

Amplitude's Direct Listing (ticker symbol AMPL)

February 11, 2022

Amplitude¹

In 2011, Curtis Liu, Spenser Skates, and Jeffrey Wang, three young coders (programmers) one year out of college, quit their well-paid day jobs and decided to start a company. Skates and Liu had gone to M.I.T. together, where their team won Battlecode, M.I.T.'s largest coding competition. After graduation, Liu moved to the Bay area, where he met Jeffrey Wang, a recent Stanford computer science grad. The three budding entrepreneurs applied to join the San Francisco Y Combinator, and were accepted. Y Combinator is an American seed money startup accelerator. Potential entrepreneurs apply, and if accepted, Y Combinator provides both an office with the opportunity to interact with other budding entrepreneurs and some seed capital (i.e., gives the team some money) in return for taking a stake in the business. After a false start with their first idea for a company, the three coders co-founded Amplitude in 2012. They applied again, and were given a second chance by the San Francisco Y Combinator with their idea for Amplitude, a "digital optimization" or "product analytics" company that was creating a software platform that allows the employees of a company to analyze how potential customers interact with the company's web site. The first two years, they operated in "stealth mode," developing the software platform in secrecy.

Eventually, Liu, Skates, and Wang moved into their own offices in San Francisco, where the company is still based. The founders began to hire additional employees, and sought angel and venture capital money to pay employees and cover other operating expenses as they scaled up. Angel investors are individuals, frequently people who founded a successful startup and cashed out, who invest their own money in other startups.

Rather than competing with other software providers, Amplitude had found that many of its clients were pretty "greenfield," i.e., were not using a competing company's software. Instead, a lot of firms had in-house information technology (IT) or data science teams, but found it easier to use Amplitude's platform. Amplitude's strategy with a client is generally to "land and expand"—get the foot in the door and show how the Amplitude platform can be useful, with the company then expanding its use. Once the Amplitude platform is set up with the company data imported, non-specialist employees could get fast answers using Amplitude software that was designed to be easy to use, rather than waiting a week or more for in-house data scientists to write a report answering a question.

Some large tech companies, such as Facebook and Amazon, have sufficiently large in-house capabilities that they do not need to go to an outside vendor such as Amplitude. But many

¹ This case study has been prepared by Professor Jay Ritter of the University of Florida's Warrington College of Business using information from Amplitude's S.E.C. filings, Pitchbook, interviews with company executives and other participants, and participation as a "fly on the wall" in Zoom video meetings between the company and participants in the process.

other companies, even large ones, do not have large data scientist teams with many coders, and find that using Amplitude's platform is useful.

As with many tech startups, there are fixed costs for writing software that must be paid up front, with revenue coming in during future years. Thus, external funding is required if the company is going to grow rapidly.

Venture Capital funding:

In 2012, Y Combinator investors purchased a \$150,000 convertible note, providing the three young coders with money to live on. Amplitude developed its analytics database in stealth mode, and in 2014 launched their real-time mobile analytics platform. The company, with its digital optimization product, in 2015 received \$9 million in Series A venture funding from Benchmark Capital at a split-adjusted price of \$0.62 per share. Benchmark also took a board seat. The convertible note was converted into stock at the same time. Pitchbook gives a post-money valuation of \$30.97 million.

In 2016, Battery Ventures led a \$15 million Series B funding round, and took a board seat. Pitchbook lists it as \$15.9 million at \$1.11 per share, giving the company a post-money valuation of \$85 million.

In 2017, IVP led the \$30 million Series C funding round, according to the "About Us" portion of their website at <https://amplitude.com/company> Pitchbook lists it as \$30 million at \$3.76 per share, giving the company a post-money valuation of \$335 million. Amplitude also opened an office in Amsterdam to expand its global presence.

In 2018, Sequoia Capital led a Series D funding round raising \$80 million, and took a board seat. Pitchbook lists it as \$80.15 million at \$8.57 per share, giving Amplitude a post-money valuation of \$850 million. The company continued to expand, opening offices in London, Paris, Singapore, and New York City.

Pages 167-169 of the S.E.C. form S-1 at <https://www.sec.gov/Archives/edgar/data/0001866692/000119312521260696/d143868ds1.htm> gives details of the Series D, E, and F funding rounds. The Series D round was in November 2018 in which \$79.8 m was raised at \$8.5681 per redeemable convertible preferred share, with Sequoia investing \$50 million.

In April 2020, Amplitude raised another \$50 million in a Series E round led by GIC, with Jasmine Ventures investing \$30 million. The S-1 states that it raised \$49.8 m at \$9.5498 per redeemable convertible preferred share. Pitchbook reports a post-money valuation of \$1 billion.

In 2021, Amplitude raised \$200 million in a Series F round leading up to its direct listing in September 2021. Pitchbook lists it as \$150 million at \$32.02 per share, giving Amplitude a post-

money valuation of \$4.15 billion. Of the \$200 million, \$50 million came in after Pitchbook did its calculation.

The Series F round had six separate closings starting in May 2021, raising \$200 million in total, with Sequoia investing \$100m, Battery Ventures investing \$10 m, and Jasmine Ventures investing \$37.5 million at a price of \$32.02 per redeemable convertible preferred share. IVP put in \$1m.

