million**	N/A
Price Discovery	Investment banks sets an offer price	Financial advisors and NYSE set a guide price	NYSE sets a guide price
Money on the Table	$77.74 million ***	$0	$0
Lockup	Yes, 10 - 20% float on average	SPOT, WORK, ASAN (no lockup) PLTR (23% float)	No lockup

** The table is a modified version of on produced by Horton, 2019.*
*** $29.5M is the average SPOT and WORK paid investment banks to serve as financial advisors. ASAN and PLTR have not made this amount public.*
**** Average 2018-2020.*

Role of Investment Banks

In an IPO, investment banks function as underwriters, which involves aiding in legal filings, writing the prospectus, valuing the issuer, producing research, hosting a roadshow, book building, and underwriting any settlement risk. In a direct listing, investment banks are not necessary, although they may serve as financial advisors to assist in marketing the issuer and

building an accessible equity story, as well act as a high-touch market maker on the days just before and after the listing. In some cases, investment banks will advise private placements prior to a direct listing if an issuer is interested in raising capital.

Price Discovery

In an IPO, the underwriting team produces a valuation for an issuer which is determined by balancing the interests of existing shareholders and securing a high demand in the public markets (sought out through work done by the syndicate desk). Continued investor feedback throughout the IPO process helps determine a logical price. In some events, the introduction of public opinion can highlight an unrealistic prior valuation made through private placements (as was the case with WeWork's abandoned IPO). The resulting offer price tends to undervalue the firm, favoring the interests of investors over existing shareholders. In a direct listing, investors do not begin trading on the back of a pre-determined valuation, rather, the NYSE and financial advisor, if the firm chooses to have one, produce a general guide price. In the case of Slack, financial advisors estimated several days before the firm went public that they would set a reference price between $14 and $46, ultimately settling on $26 the night before the listing. This reference price has minimal bearing on the price that the firm starts publicly trading at, as a process of market-driven price discovery ensues on the morning of the listing, in which buyers and sellers arrive at an optimal price through their requested orders. On the morning of Slack's listing, market players drove the price up 48% to $38.50 before it publicly launched on the exchange. While this process may sound enigmatic, it is no different from how an exchange determines daily opening prices for securities. For direct listings, a stock exchange effectively builds an orderbook, whereby buyers and sellers may request a price and volume to trade. Once enough sales have been initiated

to meet the free float requirement on the first day of trading, the stock is released to the public market.

Stabilization

Beyond due diligence, marketing, and financial advisory, the primary role of an investment bank in the IPO process is to stabilize the price off the listing after the firm goes public. The two mechanisms that underwriters have for price stabilization are lockups and overallotment options. IPOs traditionally have lockup agreements, which require insiders who owned shares prior to the firm going public to hold their shares until a set number of days (generally 180, although sometimes up to six months) after the company goes public. Beyond mitigating a scenario where all existing shareholders sell their positions upon a firm going public, the economic rationale for a lockup is that it alleviates moral hazard problems and rent extraction by underwriters, who would profit from a higher initial volume of trades (Hong et.al., 2004). By virtue of how many shares are designated in the lockup agreement, underwriters allow a set percentage of the total shares to freely trade when a company initially goes public, which is referred to as the "float." An IPO float is typically only 10 - 20% of the company's total stock, which creates a supply-constrained environment, making true price discovery challenging. In fact, limited liquidity during the lockup period tends to make the stock price artificially inflate, setting a precedent for the firm to be moderately over-valued.

If undersupply becomes a problem and the stock price is too volatile within the first 30 days of being publicly traded, underwriters can utilize the overallotment option written in the prospectus (otherwise known as a greenshoe). This clause allows the underwriters to stabilize the price of the issue by augmenting the number of shares listed on the market. Underwriters are able

to increase the offer by 15%, usually by slowly issuing new shares at the market price, which allows a broader range of investors to buy the issue. If, on the other hand, the new listing's price falls unprecedentedly, the underwriter will buy back stock and hold it on their books to constrain the market supply and artificially inflate prices.

The first two direct listings did not chose to have lockup agreements, as providing liquidity for the going-public event itself requires former private shareholders to sell some of their shares immediately upon listing. When Asana and Palantir pursued their direct listings on September 30th, 2020, Asana stayed true to the precedent set by former direct listings and did not include a lockup, while Palantir place most of their shares under a lockup which will expire after their first earnings report in December 2020. Currently, roughly 23% of Palantir's shares are actively tradable, which is above the average IPO float. Without a lockup, the public market for a new listing is fully supplied and investors are arguably able to engage in more efficient price discovery without an impending down-turn in price after the lockup expires. While Palantir's lockup will expire after this paper was written, it will be curious to see how investors react to an influx of shares on the market. While lockups may provide some semblance of stabilization, direct listings do not have any formal price stabilization mechanisms due to their lack of an underwriter, making them a riskier option for companies that are worried about how investors will value their future cashflows.

--

Given all of the differences between IPOs and direct listings, in general it can be stated that larger, more established firms with a diversified shareholder base, a well-known equity story, and no need to raise additional capital may choose to pursue a direct listing. If a firm of this description instead opts into an IPO, it may be on the basis of concern that their share price will drop after the

first day of trading. Direct listings do not have the advantage of an overallotment option, making it difficult for an investment bank to intervene and manipulate the share price.

It is the role of an investment bank in an IPO to predict and control the share price of a recently-listed company, and the actions taken by investment banks in advance of and during the first few weeks of trading are at the heart of the academic literature on IPOs. There is an incredible amount of research on IPO underpricing, in which researchers consider the prices at which firms trade in the days and weeks following their public listing (Ruud, 1993; Booth and Chua, 1996; Loughran and Ritter, 2004). These papers almost entirely deal with how the underwriter impacts trading, and whether or not initial returns are backed up by a legitimate underlying demand. The root question regarding market efficiency in these IPO studies can also be applied to direct listings. In the case of direct listings, is market-driven price discovery the most efficient way for a new listing to start trading, or do investment banks provide indispensable stability?

Data

The list of stocks analyzed in this paper was sourced from the NASDAQ's website, which compiles the ticker symbol, date, price, number of shares listed, and offer amount of all securities that were publicly listed through an IPO on the NASDAQ and NYSE. The scope of my paper covers firms that initially listed on the NASDAQ or NYSE between January 1st, 2018 and October 15th, 2020, and I studied the returns of firms through November 11th, 2020 in order to have sufficient return data from firms that listed in October 2020.

