

PitchBook Data, Inc.

John Gabbert Founder, CEO

Nizar Tarhuni VP, Editorial and Institutional Research

Daniel Cook, CFA Head of Quantitative Research

Paul Condra Head of Emerging Technology Research

Institutional Research Group

Analysis



Andy White
Lead Quantitative Research Analyst
andy.white@pitchbook.com



James Ulan
Lead Analyst, Emerging Technology
james.ulan@pitchbook.com

pbinstitutionalresearch@pitchbook.com

Publishing

Designed by **Joey Schaffer**

Published on February 6, 2023

Contents

Introduction and key takeaways	1
Background	2
Deal flow	3
Deal sizes	8
Valuations	10
Valuation step-ups	13
Exits	15

QUANTITATIVE RESEARCH

Introducing PitchBook Patent Research

Takeaways on patents' impact on startup success

PitchBook is a Morningstar company providing the most comprehensive, most accurate, and hard-to-find data for professionals doing business in the private markets.

Introduction and key takeaways

While business growth and revenue represent the clearest signs of business momentum, intellectual property (IP) can also prove to be tremendously valuable, especially if it is well defended with patents. PitchBook's new patent data provides an opportunity to examine what impact, if any, patents have on startups seeking VC. Our initial analysis incorporated a high-level approach, focusing on several core VC indicators such as deal flow, deal sizes, valuations, and exits. In general, we found strong correlations between the presence of patents and the ability to raise rounds at higher valuations and achieve larger exit values on average. While the nuances of the patent cycle and patent records can make analysis tricky, our intent was to create an initial framework through which the value of patents in the startup ecosystem could be more clearly assessed.

This analysis does not make a distinction between firms with granted patents and those with pending patent applications. For our analysis, companies that have granted patents or pending patent applications at the time of a venture funding round or exit are included in the group and referred to as "patent companies," "patent startups," or the "patent set."

Our initial findings include the following:

Deal flow

- Startups seeking patents raise more capital than their non-patent-seeking peers. About 58% of VC went to startups with patents or with patent applications from 2011 to 2020. This capital is concentrated in the late stage and the venture-growth stage, where 63.2% and 80.4% of capital went to patent companies, respectively. This is greater than the angel and seed stage and the early stage, where 25.0% and 42.6% of capital went to patent companies, respectively.
- 18.5% of startups raising angel and seed rounds were active patent seekers at the time of their raise compared with 29.9% of early-stage startups, 49.7% of late-stage startups, and 70.6% of venture-growth companies.

Deal sizes

- Between 2011 and 2020, deal sizes for patent startups were 40% to 60% larger than those for nonpatent startups in a given year.
- By stage, deal sizes for patent startups are on average 45.4% larger for angel, 51.5% larger for seed, 73.2% larger for early stage, 71.2% larger for late stage, and 46.0% larger for venture growth.

Valuations

- Across stages, patent companies raise capital at notably higher valuations than nonpatent companies. Angel deals show the largest difference (the annual median is 93.2% larger on average), and late-stage deals clock the second-highest figure (the annual median is 51.2% larger on average).
- Venture-growth deals see a slight deterioration in excess valuation by patent companies. This may be due to companies of this maturity having relatively more information with which to make valuation decisions.

Valuation step-ups

- Valuation step-ups from round to round are highest for companies that begin patenting activities between financings.
- Companies with sustained patenting activity register the smallest valuation jumps.

Exits

- From 2011 and 2022, patent-seeking companies accounted for 78.6% of VC exit value but only 24.1% of VC exit count.
- Patent-seeking companies exit via the public markets at a rate more than five times higher than non-patent-seeking companies (23.2% versus 4.0%).
- For acquisition exits, the median exit value for patent companies is 154.9% higher than it is for nonpatent companies per year on average. It is 48.2% higher for public listings.

Background

Venture investing involves high-risk investment decisions, and returns are typically governed by power law distributions where most startups fail and a small number of investments make up most of a fund's returns. One contributor to the difficulty of assessing risk is the relative lack of available information pertaining to early-stage startups, as these nascent businesses sometimes lack a history of performance. To mitigate this risk, investors often look to alternative indicators of value, such as traction, the founder's track record, board members, or other firms invested in

the startup. Yet another indicator of value could be found in protected IP, such as patents, that enable organizations to pursue a technology without the fear that it could be stolen or mimicked by a competitor.

PitchBook's patent data set consists of more than 46 million patent application and grant documents from the following jurisdictions: the United States, the European Patent Office, Japan, China, Germany, Canada, Australia, the United Kingdom, France, and Spain. For the purposes of our analysis, we have included only companies that are headquartered in the US, but patents may have been filed in any of the above jurisdictions.