In total, the company had raised about \$384 million from venture capitalists, not including the Y Combinator and SV Angel stakes. On Sept. 28, 2021, Pitchbook listed 41 investors in Amplitude. Pitchbook lists only \$337 million in cumulative funding, rather than the \$384 million total above, largely because of the late \$50 million Series F investment.

Valuation questions

Page i of the prospectus (S.E.C. form 424B) reports that the company has stock options representing 28,770,430 shares outstanding, with a weighted average exercise price of \$3.33, plus options for 282,734 shares that were recently granted with a weighted average exercise price of \$24.56, plus 479,481 restricted stock units (RSUs). Including the 102,756,934 outstanding shares, the RSUs, and the options, which are mainly deep in the money, the fully diluted share count is 132.3 million shares.

Page 143 of the direct listing prospectus lists Amplitude's competitors:

- Product analytics point tools such as Pendo, Mixpanel, and Heap;
- Web and marketing analytics vendors such as Adobe Experience Cloud and Google Analytics;
- Business intelligence solutions such as Looker and Tableau.

Unfortunately, for comparable firm valuation purposes, Adobe and Google Analytics parent Alphabet are the only publicly traded companies, but their main businesses are much larger.

The investor day presentation, which is more than 2 hours in length, from Sept. 14, 2021 is available at <https://info.amplitude.com/reg-amplitude-investor-day-video> [as of November 1, 2021]. This link will be removed sometime in 2022.

With each funding round, prospective venture capital investors had to address questions that did not have easy answers. How big is the potential addressable market (future industry revenue) for Amplitude's platform? In the narrowly defined industry (a "vertical") of product analytics, how much competition is there? Are there network effects or economies of scale that would lead to a "winner take all" outcome? How big are customer acquisition costs? What is the churn rate of clients? Are future profit margins potentially large (as with Facebook, Alphabet, Apple, and Microsoft), or will competition limit the margins, as is true in traditional industries such as restaurants, construction, and automobile manufacturing? Will Amplitude be

able to maintain its high revenue percentage growth rates for a long time, or will they decline rapidly as the company gets bigger? How long will Amplitude continue to have negative free cash flow, and thus need external financing that will dilute the existing shareholders? For investors at the time of the direct listing, the same questions needed to be addressed.

In practice, given the huge amount of uncertainty in the answers to the above questions, many investors look to past returns on similar companies, comparable firm valuations, and valuation levels in recent transactions (either funding rounds or private market transactions). Historical returns on venture-backed and tech company IPOs are available on Jay Ritter's IPO data page at <https://site.warrington.ufl.edu/ritter/ipo-data/> Several of the tables show that tech stock IPOs historically, on average, have substantially beaten the market if the internet bubble cohorts of 1999-2000 are excluded. The tech stocks that had more than \$100 million in trailing twelve months (TTM) sales have done even better yet.

On the other hand, Ritter's Table 4a, reproduced below, shows that the median tech stock was priced at a price-to-sales ratio of 7.0 at the end of the first day of trading. The series F round of VC funding had given Amplitude a post-money valuation of \$4.15 billion, and with \$128.8 million in TTM sales, the resulting price-to-sales ratio was already 32.2, substantially higher than the historical median. The same table showed that in 2020, the median tech stock IPO sold at a price-to-sales ratio of 21.8 at the end of the first day of trading. And these numbers used the basic number of shares outstanding, rather than the fully diluted number, which in Amplitudes case would give it a valuation close to 30% higher. So although tech stock IPOs had historically done well, public market investors today were paying much higher multiples than had been true in the past, potentially limiting their future returns.

The direct listing prospectus reports trailing twelve month (TTM) revenue of \$128.8 million, ending on June 30, 2021. On Sept. 21, the company issued a press release with second quarter revenue and earnings, and gave guidance for the third quarter and the full year on revenue. Revenue in the second quarter of 2021 increased 66% from the second quarter of 2020.

Compensation and governance:

In 2020 and 2021, Amplitude added three new board members, Erica Schultz, Elisa Steele, and Catherine Wong, all of them female and all of them with extensive experience as executives of technology companies. SB 826, a California law passed in 2018, requires that publicly held companies headquartered in the state with six or more directors must have at least three women on the board of directors. California law AB 979, passed in 2020, requires that publicly traded companies with at least nine board members must have at least three board members that are not self-identified as heterosexual Caucasians. At the time of the direct listing, four of Amplitude's nine board members were Asian-American, and three were female.

June 21, 2021, Amplitude confidentially filed a draft registration statement (DRS) with the S.E.C., which was posted on the S.E.C.'s EDGAR web site after the company filed its public S-1 (preliminary prospectus) on August 30, 2021. The S-1 reveals the ownership of co-founders Spenser Skates (age 33) and Curtis Liu (age 32), and executives Matt Heinz, Jennifer Johnson, and Hoang Vuong, along with those of various board members and VC-firms owning 5% or more of the company. Co-founder Jeffrey Wang was not listed as a 5% owner. All of the other executives and board members are older than the founders. The total number of shares (all classes) add up to over 100,000,000. On page 15 of the S-1, the June 30, 2021 weighted average number of shares for earnings per share (EPS) is given as 28.8 million, implying a stock split of about 3.263 for 1 later that summer as the company prepared for its listing. Several of the recently hired top executives negotiated large stock grants when they joined the company, reflecting the competitive conditions in the labor market for executives with technology company experience. Hoang Vuong (1.71 m shares), the Chief Financial Officer (CFO), joined in April 2019. It is common for a company that is planning to go public to hire a CFO who has experience at a publicly traded company, and is thus familiar with S.E.C. reporting requirements. Matt Heinz (1.3 m shares), the Chief Revenue Officer, joined the company in October 2019. Jennifer Johnson (331K shares) joined as the Chief Marketing and Strategy Officer in September 2020.