The NASDAQ's website included an initial list of 798 securities that went public during this period. Of the 798 companies, 122 tickers were not actively associated with a company. From the list of tickers not found, 116 ended in "U," which indicated that they were unit offerings. An

additional 137 unit offerings were found in the dataset. All 253 unit offerings were removed due to the fact that units are products that include more than one class of security, and they do not serve as a legitimate comparison to direct listings.

The six companies that were not actively identifiable under the ticker listed from the NASDAQ and were also not units were independently researched and added back into the dataset – the tickers were not initially found because they had either been changed or subsequently acquired.

Of the remaining 545 companies, seven were removed from the study because they were previously trading on an OTC market before their IPO. Three additional companies were removed because they had zero trading volume for over 10 days within the range of this paper's analysis, resulting in no trading prices being published for those days. Four companies were removed from the list of IPOs because they went public through a direct listing (SPOT, WORK, ASAN, PLTR). These four firms were studied separately in this paper. Ultimately, this paper studies 531 companies that went public through an IPO, and four companies that went public through a direct listing.

Using the tickers from the list of companies described above, I "web scraped" time-series trading data from Yahoo Finance for the first 60 trading days after each company's IPO. The data included the stock's opening price, closing price, daily high, and daily low. I used the stock's closing price as opposed to a computed adjusted close because a dividend would not have been issued within the first 60 days of trading that I observed.

I used the Crunchbase database to collect additional information on each firm that could serve as a predictive measure for increased volatility during trading. Of the 531 IPOs and four direct listings in my dataset, Crunchbase had data for 483 (91%) of the IPOs and all four of the

direct listings. All firms for which data were not available were still included in the study, but the values for the variables were left blank. The Crunchbase data included information on the industry of the firm, the number of pre-IPO funding rounds the company had engaged in, the number of acquisitions the company had done, and the number of patents they held. For the industry information, I used a dummy variable for tech companies (1 = tech, 0 = non-tech).

Tables 2 and 3 provide, respectively, summary statistics for the IPOs and Direct Listings in my dataset; a more complete table of summary statistics for the data used in this paper can be found in the Appendix in Tables 11 and 12.

Table 2: *IPO Summary Statistics by Year*

IPO Summary Statistics									
Year	Number of IPOs	First Day Returns	Offer Price	Offer Amount	Money on the Table	Tech Company	Funding Rounds	Acquisitions	Patents
2018	199	43.8%	$14.53	$237,063,859.00	$77,359,866.97	26.30%	3.4	1.3	37.2
2019	165	17.2%	$15.68	$271,860,196.00	$27,769,881.72	26.90%	4	0.9	21.1
2020	*167*	*29.4%*	*$16.90*	$317,422,007.00	*$127,553,670.15*	*23.40%*	*3.5*	*0.9*	*13.5*

Table 3: *Direct Listing Summary Statistics by Year*

Direct Listing Summary Statistics									
Year	Number of DLs	First Day Returns	Offer Price	Offer Amount	Money on the Table	Tech Company	Funding Rounds	Acquisitions	Patents
2018	1	-10.2%	$165.90	$9,245,852,532.00	$0.00	100%	20	18	293
2019	1	0.3%	$38.50	$4,559,541,140.00	$0.00	100%	12	7	104
2020	*2*	*34.1%*	*$14.13*	$1,247,436,297.50	*$0.00*	100%	*19.3*	*3*	*355*

All summary statistics for 2020 are italicized, as the year 2020 had not concluded at the time this paper was submitted.

The summary statistics in Tables 2 and 3 illustrate some of the primary differences between firms that pursued an IPO and those that pursued a direct listing within this study. With respect to the size of the firm, the average offer amount of a direct listing was over 18 times the size of the offer amount of a IPO. This is partially due to the previous funding rounds that these firms pursued, as the average firm that went public through a direct listing had done 17.5 funding rounds, as compared to the average firm that went public through an IPO, which had done 3.7 funding

rounds. These differences are indicative of the fact that firms pursuing direct listings chose their method of listing because they do not need to raise more capital.

Exogenous market factors at any given time have massive implications on a firm's returns. To compare the returns of the above companies in a relative fashion, I used the NASDAQ composite index as a measure of daily market returns. I downloaded the NASDAQ composite index's trading data (open, close, daily high, and daily low; listed in points) for the period of the study, 1/1/2018 - 11/12/20. Using the NASDAQ returns, I computed the excess returns of the various firms for their first 60 days of trading:

$$((stock\_close_t - stock\_close_{t-1}) / (stock\_close_{t-1})) - ((index\_close_t - index\_close_{t-1}) / (index\_close_{t-1})) \quad (1)$$

For a stock's first day of trading, I used the price of the issue, which tended to result in incredibly high excess returns on the first day of trading as issues are intentionally underpriced. I also used the "issue price" to calculate the excess returns for the four firms which went public through a direct listing. While the issue price functions as a guide rather than as an actual price at which new shares list, it still serves as a marker from which liquidity develops prior to actually going public on the first day of trading. While excess returns are the industry-standard metric of calculating volatility, I also calculated a measure of intraday trading volatility to have a metric for stock price movement throughout the day. Intraday volatility was calculated on a daily basis by:

$$((stock\_high_t - stock\_low_{t-1}) / (stock\_open_{t-1})) - ((index\_high_t - index\_low_{t-1}) / (index\_open_{t-1})) \quad (2)$$

As one would expect, stock price movements at the daily extremes were much more drastic than what was found in the measure of excess returns.

Economic Theory and Model

Using the data described above, I initially looked at returns over the 60 day period following public listing for both IPOs and direct listings. To present a full spectrum of returns, this paper looks at absolute returns, relative returns versus the closing price on the first day of trading, and average relative returns within 10-day bins. Given the fact that IPOs are initially underpriced, they may outperform more than direct listings for the first few days after going public, which will be observable in the results. For the relative returns analyzed in 10-day bins, there may be noticeable differences in the returns before and after 30 days of trading if utilization of the overallotment clause significantly contributes to returns.

As discussed in the data section, I created a measure of "intraday" volatility and analyzed statistical differences between intraday volatility in IPOs and direct listings. Given its method of calculation, intraday volatility will likely be greater than daily excess returns, and it will serve as a better indicator of how much observable price movement listings experience within their first 60 days of trading. An apparent difference between IPOs and direct listings may be observable here, as constraint from the lockup and price manipulation by underwriters could cause higher spikes in the price of IPOs.