Analysis of patents with respect to venture funding rounds can pose some logistical difficulties. The process of applying for and ultimately obtaining (or being refused) patent protection is a lengthy one. In the US, the timeline from patent application to patent grant tends to be around two years but can vary significantly depending on the circumstances. Additionally, most patent applications are not made public until 18 months after filing, so data from the most recent years is less reliable.

This analysis does not make a distinction between firms with granted patents and those with pending patent applications. While a company may not have been granted patent protection for their technology, it can credibly claim pending patents, which can discourage competition just as a granted patent can. It can also serve as a strong signal to potential investors performing due diligence ahead of a funding round. Hence, for our analysis, companies that have granted patents or pending patent applications at the time of a venture funding round or exit are included in the group and referred to as "patent companies," "patent startups," or the "patent set."

It is important to note that this analysis is not intended to imply causality. Though it seems logical that the presence of patenting activity, or lack thereof, may affect a company's prospects while seeking investment capital, without deeper examination of other coincident factors, it is impossible to claim a causal relationship. In future research we will consider diving deeper into the question of causality where possible, as well as making comparisons across industries, examining the distinction between granted and pending patents, exploring the effect of patent seeking on failure rates, and more.

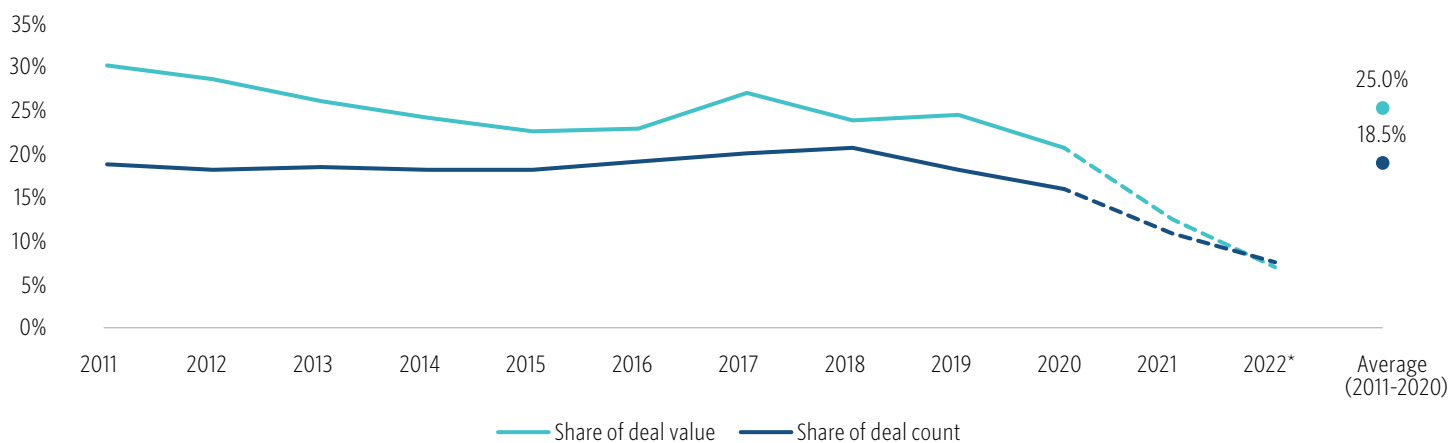
Deal flow

Section takeaways

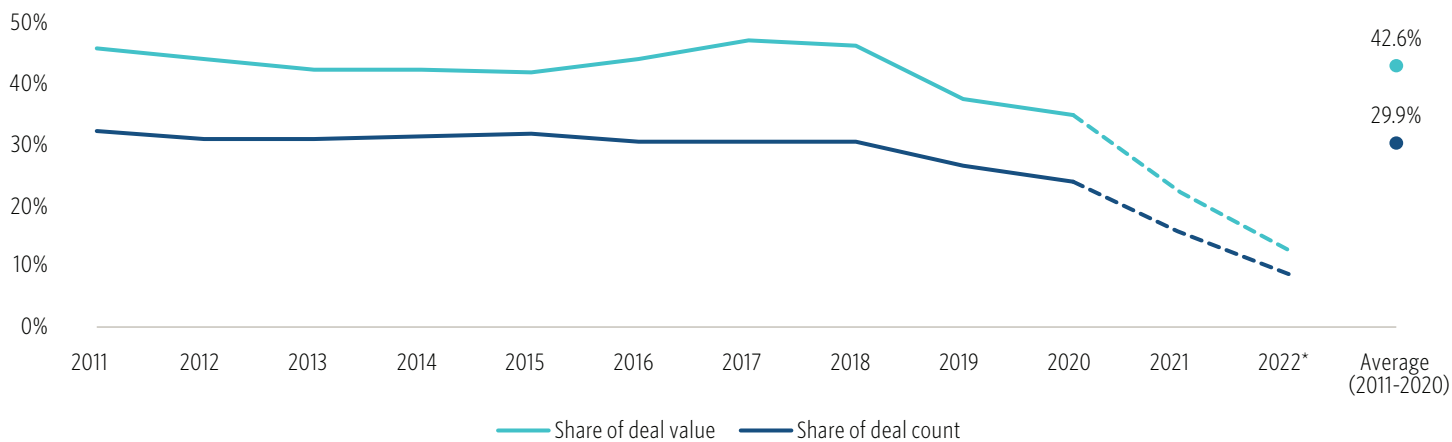
- Startups seeking patents raise more capital than their non-patent-seeking peers. About 58% of VC went to startups with patents or with patent applications. This capital is concentrated in the late stage and venture-growth stage, where 63.2% and 80.4% of capital went to patent companies, respectively. This is greater than the angel and seed stage and the early stage, where 25.0% and 42.6% of capital went to patent companies, respectively.
- 18.5% of startups raising angel and seed rounds were active patent seekers at the time of their raise compared with 29.9% of early-stage startups, 49.7% of late-stage startups, and 70.6% of venture-growth companies.

Disclaimer: In the following charts and tables, trends for recent years may be misleading due to many patent applications not being publicly disclosed until 18 months after filing. The average includes data from 2011 to 2020 and excludes data from 2021 and 2022 due to publication lags.

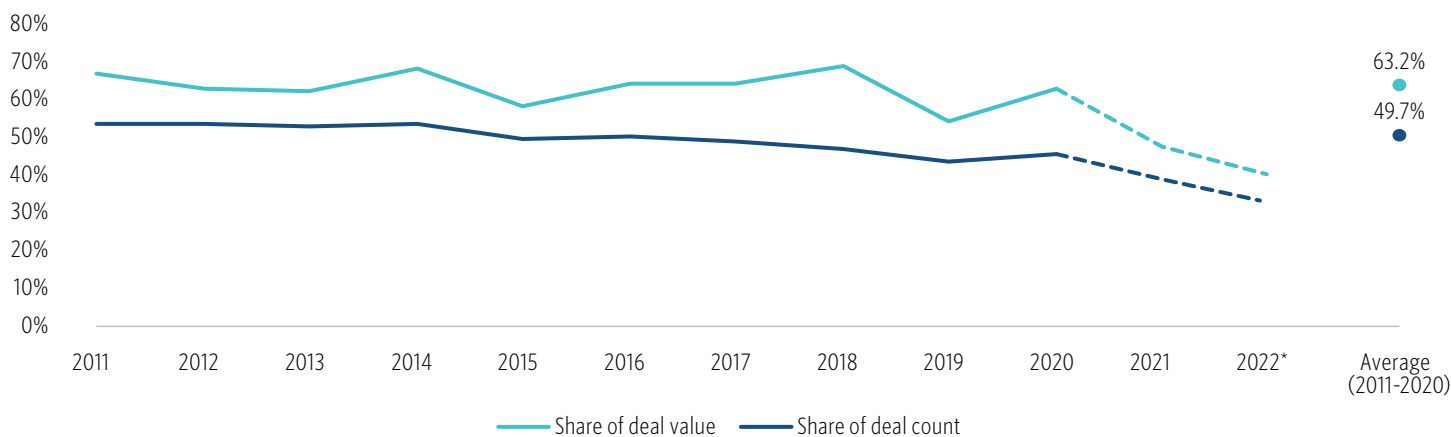
Patent-seeking firm angel and seed VC deal value and count as a share of all angel and seed VC deal value and count



Patent-seeking firm early-stage VC deal value and count as a share of all early-stage VC deal value and count