The beneficial ownership of executive officers and directors and 5% shareholders prior to the direct listing is given on page 173 of the S-1 at

https://www.sec.gov/Archives/edgar/data/0001866692/000119312521260696/d143868ds1.htm#toc143868_16

Owner	Number of shares	Percentage ownership
Spenser Skates, co-founder and CEO	8.8 million	8.7%
Curtis Liu, co-founder and Chief Technology Officer	7.7 million	7.7%
Hoang Vuong, CFO	1.7 million	1.7%
Matt Heinz, Chief Revenue Officer	1.3 million	1.3%
Jennifer Johnson, Chief of Marketing and Strategy	0.3 million	0.3%
Benchmark Capital	15.3 million	15.3%
Battery Ventures	14.0 million	14.0%
Institutional Venture Partners	8.8 million	8.8%
Sequoia Capital	7.8 million	7.8%
Jasmine Ventures	5.0 million	5.0%

Page 149 of the S-1 states that of the nine-member board of directors, three are elected to a 3-year term each year. This practice is known as a staggered, or classified, board of directors and makes it impossible for shareholders to replace more than one-third of the board in a given year.

Page 156 states that the CEO and CTO are paid cash compensation of \$275,000 per year, but the head of marketing was hired at a base salary of \$360,000 per year and given options worth \$3.1 million (the exercise price is \$4.19 per share) when she joined the company. The options vest over a 4-year period.

Amplitude has a dual-class structure, with the Class B shares held by insiders having 5 votes, and the publicly traded Class A shares having 1 vote. Each outstanding share of Class B common stock is convertible into one share of Class A common stock.

Although not required by law, almost all IPOs in the U.S. have lock-up provisions, whereby any pre-issue shareholder of the company cannot sell any shares in the open market without the express written permission of the designated underwriter until a certain period of time has elapsed, typically 180 calendar days after the IPO. Most direct listings, including that of Amplitude, have not had any lockup provisions. Shares that are eligible for trading must be registered, however.

The process of going public:

In the U.S., all exchange-listed stocks must file audited financial statements with the S.E.C. There are other companies, however, that are private or that are traded on the over-the-counter (OTC) market that also are subject to public reporting requirements. For example, Publix Super Markets, Inc. is an employee-owned company that does not have publicly traded stock, but has enough shareholders that it is subject to public reporting requirements. If an employee wants to sell stock, the person must sell it back to the company at a price that is determined by a committee once per quarter. Some listed companies have never gone public, but became listed after some corporate reorganization. Increasingly, some private companies are becoming publicly traded by merging with a Special Purpose Acquisition Company (SPAC) that had previously gone public. Most listed companies, however, have conducted an initial public offering (IPO).

The process of going public in the U.S. and listing on an exchange involves several steps. Firms typically confidentially file a Draft Registration Statement (DRS), which is essentially a first draft of the IPO prospectus, with the S.E.C.'s Division of Corporate Finance. The DRS is typically prepared by the company in consultation with an outside law firm and underwriters or financial advisors. In Amplitude's case, the drafting of the DRS took three weeks, which is relatively fast.

A staff attorney at the S.E.C. then examines the document, and typically raises some questions that are then sent to the company to address. The document must fulfill numerous detailed requirements, including what font size must be used for certain statements. Importantly, a specified number of years of audited financial statements must be included. Importantly, the S.E.C. is concerned with disclosure, and does not make a judgment on what an appropriate valuation for the company would be. After filing a DRS, the company typically conducts some

private meetings with prospective mutual fund investors to gauge the level of interest in the company at various valuation levels. These meetings are known as “testing the waters,” based on the analogy of sticking a toe into a body of water to test the temperature before plunging in.

If the company decides to proceed with an IPO or direct listing, it then publicly issues a preliminary prospectus, called an S-1 after the S.E.C. form.² The S-1 normally would differ from the DRS in that one more quarter’s financial statements would typically have become available during the 3 months or so that the DRS was under S.E.C. review. The S-1 must be issued three weeks before the issuing company, known as the issuer (whether or not the company itself is selling shares in the offering), starts its road show. The S-1 normally does not contain any suggestion about the offer price. These documents are filed electronically, although a few firms also print some copies of the final prospectus.

If the company is doing a traditional IPO, it files an amended S-1, referred to as an S-1/A, that contains a file price range and number of shares to be issued. The S-1/A is usually identical to the final prospectus, S.E.C. form 424B, except that the final prospectus will have the actual number of shares offered and the offer price, and is typically filed the afternoon before the road show starts. In Amplitude’s case, the dates for filing its S-1, holding its investor day, the dates on which the investor education meetings would occur, and the start of trading, were all planned more than two months in advance. The road show or investor education meetings are typically scheduled before the S-1/A is posted.