If there is an observable difference in volatility between IPOs and direct listings, the reason for this difference may be explained by several factors: the involvement of investment banks, the type of firm that has chosen the direct listing method thus far, or investor concern about buying direct listings. This paper looks for any characteristics of IPOs that may result in higher or lower volatility, and applies the significant findings to direct listings. If, in example, the direct listings have characteristics that are associated with statistically higher volatility but the model found that they have empirically lower volatility (or vice versa), investment banks may be to blame.

Using OLS, this paper runs the following regressions to find characteristics that may be associated with statistically higher or lower volatility:

$$Y_i = \beta_o + \beta_1 X1_i + \beta_2 X2_i + \beta_3 X3_i + \beta_4 X4_i + \beta_5 X5_i + \beta_6 X6_i + u_1$$

Y_i = (1) Intraday Volatility Days 1-10, (2) Intraday Volatility Days 11-20, (3) Intraday Volatility Days 21-30, (4) Intraday Volatility Days 31-60, (5) Excess Returns Days 1-10, (6) Excess Returns Days 11-20, (7) Excess Returns Days 21-30, (8) Excess Returns Days 31-60
$X1_i$ = Offer Price
$X2_i$ = Number of Shares Issued
$X3_i$ = Tech Company Dummy Variable (1 = tech, 0 = not tech)
$X4_i$ = Number of Funding Rounds Prior to Listing
$X5_i$ = Number of Acquisitions
$X6_i$ = Number of Patents

Results

(a) Summary Statistics

The most interesting and relevant results of this study come in the form of summary statistics. From an absolute standpoint, without comparing the new listing's returns to the market, IPOs performed much better than direct listings. Absolute returns for the 10th day of trading were calculated by applying the following formula, assuming t = the first day of trading.

$$((stock\_close_{t+10} - stock\_close_t) / (stock\_close_t)) \quad (3)$$

Table 4: *Absolute Returns in the Days Following Public Listing*

Absolute Returns From Close on First Day of Trading

Days After Listing	IPO Returns	DL Returns
10	1.5%	-6.4%
20	-1.8%	-2.9%
30	-5.7%	2.9%
60	-11.1%	-9.2%

The table above indicates that, with the exception of the first 10 days of trading for IPOs, most new listings have negative returns following the close on the first day of trading. This is no surprise, given the fact that the price on the first day is often driven above its realistic value as investors vie for shares of a newly listed company. While it could be surmised that the average 1.5% return from the close on the first day to the close on the 10th day can be attributed to investment banks exercising the overallotment option in the IPO's offering terms, the sample size of direct listings is too small to discern a statistically significant difference, and the absolute changes in price do not account for systemic risk.

Using the NASDAQ returns, I computed the excess returns over 10, 20, 30, and 60 trading days to parallel Table 4, in which I found the average returns from the close of the first day of trading. Using 10 days of trading as an example, the excess returns were calculated as follows:

$$((stock\_close_{t+10} - stock\_close_t) / (stock\_close_t)) - ((index\_close_{t+10} - index\_close_t) / (index\_close_t)) \quad (4)$$

Table 5: *Relative Returns in the Days Following Public Listing*

Relative Returns From Close on First Day of Trading		
Days After Listing	IPO Returns	DL Returns
10	2.8%	-10.7%
20	3.7%	-5.1%
30	2.5%	-0.7%
60	1.5%	-14.5%

In contrast to Table 4, Table 5 shows that IPOs tend to have positive excess returns through the first 60 days of trading, even after the "pop" on the first day of trading. Direct listings, conversely, underperform the market on average (by a substantial amount). Looking at the performance of specific stocks from the direct listing group, the underperformance is largely due to the prices of

ASAN and WORK slowly falling through the weeks after they each started trading. With such a small sample size, two stocks falling can easily upset the group's average.

In order to better understand the impact that investment banks have on IPOs in comparison to the lack of influence they have over direct listings, it is important to separate the returns for the first 30 days of trading, when investment banks may utilize the overallotment option to add new shares in the market. In the following days of trading (31-60), underwriters have less control over the stock price, and IPOs and direct listings should have more comparable returns if all else were equal. Table 6 was calculated by finding the average returns (as detailed in Equation 1) and standard deviation from each day of trading, and then creating bins by computing the average for each 10-day period.

Table 6: *Average Excess Returns Following Public Listing, in Bins*

	Excess Returns			
Days After	IPO		Direct Listing	
Initial Offer	Avg.	St. Dev.	Avg.	St. Dev.
1 - 10	3.3%	23.4%	0.3%	4.8%
11 - 20	0.0%	5.3%	0.4%	2.6%
21 - 30	-0.2%	5.4%	0.4%	3.6%
31 - 40	0.0%	5.2%	-0.1%	2.0%
41 - 50	0.1%	5.2%	0.1%	1.3%
51 - 60	-0.1%	5.1%	-0.8%	4.4%

Table 6 shows that IPOs have, on average, high excess returns for the first 10 days of trading, followed by very minimal returns, if any, for the next 50 days. Looking at the average returns on a daily basis, found in the Appendix in Table 13, the high excess returns for IPOs during the first 10 days of trading is entirely concentrated on the first day of trading, which has an average return of 31%. The direct listings have very moderate and steady returns for the first 30 days of trading, followed by underperformance over the next 30 days. To reference Table 13 again, direct listings

have as average excess return of 13.7% on their first day of trading, which is only 44.2% of the pricing "pop" that IPOs have. As discussed in the Data section of this paper, it is important to note that returns for the first day of trading were calculated by taking the percentage change between the offer price and the closing price. In the case of IPOs, the offer price is intended to be below the value of the firm at a price-per-share level, whereas the direct listing offer price (which only serves as a guideline), must be within the anticipated price range listed on the registration statement. Therefore, direct listings should not merit excess returns on their first day of trading unless market players believe that the firm is undervalued in their registration statement. A potential explanation for a pricing pop on the first day a direct listing trades publicly is that investors associate abnormally high returns with "investor excitement" around new listings, believing that excess returns are a default outcome of all new listings, while in actuality, investment banks artificially create the outperformance.

Table 6 shows that the second 30 days of trading for both IPOs and direct listings are relatively comparable. The only exception is days 51-60 for direct listings, which is the result of WORK falling 14.5% during the period for unrelated reasons. Assuming the second 30 days of trading are held constant, the intervention of investment banks for the first 30 days of trading results in a quick price jump, followed by very minimal returns against the market. Direct listings, on the other hand, perform more consistently for the first 30 day of trading.