With a traditional IPO, there are typically 2-5 or more bookrunners, although a small offering may have only one bookrunner, and a large offering may have eight or more. There may be some co-managing underwriters as well. In practice, one or two of the bookrunners actively participate in the IPO. The most important bookrunner is listed on the front page of the IPO prospectus on the left side at the top of the list of underwriters, and is known as the lead-left underwriter. The other managing and co-managing underwriters are paid less, and normally are included in the underwriting syndicate mainly to compensate them for providing future analyst coverage or for providing loans (loans are more typical for a buyout-backed company than for a startup).

The road show (or in the case of a direct listing, the “investor education” meetings) is partly a marketing event: the firm markets its stock to potential investors. The lead bookrunner will then follow up with these investors and record their “indications of interest.” These buy orders are put in a spreadsheet. A mutual fund or hedge fund might state that it wants to buy up to, say, 200,000 shares, and it may or may not include the maximum price that it is willing to pay. The spreadsheet also includes a column for “color,” such as whether the investor will buy twice as many shares in the aftermarket (once trading starts) as they were allocated. These indications of interest frequently overstate how many shares the investor actually wants to buy.

² For very small companies, SEC form SB for small business rather than an S-1 filing would apply. Foreign firms issue an F-1.

Further, the underwriter does not know whether the investor will be a buy-and-hold investor or a “flipper,” an investor who sells the stock as soon as it starts trading. Consequently, the underwriter typically wants the offering to be oversubscribed (there are indications of interest for more shares than will be offered). In other words, the spreadsheet gives a very imperfect measure of the demand curve for the stock that is being sold.

The afternoon before trading starts, the issuer and lead underwriter negotiate the offer price and decide on the final number of shares to be offered. They then include these numbers in the final prospectus, and notify the S.E.C. The S.E.C. then declares the offering effective, and trading starts the next morning, typically in the late morning rather than at 9:30am. The underwriter notifies clients of the final offer price and how many shares they have been allocated. These investors then must confirm that they indeed want to purchase the shares. The regulatory reason for the confirmation requirement is that at the time of submitting the indication of interest, these investors did not know for certain how much money was being raised or what the offer price would be.

With a traditional IPO, some issuers delegate the allocation of shares entirely to the lead underwriter, and others become more involved in jointly determining the allocations.

In the S-1 that Amplitude filed, the company said its advisers are Morgan Stanley, Bank of America Corp., Citigroup Inc., KeyBanc Capital Markets, Robert W. Baird & Co., UBS Group AG and William Blair & Co. Morgan Stanley, which had advised several other companies on their direct listings, was the main advisor.

Spenser Skates, Amplitude’s CEO, had been thinking of a direct listing since 2019. With a direct listing, there is no offer price and allocation of shares, and there are no underwriters. There is a reference price, however. The reference price is chosen by the exchange on which the company is listing the day before the start of trading, and is designed to give investors a benchmark for what price the stock might start trading at. Normally, the reference price is based on recent private market transactions in the stock. In general, the reference price is set lower than the opening price of the direct listings that have occurred. Unlike an IPO offer price, however, no transactions occur at the reference price.

In addition to fees paid to Morgan Stanley and other financial advisors for the direct listing, Amplitude incurred other costs: legal and listing costs, and higher director and officer (D&O) insurance rates. Although the company already had audited financial statements, accounting and auditing costs would increase on a point-forward basis in order to comply with the S.E.C.’s public reporting requirements. On November 9, 2021, Amplitude announced third quarter results, which included \$16.1 million of costs associated with its direct listing.

For the CEO, CFO, and general counsel, a large amount of their time from June through September 2021 was occupied by preparing the S.E.C.’s Draft Registration Statement and marketing the stock to prospective institutional buyers in a series of on-line investor

presentations. Furthermore, Amplitude hired an investor relations company to assist with the marketing, and hired an in-house investor relations person.

If the company did a traditional IPO, perhaps with gross proceeds of at least \$300 million in shares sold by the company, the issuer could expect to pay underwriters a gross spread of 6%, \$18 million in total, split proportionately between the company and selling shareholders. A VC-backed tech company could expect to see its price jump by an average of 30% or more on the first day of trading, based on statistics available in Table 4h at <https://site.warrington.ufl.edu/ritter/files/IPO-Statistics.pdf>. A jump of 30% on a \$300 million IPO would mean that \$90 million was “left on the table”, money that was not collected by the issuer. Much of the time and money spent on marketing the stock and preparing S.E.C. documents would be the same whether a direct listing or a traditional IPO was being used, so the comparison would largely be the difference between payments to financial advisors in a direct listing vs. the gross spread and money left on the table in an IPO.

On the other hand, in a direct listing Amplitude would not be raising any money, which necessitated the \$200 million Series F round several months before the direct listing. If this Series F stock was sold at a discount relative to what the stock started to trade for, that discount would be the equivalent of money left on the table.

Table A below outlines some of the differences between going public with a traditional bookbuilt IPO versus using a direct listing.