While volatility is usually examined through standard deviation and excess returns, the issue of price manipulation by investment banks may be better examined by looking at intraday price movements. The large block trades issued to buy back stock (in the case of a price fall) result in a large difference between the stock's daily high and low prices. The following table displays

intraday stock price movements (minus the intraday index movements), sorted in bins, calculated by Equation 2.

Table 7: *Intraday Volatility Following Public Listing, in Bins*

	Intraday Price Movement			
Days After Initial	IPO		Direct Listing	
Offer	Avg.	St. Dev.	Avg.	St. Dev.
1 - 10	7.7%	8.0%	4.5%	2.3%
11 - 20	5.8%	6.1%	2.4%	1.7%
21 - 30	5.8%	5.4%	4.0%	2.8%
31 - 40	5.9%	5.2%	2.5%	1.7%
41 - 50	5.7%	6.7%	2.2%	1.0%
51 - 60	5.5%	5.1%	5.1%	4.1%

Table 7 shows that, for all bins from the first through the 60th day of trading, firms that went public through an IPO have higher intraday price movements than those that went public through a direct listing. Given the fact that IPOs continue to have high intraday trading during the period of 30 – 60 days after going public, the difference in intraday pricing volatility between IPOs and direct listings cannot be explained by the involvement of investment banks. It is likely that direct listings have lower price movements throughout the day because no new shares are listed during their going-public process, so there is lower turnover of shares.

Figures 1 and 2 are graphs of the excess returns and intraday price movement for IPOs and direct listings. From a visual standpoint in Figure 1, the excess returns from direct listings track excess returns from IPOs, the only difference being that the small sample size of direct listings produces more aggressive swings on the graph. The first day of trading is the only time that there appears to be a substantial difference in the returns from IPOs and direct listings, which is reflected numerically in Table 6. The same cannot be said for Figure 2, which shows that the intraday price movements for direct listings are significantly lower than those for IPOs. A logarithmic trendline, calculated by Equation 5, was included in Figure 2 to mimic a larger number of direct listing

observations. The trendline on the graph remains 1.5% - 2% below the average intraday movement for IPOs, as is clear in Table 7.

$$Y = m_1 * ln(X) + C \qquad (5)$$

Figure 1: *Excess Returns*

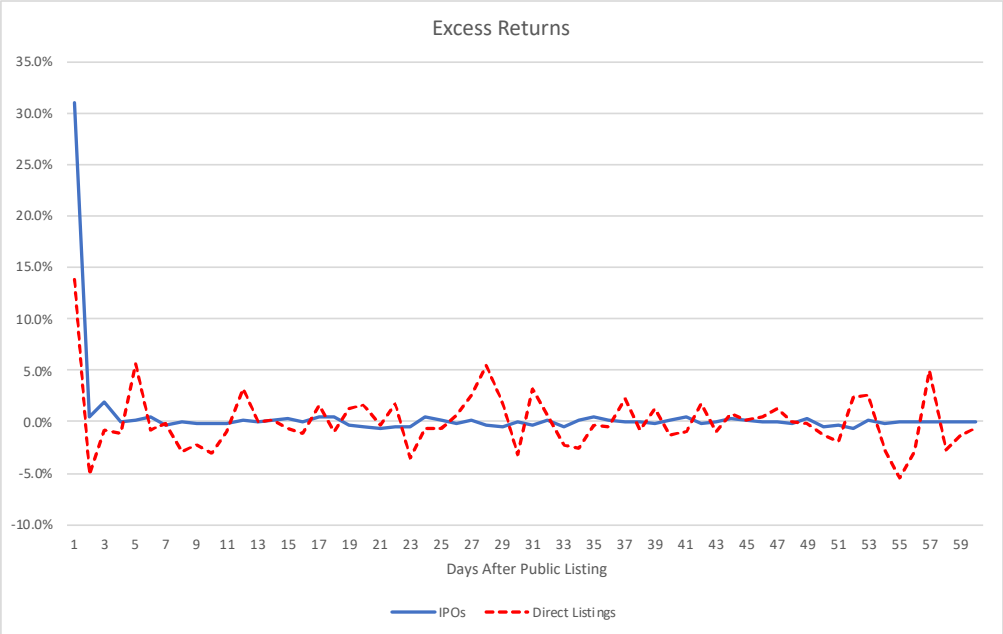
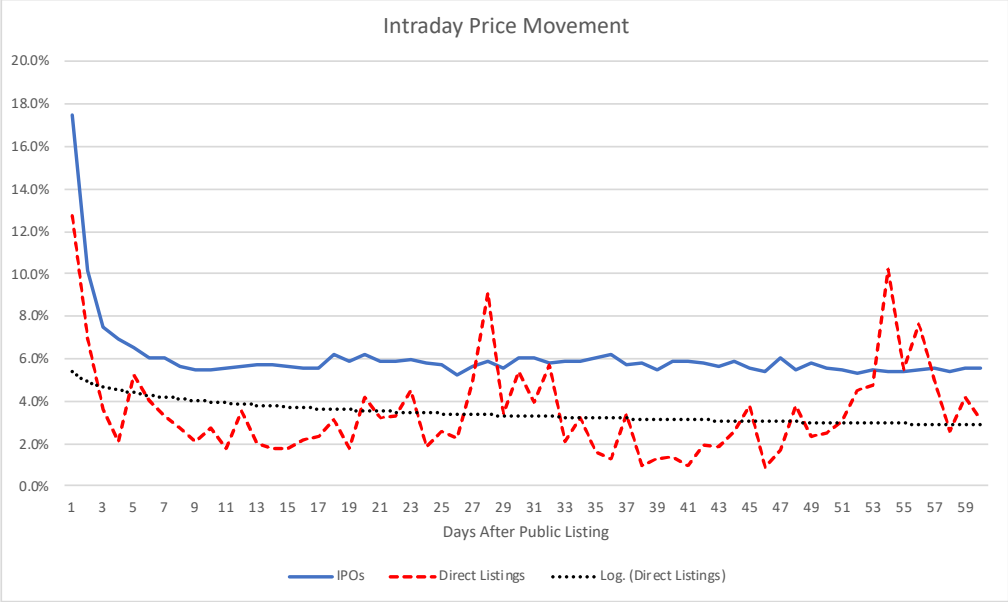


Figure 2: *Intraday Price Movement*



Given the significantly lower intraday volatility of direct listings, this paper further examines what may cause a difference in volatility. The direct listings have an average offer amount of over $4 billion, whereas most IPOs in the study are significantly smaller, with an average offer amount of $273 million. In Table 8 and Figure 3, direct listings are compared to IPOs with an offer amount over $500 million, which account for 12.8% of the total study.