The road show:

Unlike a traditional IPO, there is no “road show” in a direct listing, but rather investor education meetings. The key difference is that underwriters do not participate in the investor education meetings, and do not collect orders (known as “indications of interest”) from potential buyers, as they would in a road show. Roughly a month before the start of the formal investor education meetings, Amplitude started having one-on-one video discussions with potential investors, almost all of which were mutual funds. These were termed testing the waters meetings, based upon a provision in the 2012 JOBS Act that permitted companies thinking of going public to have these meetings. Both the testing the waters and investor education meetings typically started with a PPT presentation from the CEO, with questions from the buy-side person or persons sometimes interrupting the presentation, and then further questions at the end of the presentation. The questions that came up varied quite a bit from investor to investor.

After these meetings, potential investors individually made decisions regarding what price, if any, they would be willing to buy Amplitude stock once it started trading.

The first day of trading:

Nasdaq set a reference price of \$35 per share on Monday, September 27, presumably based on the \$32.02 price that Series F investors had paid in May of 2021. The stock opened at \$50.00, and traded 11,529,531 shares during the day, hitting a high of \$54.90 and a low of \$50.00, closing at \$54.80, valuing the company at \$5.6 billion on an undiluted basis with 102.7 million shares, or \$7.1 billion on a fully diluted basis with 131.5 million shares. Information on the first day of trading for other direct listings is available at

<https://site.warrington.ufl.edu/ritter/files/IPOs-Direct-Listings.pdf>

35,398,389 shares had been registered for trading, but many of these shareholders did not sell their shares on the first day of trading. With \$128.8 million in TTM revenue (through the second quarter), the end-of-first-trading-day valuation numbers give AMPL a price-to-sales ratio of \$5.6 billion/\$0.1288 billion = 43.5 on an undiluted basis or \$7.1/0.1288 = 55 on a fully diluted basis.

In the 20 years from 2001-2020, only eight companies have gone public in the U.S. with more than an inflation-adjusted \$100 million in TTM and a price-to-sales (PSR) ratio at the end of the first day of greater than 42 on an undiluted basis:

Year Company	PSR	3-year buy-and-hold return from first closing price
2013 Twitter	46	-59%
2014 Mobileye NV	154	72%
2014 LendingClub	48	-83%
2017 Snap	70	-41%
2019 Zoom Video Communications	48	322%
2020 nCino	54	-22%
2020 Snowflake	174	17%
2020 C3.ai	54	-50%

Returns are through the 3-year anniversary, Sept. 28, 2021, or the delisting date if they were delisted before 3 years.

Analyst coverage

Analysts normally do not cover a stock until 25 calendar days after the listing date. On Friday, October 22, AMPL closed at \$67.41. On Monday, October 25, the first business day more than 25 days after the direct listing, six brokerage firms initiated coverage, with William Blair, UBS, and KeyBanc analysts putting out buy recommendations and B of A Securities (Merrill Lynch), Baird, and Morgan Stanley putting out hold recommendations. Five of the six analysts also

included price targets of between \$70 and \$78 per share. All six brokerage firms had been hired as a financial advisor for the direct listing, along with Citigroup, which did not initiate coverage until December 8, 2021, when it came out with a buy rating and an \$80 price target.

Table A

Direct Listings vs Traditional Bookbuilt IPO

	IPO	Direct Listing
Investment bankers	Conduct due diligence Assist in preparing prospectus Recommend offer price and allocation of shares	Conduct due diligence Assist in preparing prospectus Share sales are up to each holder
Outside law firm	Assist in preparing prospectus	Assist in preparing prospectus
Lockup period	Typically 180 days	Typically none, but only registered shares can be sold
Capital raise	Usually some or all of proceeds	Generally none due to cumbersome regulatory requirements
Determination of opening price	Designated market maker balances supply and demand	Designated market maker balances supply and demand
Price stabilization	Underwriters can buy back over-allotment shares	None

The following tables are taken from Jay Ritter's website at <https://site.warrington.ufl.edu/ritter/ipo-data/>

At the time of the September 28, 2021 direct listing, the 2021 numbers were not fully available.

Table 1: Mean First-day Returns and Money Left on the Table, 1980-2021 (Dec. 30, 2021)

The sample is IPOs with an offer price of at least \$5.00, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, banks and S&Ls, and stocks not listed on CRSP (CRSP includes Amex, NYSE, and NASDAQ stocks). Proceeds exclude overallocation options. The amount of money left on the table is defined as the closing market price on the first-day of trading minus the offer price, multiplied by the shares offered.