Table 8: *Intraday Volatility Following Public Listing, in Bins (Large IPOs)*

Intraday Price Movement (IPOs with an offer amount $500 million)

Days After Initial	IPO		Direct Listing	
Offer	Avg.	St. Dev.	Avg.	St. Dev.
1 - 10	6.1%	4.0%	4.5%	2.3%
11 - 20	3.7%	2.0%	2.4%	1.7%
21 - 30	3.8%	2.2%	4.0%	2.8%
31 - 40	3.9%	2.2%	2.5%	1.7%
41 - 50	3.6%	1.9%	2.2%	1.0%
51 - 60	3.5%	1.9%	5.1%	4.1%

Figure 3: *Intraday Price Movement (Large IPOs)*

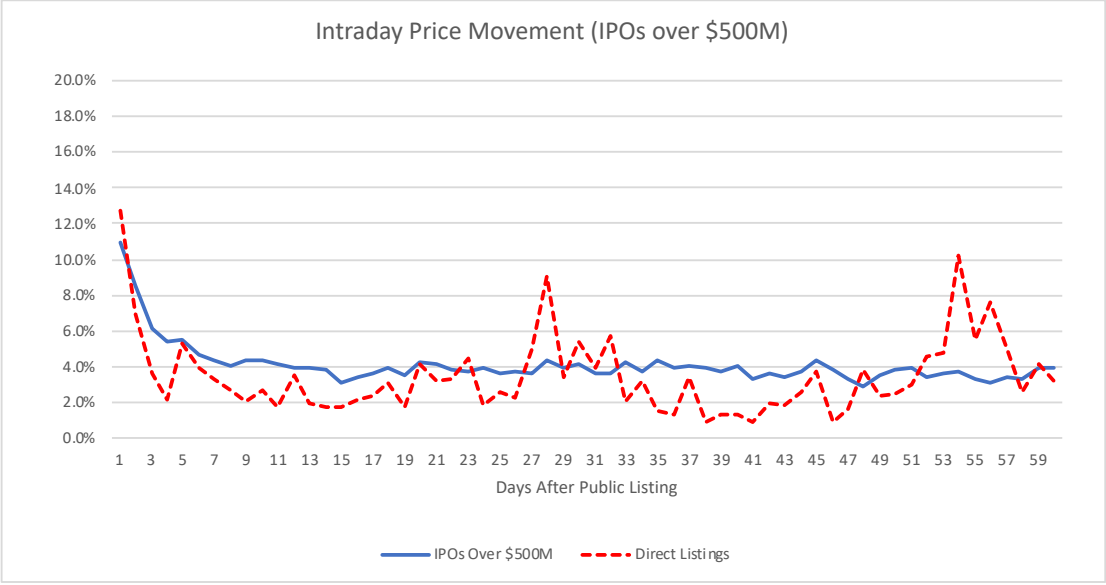


Table 8 and Figure 3 show that IPOs of a similar size to direct listings have intraday volatility that is much more comparable to the direct listings in the study.

(b) OLS Regression: predictive measures of volatility

To further analyze factors that may impact trading volatility for both IPOs and direct listings, I examined potential predictive measures of volatility by running regressions for the excess return and intraday volatility bins in Tables 6 and 7. My independent variables were factors that could potentially indicate higher trading volatility, including number of shares issued and number of funding rounds that occurred prior to going public. All dependent variables are listed in Table 9, and their summary statistics are detailed in Table 10. The regressions I ran are as follows:

Table 9: *Dependent Variables in OLS Regressions*

Y Variables:	Regression
Intra-Day Volatility Days 1-10	(1)
Intra-Day Volatility Days 11-20	(2)
Intra-Day Volatility Days 21-30	(3)
Intra-Day Volatility Days 31-60	(4)
Excess Returns Days 1-10	(5)
Excess Returns Days 11-20	(6)
Excess Returns Days 21-30	(7)
Excess Returns Days 31-60	(8)

Table 10: *OLS Regression Results*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Offer Price	-0.0006067 *	-0.0006953 ***	-0.0006741 ***	-0.0009343 ***	0.000672	-0.0001908	0.0000473	0.0000558
	(0.0002955)	(0.002039)	(0.0001834)	(0.0002041)	(0.0008135)	(0.0000993)	(0.0000939)	(0.0000664)
Number of Shares Issued	-2.35e-10 *	-2.83e-10 ***	-2.24e-10 ***	-2.11e-11 ***	8.30e-10 **	-1.40e-12	-1.79e-11	2.00e-11
	(1.12e-10)	(7.76e-11)	(6.97e-11)	(6.10e-11)	(3.10e-10)	(3.78e-11)	(3.57e-11)	(1.98e-11)
Tech Company (dummy var.)	0.0132696 *	-0.0008898	-0.0022441	-0.0048005	-0.0115519	0.0002522	0.0025983	-0.0012284
	(0.0055755)	(0.0038665)	(0.0035158)	(0.0030843)	(0.153513)	(0.0018832)	(0.0018005)	(0.001004)
Number of Funding Rounds	0.0015297 *	0.0014879 ***	0.0017733 ***	0.0016525 ***	-0.0001234	0.0003296	0.0002339	0.0002334
	(0.0006785)	(0.004686)	(0.0004299)	(0.000377)	(0.0018682)	(0.0002282)	(0.0002201)	(0.0001227)
Number of Acquisitions	-0.0020498 *	-0.0010748	-0.0008834	-0.0007686	-0.0016134	0.0001656	-0.0000299	0.0000664
	(0.0009419)	(0.006502)	(0.0006156)	(0.0005407)	(0.0025933)	(0.0003167)	(0.0003153)	(0.000176)
Number of Patents	-9.14e-6	1.62e-7	-0.0000217	-9.92e-6	-0.0000317	-1.03e-6	-4.34e-6	-4.86e-8
	(0.0000288)	(0.0000199)	(0.0000178)	(0.0000155)	(0.0000794)	(9.71e-6)	(9.10e-6)	(5.04e-6)
N	483	476	455	443	483	476	455	443
R-sq	0.0510	0.0917	0.0948	0.1270	0.0183	0.0110	0.0101	0.0202

**p < 0.05, **p < 0.01, ***p < 0.005*

The OLS regression in Table 9 shows that a number of variables have significant correlations with the 10-day bins of intraday volatility, while there are fewer correlations with excess returns. While excess returns are important in regard to investor experience, they are not necessarily good indicators of how drastically the stock price moved throughout any given day in response to swings in investor sentiment or investment bank-involvement. As shown in the regressions in Table 9, only one variable (number of shares issued during days 1-10 of trading) is a moderately significant predictor of excess returns among regressions 5 through 8.

For the four intraday volatility regressions, three variables displayed significant correlation: offer price, number of shares issued, and number of funding rounds prior to listing. Offer price has a negative correlation to intraday volatility, which indicated that lower offer prices produce higher volatility. The average offer price in the dataset is $15.64, and 131 companies (19%) have an offer price in the lowest end of the spectrum, from $4.00 to $11.88. A former investment banker I spoke with on the subject commented that "Any company that goes public with an offer price under $12.00 is a bad company." While this comment is not based on any proven research, firms that choose to price their shares below the generally accepted offer price may be attempting to cater to a larger retail market, or are interested in appealing to investors with a price that appears to be "undervalued" in an attempt to mask poor financials. Whatever the case, low offer prices tend to be associated with higher intraday volatility, especially in the first 11-60 days of trading.

Another significant indicator of intraday volatility is the number of shares that a firm issues, which has a negative relationship with volatility. This correlation may be due to the fact that smaller firms tend to have less research published about them, and investors are unable to act efficiently in the absence of perfect information. While the involvement of an investment bank in

the IPO process means that a prospectus exists with ample financial information about the firm, few investors following the going-public event itself choose to read the prospectus. As information about the recently-public firm arises, investors may buy and sell erratically, as would be evident in the significant relationship with intraday volatility from days 11-60.

The number of funding rounds a firm went through prior to going public has a positive statistical relationship with intraday volatility, meaning that a firm with more private shareholders has greater trading volatility. This makes logical sense, as a more diversified group of large private shareholders will sporadically sell of major portions of their shares in the weeks after a company goes public. As with the offer price and the number of shares issued, the significance of the number of private funding rounds a firm went through is most significant for days 11-60 of trading.

(c) OLS Regressions: Implications on Direct Listings

While it is not possible to run regressions for firms that went public through direct listings given the fact that the small sample has multicollinearity, the results of the OLS regression for IPOs can be applied to direct listings, as the indicators of increased volatility that are not tied to investment bank-influence should be consistent across all recently-public firms. The results shown in Table 7, Table 13, and Figure 2 show that direct listings have lower intraday volatility than IPOs by 1.5% – 2% on average. If the significant indicators of volatility found in the regression apply to the four firms that went public through a direct listing, then their lower intraday volatility can be explained by the lack of influence by investment banks in the direct listing process.

1. Offer Price

The average IPO offer price in this study was $15.64, and the regression found that low offer prices are indicative of increased volatility. In the case of the direct listings, the average offer price was $58.16, with only one offer price below the IPO average (PLTR, $7.25). The high offer prices of the direct listings in this study may be indicative of their low intraday trading volatility.

2. Number of Shares Issued

In the regressions for IPO intraday volatility, a below-average number of shares issued was correlated with higher volatility. The average number of shares issued in an IPO in the study was 14,958,531. Looking at direct listings, the average number of shares issued was 115,331,763, which is 7.7 times higher than the IPO average. The large number of shares listed in the four direct indicates that the direct listings should have had low intraday trading volatility.

3. Number of Funding Rounds Prior to Listing

The OLS regression for IPO intraday volatility found that a large number of funding rounds prior to listing is positively correlated with high intraday volatility. The average number of funding rounds that IPOs had prior to listing in the study was 3.65, while the average direct listing had done 17.75 funding rounds. As of the time of this paper, firms cannot legally raise capital through direct listings, so it is effectively a requirement of the direct listing process to have had prior funding rounds. In the case of IPOs, a larger number of funding rounds prior to going public likely indicates that the firm has a higher percentage of shares in a lockup. If this were the case, a smaller supply of shares on the market before the expiration of the lockup is positively correlated with higher intraday volatility. With the exception of PLTR, which has a lockup that includes 77% of

their total shares, the direct listings in this study allowed all of their shares to immediately begin trading upon listing. Therefore, it is unlikely that a large number of funding rounds would create higher intraday volatility for direct listings.

Conclusion

In summation of my results, if the OLS regressions in Table 10 were applied to the direct listings in the study, the average offer price and number of shares issued should result in lower volatility on average, whereas the number of funding rounds before going public should indicate higher volatility, albeit, likely without application to direct listings. The offer price of an issue multiplied by the number of shares issued produces the offer amount, therein, the regression shows that a high offer amount is negatively correlated with high intraday volatility. Looking back at Table 8 and Figure 3, which compare IPOs with offer amounts over $500 million to direct listings, it is clear that IPOs with larger offer amounts have similarly low intraday volatility to direct listings. It can therefore be surmised that the direct listings in this study have significantly lower intraday volatility than their IPO counterparts in large part because of their high offer amount.

While this paper does not prove that the involvement of underwriters in the IPO process results in higher price volatility for the first 60 days of trading, it does provide a framework with which to analyze direct listings going forward. The direct listings in this study were a homogenous group (large tech companies that engaged in above-average numbers of funding rounds), but when a more heterogenous group of firms go public through direct listings, a closer comparison can be made to firms that pursue IPOs. This comparison will be especially important if the SEC rules that firms are able to list primary shares in a direct listing. Thus far, only well-funded firms have been able to pursue direct listings because of their legal inability to raise capital in their chosen

mode of going-public. If firms are able to raise capital in direct listings, investment bank involvement will be the only true difference between IPOs and direct listings, especially given the fact that direct listings will likely all have lockups if they issue primary shares.

The role of investment banks as the underwriters of IPOs has been a consistent pillar of going-public, but their necessity may lessen in a marketplace with modern trading technology and information-sharing platforms. As discussed in the Literature Review, financial markets constantly give rise to innovations that push the status-quo of near-efficiency, and direct listings an innovation that begins to solve the potential inefficiency of investment banks. Direct listings are likely a permanent phenomenon on US exchanges, and the regulatory framework surrounding the listing process remains in-flux. If more firms choose to go public through direct listings, market players and academics will continue to analyze the practical difference between the two listing mechanisms, and may find one to be more efficient than the other.