Year	Number of IPOs	Mean First-day Return		Aggregate Amount Left on the Table	Aggregate Proceeds
		Equal-weighted	Proceeds-weighted		
1980	71	14.3%	20.0%	\$0.18 billion	\$0.91 billion
1981	192	5.9%	5.7%	\$0.13 billion	\$2.31 billion
1982	77	11.0%	13.3%	\$0.13 billion	\$1.00 billion
1983	451	9.9%	9.4%	\$0.84 billion	\$8.89 billion
1984	171	3.7%	2.5%	\$0.05 billion	\$2.02 billion
1985	186	6.4%	5.6%	\$0.23 billion	\$4.09 billion
1986	393	6.1%	5.1%	\$0.68 billion	\$13.40 billion
1987	285	5.6%	5.7%	\$0.66 billion	\$11.68 billion
1988	105	5.5%	3.4%	\$0.13 billion	\$3.88 billion
1989	116	8.0%	4.7%	\$0.27 billion	\$5.81 billion
1990	110	10.8%	8.1%	\$0.34 billion	\$4.27 billion
1991	286	11.9%	9.7%	\$1.50 billion	\$15.39 billion
1992	412	10.3%	8.0%	\$1.82 billion	\$22.69 billion
1993	510	12.7%	11.2%	\$3.52 billion	\$31.44 billion
1994	402	9.6%	8.3%	\$1.43 billion	\$17.18 billion
1995	462	21.4%	17.5%	\$4.90 billion	\$27.95 billion
1996	677	17.2%	16.1%	\$6.76 billion	\$42.05 billion
1997	474	14.0%	14.4%	\$4.56 billion	\$31.76 billion
1998	281	21.9%	15.6%	\$5.25 billion	\$33.65 billion
1999	476	71.2%	57.4%	\$37.11 billion	\$64.67 billion
2000	380	56.3%	45.8%	\$29.68 billion	\$64.80 billion
2001	80	14.0%	8.4%	\$2.97 billion	\$35.29 billion
2002	66	9.1%	5.1%	\$1.13 billion	\$22.03 billion
2003	63	11.7%	10.4%	\$1.00 billion	\$9.54 billion
2004	173	12.3%	12.4%	\$3.86 billion	\$31.19 billion
2005	159	10.3%	9.3%	\$2.64 billion	\$28.23 billion
2006	157	12.1%	13.0%	\$3.95 billion	\$30.48 billion
2007	159	14.0%	13.9%	\$4.95 billion	\$35.66 billion
2008	21	5.7%	24.7%	\$5.63 billion	\$22.76 billion
2009	41	9.8%	11.1%	\$1.46 billion	\$13.17 billion
2010	91	9.4%	6.2%	\$1.84 billion	\$29.82 billion
2011	81	13.9%	13.0%	\$3.51 billion	\$26.97 billion
2012	93	17.7%	8.9%	\$2.75 billion	\$31.11 billion
2013	158	20.9%	19.0%	\$7.89 billion	\$41.56 billion
2014	206	15.5%	12.8%	\$5.40 billion	\$42.20 billion
2015	118	19.2%	18.9%	\$4.16 billion	\$22.00 billion
2016	75	14.5%	14.2%	\$1.77 billion	\$12.52 billion
2017	106	12.9%	16.0%	\$3.68 billion	\$22.98 billion
2018	134	18.6%	19.1%	\$6.39 billion	\$33.47 billion
2019	112	23.5%	17.7%	\$6.93 billion	\$39.18 billion
2020	165	41.6%	47.9%	\$29.66 billion	\$61.87 billion
2021	309	32.0%	23.7%	\$27.98 billion	\$118.00 billion
1980-1989	2,047	7.2%	6.1%	\$3.30 billion	\$53.98 billion
1990-1998	3,614	14.8%	13.3%	\$30.08 billion	\$226.38 billion
1999-2000	856	64.6%	51.6%	\$66.79 billion	\$129.47 billion
2001-2021	2,567	18.5%	18.2%	\$129.47 billion	\$710.02 billion
1980-2021	9,084	18.9%	20.1%	\$229.72 billion	\$1,119.85 billion

Table 4a (updated December 23, 2021)

Technology Company IPOs, 1980-2021 including Direct Listings

There are 3,297 tech stock IPOs and 9 direct listings, for a total of 3,306 listings, after excluding those with an offer price below \$5.00 per share, unit offers, ADRs, closed-end funds, natural resource limited partnerships (and most other LPs, but not buyout firms such as Carlyle Group), acquisition companies, REITs, bank and S&L IPOs, and firms not listed on CRSP. Missing and questionable numbers from the SDC new issues database are supplemented by direct inspection of prospectuses on EDGAR, information from Dealogic for IPOs after 1991, Howard and Co.'s *Going Public: The IPO Reporter* from 1980-1985, and the Graeme Howard-Todd Huxster collection of IPO prospectuses for 1975-2006. Tech stocks are defined as internet-related stocks plus other technology stocks including telecom, but not including biotech. Loughran and Ritter (2004) list the SIC codes in their appendix 3 and sources of founding dates in appendix 1. The definition of technology stocks has been changed from that in Loughran and Ritter (2004 *Financial Management*), with SIC=3559, 3576, 3844, and 7389 added to tech. Some 7389 (business services) companies have had their SIC codes changed into non-tech categories, such as consulting and two new SIC codes that I have made up: 5614 for telemarketing firms and 7388 for non-tech business services such as Sotheby's Auctions. I have also added the S.E.C.'s computer communications equipment code of 3576 for 21 companies, including Cisco Systems.

For the column with VC-backed IPOs, there are 3,469 IPOs including both technology and non-technology companies.