Appendix

Table 11: *Detailed Summary Statistics: IPOs*

Variable	Observations	Mean	St. Dev.	Min	Max
Offer Price	531	15.64331	8.167055	4	120
Number of Shares Issued	531	15,000,000	23300000	240,000	207,000,000
Tech Company (dummy var.)	483	0.2546584	0.4361207	0	1
Number of Funding Rounds	483	3.654244	3.581667	0	27
Number of Acquisitions	483	1.039337	2.865684	0	26
Number of Patents	483	24.38095	88.99534	0	1075
Volatility Days 1-10	531	0.0801512	0.055087	-0.0205991	0.4890732
Volatility Days 11-20	521	0.0577601	0.0384264	-0.0159583	0.2957589
Volatility Days 21-30	498	0.0567931	0.0361074	-0.0154244	0.3226879
Volatility Days 31-60	486	0.0567931	0.0301787	-0.017539	0.2085283
Excess Returns Days 1-10	531	0.033896	0.1475376	-0.0957727	2.183652
Excess Returns Days 11-20	521	0.0005254	0.0167213	-0.0791905	0.1197586
Excess Returns Days 21-30	498	-0.0013983	0.0167124	-0.0607478	0.1124222
Excess Returns Days 31-60	486	0.0000745	0.0091384	-0.0368434	0.0393018

Table 12: *Detailed Summary Statistics: Direct Listings*

Variable	Observations	Mean	St. Dev.	Min	Max
Offer Price	4	58.1625	72.95459	7.25	165.9
Number of Shares Issued	4	115,000,000	102,000,000	30,000,000	257,000,000
Number of Funding Rounds	4	17.75	7.932003	11	28
Number of Acquisitions	4	7.75	7.5	0	18
Number of Patents	4	276.75	313.2639	0	710
Volatility Days 1-10	4	0.045407	0.0122281	0.0331289	0.0622643
Volatility Days 11-20	4	0.0243536	0.0062263	0.0180116	0.0324229
Volatility Days 21-30	4	0.0403781	0.0203492	0.0272724	0.070363
Volatility Days 31-60	2	0.0314546	0.0122314	0.0228057	0.0401035
Excess Returns Days 1-10	4	0.0032007	0.0193929	-0.0172718	0.0243862
Excess Returns Days 11-20	4	0.0040492	0.0134092	-0.0119425	0.0171617
Excess Returns Days 21-30	4	0.0035163	0.0162025	-0.0090682	0.0269024
Excess Returns Days 31-60	2	-0.0028955	0.00798	-0.0085382	0.0027473

Table 13: *Daily Excess Returns and Intraday Price Movements Following Public Listing*

	IPO				Direct Listing			
Days after	Excess Returns		Intra-Day Price Movement		Excess Returns		Intra-Day Price Movement	
Initial Offering	Avg.	St. Dev.	Avg.	St. Dev.	Avg.	St. Dev.	Avg.	St. Dev.
1	31.0%	141.2%	17.5%	16.9%	13.7%	23.2%	12.7%	5.8%
2	0.5%	9.3%	10.1%	9.9%	-5.1%	3.9%	6.9%	1.7%
3	1.9%	43.2%	7.5%	6.8%	-0.8%	2.1%	3.6%	2.1%
4	0.0%	7.3%	6.9%	8.3%	-1.1%	4.6%	2.1%	1.8%
5	0.1%	5.9%	6.5%	7.1%	5.6%	4.3%	5.3%	5.0%
6	0.5%	6.8%	6.0%	7.0%	-0.7%	1.9%	4.0%	1.3%
7	-0.4%	5.3%	6.0%	7.8%	-0.2%	2.5%	3.3%	0.4%
8	0.1%	5.1%	5.6%	5.5%	-2.8%	1.5%	2.7%	2.0%
9	-0.1%	4.9%	5.5%	5.1%	-2.2%	2.8%	2.1%	1.5%
10	-0.1%	4.9%	5.5%	5.3%	-3.0%	1.1%	2.7%	1.3%
11	-0.2%	4.1%	5.5%	4.8%	-1.0%	1.9%	1.8%	0.9%
12	0.1%	4.8%	5.6%	5.6%	3.3%	3.0%	3.5%	2.3%
13	-0.1%	4.7%	5.7%	5.4%	0.0%	1.2%	2.0%	0.9%
14	0.1%	4.8%	5.7%	5.3%	0.2%	3.0%	1.8%	2.0%
15	0.3%	5.7%	5.6%	6.1%	-0.7%	1.7%	1.8%	0.9%
16	0.0%	5.5%	5.6%	5.7%	-1.2%	2.1%	2.2%	1.4%
17	0.4%	4.9%	5.6%	4.8%	1.6%	3.0%	2.3%	1.7%
18	0.5%	6.2%	6.2%	7.1%	-1.0%	1.2%	3.1%	1.1%
19	-0.3%	5.1%	5.9%	5.3%	1.3%	3.0%	1.7%	1.6%
20	-0.4%	6.7%	6.2%	10.8%	1.7%	6.2%	4.2%	4.3%
21	-0.6%	5.8%	5.8%	5.3%	-0.4%	1.1%	3.2%	2.4%
22	-0.5%	4.5%	5.9%	5.4%	1.7%	3.4%	3.3%	2.1%
23	-0.4%	4.9%	6.0%	5.4%	-3.6%	3.4%	4.5%	0.6%
24	0.4%	4.8%	5.8%	5.4%	-0.6%	3.9%	1.8%	0.7%
25	0.1%	4.9%	5.7%	5.4%	-0.7%	2.0%	2.6%	0.8%
26	-0.1%	4.7%	5.3%	4.4%	0.6%	1.0%	2.2%	1.0%
27	0.2%	6.6%	5.6%	6.1%	2.6%	6.1%	4.9%	4.2%
28	-0.4%	5.5%	5.9%	5.2%	5.4%	7.7%	9.1%	9.2%
29	-0.5%	4.7%	5.6%	4.9%	1.8%	3.8%	3.4%	3.5%
30	0.0%	7.1%	6.0%	6.9%	-3.2%	3.7%	5.4%	3.6%
31	-0.4%	5.6%	6.0%	5.5%	3.2%	7.3%	4.0%	3.7%
32	0.1%	5.1%	5.8%	5.4%	0.6%	3.8%	5.7%	5.2%
33	-0.4%	4.9%	5.9%	5.0%	-2.3%	1.2%	2.1%	1.9%
34	0.1%	5.7%	5.9%	5.2%	-2.6%	2.8%	3.2%	3.0%
35	0.5%	6.1%	6.0%	5.9%	-0.3%	0.8%	1.6%	0.0%
36	0.1%	5.0%	6.2%	5.4%	-0.5%	1.2%	1.3%	0.1%
37	0.0%	4.4%	5.7%	4.7%	2.2%	0.3%	3.4%	2.3%
38	0.0%	5.1%	5.8%	5.2%	-0.8%	1.3%	0.9%	0.4%
39	-0.1%	4.7%	5.5%	4.8%	1.3%	0.2%	1.3%	0.2%
40	0.1%	5.3%	5.9%	5.1%	-1.3%	0.8%	1.4%	0.1%
41	0.5%	6.2%	5.9%	6.8%	-1.0%	1.7%	0.9%	0.6%
42	-0.1%	5.1%	5.8%	5.3%	1.8%	0.9%	1.9%	0.5%
43	0.1%	5.1%	5.6%	6.2%	-1.0%	0.6%	1.8%	0.1%
44	0.4%	5.4%	5.9%	6.3%	0.8%	1.0%	2.5%	0.1%
45	0.1%	4.6%	5.5%	4.9%	0.2%	1.0%	3.8%	2.8%
46	0.0%	5.3%	5.4%	4.8%	0.6%	1.1%	0.9%	3.0%
47	0.1%	5.1%	6.0%	17.2%	1.3%	0.6%	1.7%	0.7%
48	-0.1%	5.4%	5.5%	5.4%	0.0%	4.4%	3.8%	0.3%
49	0.4%	5.2%	5.8%	5.2%	-0.2%	0.8%	2.4%	1.1%
50	-0.5%	4.8%	5.6%	4.7%	-1.3%	0.7%	2.5%	0.7%
51	-0.3%	6.2%	5.5%	4.7%	-1.9%	3.4%	3.0%	3.2%
52	-0.6%	4.9%	5.3%	4.6%	2.5%	1.3%	4.5%	1.5%
53	0.2%	5.0%	5.5%	5.0%	2.6%	5.8%	4.7%	3.7%
54	-0.1%	4.7%	5.4%	4.9%	-2.8%	3.4%	10.3%	12.0%
55	-0.1%	4.7%	5.4%	4.9%	-5.4%	4.5%	5.5%	4.4%
56	0.0%	4.5%	5.4%	4.6%	-2.8%	8.4%	7.6%	6.6%
57	0.1%	5.7%	5.6%	6.5%	5.0%	3.3%	5.0%	5.0%
58	0.0%	5.1%	5.4%	6.0%	-2.8%	5.5%	2.6%	0.8%
59	0.0%	5.2%	5.6%	5.0%	-1.3%	3.5%	4.2%	2.1%
60	-0.1%	4.6%	5.5%	4.9%	-0.6%	5.0%	3.2%	2.2%