For buyout-backed IPOs, the founding date of the predecessor company is used. Price-to-sales ratios are computed using both the offer price (OP) and the first closing market price (MP) for computing the market capitalization of equity. Market cap is calculated using the post-issue shares outstanding, with all share classes included in the case of dual-class companies. The undiluted number of shares is used, which is some cases (e.g., Facebook, Twitter, and Castlight Health) understates the market cap due to the existence of substantial amounts of in-the-money employee stock options that are highly likely to be exercised. Sales are the last twelve months (LTM) revenues as reported in the prospectus. The median sales, in millions, is expressed in both nominal dollars and in dollars of 2014 purchasing power using the CPI. The median age, in years, is the number of years since the calendar year of the founding date and the calendar year of the IPO. The percentage of IPOs that are profitable measures profitability using trailing LTM earnings (usually using after extraordinary items earnings, and usually using pro forma numbers that are computed assuming that any recent or concurrent mergers have already occurred, and the conversion of convertible preferred stock into common stock). In some cases, last fiscal year earnings are used when LTM earnings are unavailable.

Even concepts like market cap (for the price-to-sales ratios) become ambiguous when you realize that companies like Facebook have many deep in-the-money options outstanding, so whether you use the fully diluted number of shares or the undiluted number can affect the calculations substantially for some companies.

(table on the next page)

Year	Number of Tech IPOs	Proceeds in \$millions		Median Price-to-sales		Median sales, \$mm		Median age	% profitable
		VC-backed	Technology	OP	MP	Nominal	\$2014		
1980	22	388	378	3.4	3.8	16.2	48.8	6.5	91%
1981	72	648	838	3.5	3.6	12.9	34.8	9	88%
1982	42	490	648	4.2	4.5	10.5	26.2	5	83%
1983	173	2,798	3,271	5.9	6.6	8.6	20.6	6	71%
1984	50	614	551	2.4	2.5	9.8	22.4	6.5	80%
1985	37	667	375	2.3	2.4	13.4	29.7	7	84%
1986	77	1,558	1,217	3.4	3.6	13.0	27.8	6	74%
1987	59	1,315	1,330	3.2	3.2	17.8	37.4	5	86%
1988	28	674	888	3.0	3.4	24.0	48.5	5.5	79%
1989	35	869	748	3.4	4.0	31.5	60.9	6	77%
1990	32	1,085	764	3.6	4.0	28.6	52.5	8.5	94%
1991	71	3,887	2,760	3.2	3.6	34.6	60.0	9	75%
1992	115	4,970	5,875	3.5	3.7	22.4	38.0	8	65%
1993	127	5,929	5,715	3.0	3.6	27.0	44.3	8	74%
1994	115	3,691	3,583	3.7	4.2	21.0	33.7	8	70%
1995	205	7,165	9,786	4.6	5.8	21.4	33.3	8	71%
1996	276	11,681	16,256	6.8	8.2	16.7	25.2	7	47%
1997	174	5,016	7,479	5.2	5.7	21.2	31.1	8	50%
1998	113	4,037	8,118	8.8	11.9	22.1	32.0	7	36%
1999	370	22,298	33,512	26.5	43.0	12.1	17.2	4	14%
2000	260	23,598	42,442	31.7	49.5	12.0	16.6	5	14%
2001	23	2,658	5,773	8.1	13.4	24.6	32.9	9	30%
2002	20	1,956	2,587	2.9	3.1	95.2	125.8	9	40%
2003	18	1,824	2,242	4.1	4.6	86.2	111.0	7	39%
2004	61	7,183	9,064	6.4	7.1	55.5	70.1	8	44%
2005	45	3,458	6,993	4.5	4.5	68.0	83.5	9	36%
2006	48	4,860	4,873	5.5	6.3	57.6	67.9	9	50%
2007	76	10,566	12,572	6.5	7.8	71.2	79.8	8	30%
2008	6	863	1,194	4.9	5.7	156.7	173.6	14	67%
2009	14	1,697	4,126	3.0	3.6	174.3	193.1	11	71%
2010	33	4,038	4,347	3.4	3.9	119.5	129.0	11	64%
2011	36	8,764	9,412	6.1	6.6	141.3	150.1	10	36%
2012	40	21,096	20,887	4.5	5.0	113.4	117.1	9.5	43%
2013	45	11,935	8,662	5.3	6.1	105.8	107.5	9	27%
2014	53	18,542	9,965	6.1	6.8	90.5	90.5	11	17%
2015	38	9,890	10,087	5.3	6.2	130.8	130.9	11	26%
2016	21	6,181	2,510	4.2	4.3	109.5	108.2	10	29%
2017	30	11,269	7,844	5.0	6.3	188.4	181.5	13	17%
2018	40	16,706	12,246	7.6	11.3	182.1	171.8	12	15%
2019	38	27,534	22,881	8.1	10.6	205.8	191.3	11	30%
2020	46	41,423	32,616	13.6	21.8	211.2	191.7	12	18%
2021	122	74,224	58,383	15.2	17.8	207.7	185.8	12	22%
1980-2021	3,306	390,046	395,798	6.1	7.4	24.3	39.2	8	47%

Table 4h (updated December 23, 2021)**Technology Company IPO Underpricing, 1980-2021**

Underpricing is measured as the equally weighted average of the first-day return from the offer price to close. The screens described in Table 1 apply, including the exclusion of ADRs.