Bibliography

Booth, James R., and Lena Chua. "Ownership dispersion, costly information, and IPO underpricing." *Journal of Financial Economics*, Vol. 41, Issue 2, June 1996, p. 291-310. *ScienceDirect*.

Booth, James R, and R.L. Smith, "Capital raising, underwriting and the certification." *Journal of Financial Economics* Vol. 15, 1986, p. 262-281.

Cope, S. Gregory et al., "Newly Approved Direct Listing Capital Raising Alternative on Hold Pending SEC Review." *Vinson&Elkins.* 3 Sept 2020. https://www.velaw.com/insights/newly-approved-direct-listing-capital-raising-alternative-on-hold-pending-sec-review/

Esteve, Inigo. "Direct Listings—Something new, or variations on a theme?" *White & Case*. 15 Jun 2020. https://www.whitecase.com/publications/alert/direct-listings-something-new-or-variations-theme

Ferreira, Daniel, Gustavo Manso and Andre C. Silva. "Incentives to Innovate and the Decision to Go Public or Private." Feb 2012.

Giacchi, Peter. "Industry: Q&A with Pete Giacchi on the Future of Direct Listings." *Citadel Securities*. 26 Oct 2020. https://www.citadelsecurities.com/news/qa-with-pete-giacchi-on-the-future-of-direct-listings/

Hong, Harrison et al., "Asset Float and Speculative Bubbles." *Princeton University.* Aug 19, 2004.

Horton, Brent J. "Spotify's Direct Listing: Is It a Recipe for Gatekeeper Failure." *SMU Law Review*, vol. 72, no. 1, Winter 2019, p. 177-216. HeinOnline.

Jaffe, Marc D., Greg Rodgers, and Horacio Gutierrez. "Spotify Case Study: Structuring and Executing a Direct Listing." *Latham & Watkins LLP*. 5 Jul 2018. https://corpgov.law.harvard.edu/2018/07/05/spotify-case-study-structuring-and-executing-a-direct-listing/

Jain, Bharat, and Omesh Kini, " The post-issue operating performance of IPO firms." *Journal of Finance* Vol. 49, 1994, p. 1699-1726.

Jenkinson, T. and Jones, H. "The Economics of IPO Stabilisation, Syndicates and Naked Shorts." *European Financial Management*. 13: 616-642, 2007. https://doi.org/10.1111/j.1468-036X.2007.00376.x

Kuznetsov, Andrei, Rostislav Kapelyushnikov and Natalya Dyomina. "Performance of Closely Held Firms in Russia: Evidence from Firm-Level Data," *The European Journal of Finance*, 14:4, 2008, p. 337-358.

Loughran, Tim, and Jay Ritter. "Why Has IPO Underpricing Changed over Time?" *Financial Management*, vol. 33, no. 3, 2004, pp. 5–37. *JSTOR*.

Mauboussin, Michael and Dan Callahan. "Public to Private Equity in the United States: A Long Term Look." *Morgan Stanley Investment Management*. 4 Aug 2020. https://www.morganstanley.com/im/publication/insights/articles/articles_publictoprivateequityintheusalongtermlook_us.pdf?1596549853128

Masulis, Ronald W., and Randall S. Thomas. "Does Private Equity Create Wealth? The Effects of Private Equity and Derivatives on Corporate Governance." *The University of Chicago Law Review*, vol. 76, no. 1, 2009, pp. 219–259. *JSTOR*.

Nickerson, Benjamin J. "The Underlying Underwriter." *The University of Chicago Law Review*, Vol. 86, No. 4 (June 2019), pp. 985-1025.

Ofek, Eli and Richardson, Matthew. "The IPO Lock-Up Period: Implications for Market Efficiency and Downward Sloping Demand Curves." *Stern School of Business, New York University*. Jan 2000.

Ruud, Judith S. "Underwriter price support and the IPO underpricing puzzle." *Journal of Financial Economics.* Vol. 34, Issue 2, Oct 1993, p. 135-151. *ScienceDirect*.

Zheng, Miles. "Direct Listing or IPO?" *University of Illinois.* Aug 28, 2020.