Year	Number of IPOs			EW mean 1 st -day Return,%		
	Total	Tech	NonTech	Total	Tech	NonTech
1980	71	22	49	14.3%	21.7%	10.9%
1981	192	72	120	5.9%	7.0%	5.2%
1982	77	42	35	11.0%	13.6%	7.9%
1983	451	173	278	9.9%	13.9%	7.5%
1984	171	50	121	3.7%	5.5%	2.9%
1985	186	37	149	6.4%	6.1%	6.5%
1986	393	77	316	6.1%	7.2%	5.9%
1987	285	59	226	5.6%	7.3%	5.2%
1988	105	28	77	5.5%	5.5%	5.5%
1989	116	35	81	8.0%	11.9%	6.3%
1990	110	32	78	10.8%	14.9%	9.1%
1991	286	71	215	11.9%	17.3%	10.1%
1992	412	115	297	10.3%	14.4%	8.7%
1993	510	127	383	12.7%	17.8%	11.1%
1994	402	115	287	9.6%	14.1%	7.8%
1995	462	205	257	21.4%	30.8%	14.0%
1996	677	276	401	17.2%	20.2%	15.2%
1997	474	174	300	14.0%	16.9%	12.4%
1998	281	113	168	21.9%	39.1%	10.3%
1999	476	370	106	71.2%	86.7%	17.2%
2000	380	260	120	56.3%	68.8%	29.4%
2001	80	23	57	14.0%	23.5%	10.2%
2002	66	20	46	9.1%	8.6%	9.3%
2003	63	18	45	11.7%	17.4%	9.5%
2004	173	61	112	12.3%	16.6%	10.0%
2005	159	45	114	10.3%	10.8%	10.1%
2006	157	48	109	12.1%	15.3%	10.8%
2007	159	76	83	14.0%	18.8%	9.6%
2008	21	6	15	5.7%	2.6%	7.0%
2009	41	14	27	9.8%	16.9%	6.2%
2010	91	33	58	9.4%	15.5%	5.9%
2011	81	36	45	13.9%	20.2%	9.0%
2012	93	40	53	17.7%	23.4%	13.3%
2013	158	45	113	20.9%	26.7%	18.5%
2014	206	53	153	15.5%	25.0%	12.2%
2015	118	38	80	19.2%	18.8%	19.4%
2016	75	21	54	14.5%	32.4%	7.5%
2017	106	30	76	12.9%	21.1%	9.6%
2018	134	39	95	18.6%	32.3%	13.0%
2019	112	37	75	23.5%	28.6%	21.0%
2020	165	44	121	41.6%	62.6%	33.9%
2021	309	117	192	32.0%	33.0%	31.4%
1980-2021	9,084	3,297	5,687	18.9%	31.3%	11.8%

Table 16**Long-run Returns on IPOs Categorized by the Pre-issue Sales of the Firm, 1980-2019**

All Last Twelve Months (LTM) sales figures for the firms going public have been converted into dollars of January 2019 purchasing power using the Consumer Price Index. 8,610 IPOs from 1980-2019 are used, with returns calculated through the end of December 2020. IPOs with an offer price below \$5.00 per share, unit offers, ADRs, REITs, closed end funds, natural resource partnerships, banks and S&Ls, small best efforts offers, and IPOs not listed on CRSP within six months of the offer date are excluded. mm is millions of dollars. Buy-and-hold returns are calculated until the earlier of the three-year anniversary or the delisting date (no later than Dec. 31 of 2020 for IPOs from 2018 and 2019). Market-adjusted returns use the CRSP value-weighted index. Style adjustments use firms matched by market cap and book-to-market ratio with at least five years of CRSP listing and no follow-on equity issues in the prior five years. For post-issue book value of equity numbers, I use the post-issue common equity numbers from SDC with corrections by checking the prospectus, and for the remaining missing numbers I use the equity book values reported for the nearest quarter after the IPO on COMPUSTAT, and further missing numbers are calculated using the reported pre-IPO equity book values plus the amount of the proceeds (assuming that overallotment option shares and costs of issuing offset each other) times the fraction of the primary shares. For dual-class shares, the post-issue book-to-market ratio is calculated using the larger of the post-issue number of shares reported from SDC (with corrections to account for all share classes) and the total shares outstanding reported from CRSP at end of the IPO date. Market capitalization (size) is calculated using the first closing market price after the IPO and the post-issue number of shares outstanding. All returns include dividends and capital gains, including the index returns.

Sales (in 2019\$)	Number of IPOs	Average First-day Return	Average 3-year Buy-and-hold Return		
			IPOs	Market-adjusted	Style-adjusted
0-9.999 mm	1,681	21.4%	-6.3%	-42.5%	-27.0%
10-19.999 mm	699	28.1%	3.8%	-34.8%	-13.7%
20-49.999 mm	1,485	22.9%	24.2%	-18.9%	-2.1%
50-99.999 mm	1,399	18.0%	27.7%	-15.1%	-5.9%
100-499.999 mm	2,208	13.2%	45.6%	3.1%	9.0%
500 mm and up	1,138	9.4%	37.5%	1.7%	1.4%
0-99.999 mm	5,264	21.8%	12.7%	-27.5%	-12.6%
100 mm and up	3,346	11.9%	42.8%	2.7%	6.4%
1980-2019	8,610	17.9%	24.4%	-15.8%	-5.2%