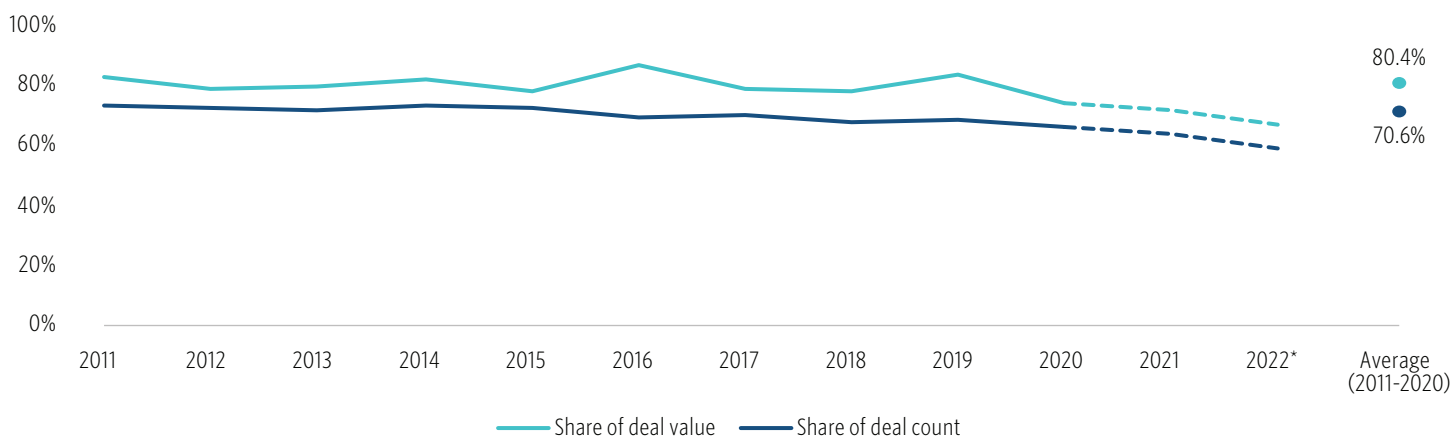


Patent-seeking firm late-stage VC deal value and count as a share of all late-stage VC deal value and count



Source: PitchBook | Geography: US
*As of December 31, 2022

Patent-seeking firm venture-growth VC deal value and count as a share of all venture-growth VC deal value and count



Source: PitchBook | Geography: US
*As of December 31, 2022

Share of VC deal value by stage for companies with patent applications/grants

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*	Average (2011-2020)
Angel and seed	30.2%	28.5%	25.9%	24.0%	22.6%	22.9%	26.8%	23.7%	24.4%	20.5%	12.3%	6.6%	25.0%
Early stage	45.9%	44.1%	42.3%	42.4%	41.8%	44.1%	47.0%	46.2%	37.7%	34.8%	22.2%	12.7%	42.6%
Late stage	66.6%	62.9%	62.3%	68.0%	58.4%	64.1%	63.8%	68.6%	54.1%	62.8%	47.5%	40.3%	63.2%
Venture growth	83.2%	79.2%	79.9%	82.0%	78.4%	87.1%	79.1%	77.8%	83.4%	74.2%	72.1%	66.8%	80.4%

Source: PitchBook | Geography: US
*As of December 31, 2022

Share of VC deal count by stage for companies with patent applications/grants

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022*	Average (2011-2020)
Angel and seed	18.7%	18.1%	18.5%	18.2%	18.0%	19.2%	20.1%	20.7%	18.2%	15.7%	10.8%	7.4%	18.5%
Early stage	32.3%	31.0%	31.1%	31.4%	31.6%	30.3%	30.3%	30.7%	26.4%	24.1%	15.4%	8.7%	29.9%
Late stage	53.5%	53.2%	52.6%	53.2%	49.7%	50.2%	49.0%	46.9%	43.6%	45.6%	39.0%	33.1%	49.7%
Venture growth	73.5%	72.3%	72.1%	73.3%	72.3%	69.4%	70.0%	68.0%	68.3%	66.3%	63.6%	58.9%	70.6%

Source: PitchBook | Geography: US

*As of December 31, 2022

The data shows that patent startups, on average, raise disproportionately more capital than their nonpatent peers. From 2011 to 2020, patent startups represented 30.7% of startup deal count on average but 58.1% of annual deal value. Outsize capital raises at patent companies increase as startups transition from angel and seed stages to the late stage and venture growth. From 2011 to 2020, on average 80.4% of capital raised annually by venture-growth companies went to patent startups. The comparable figure for late-stage startups was 63.2%; for early-stage startups, 42.6%; and for angel and seed startups, 25%.

Regarding the degree to which startups are pursuing patents, we see that, as expected, companies tend to increase their patent-seeking activity as they move along the VC funding cycle. This is likely due to companies increasing research & development (R&D) as they mature, creating new patentable IP. R&D and the pursuit of patent protection are costly endeavors, and venture funding should reasonably bolster these activities.

A select group of patent-focused startups amass 10 or more patents and/or applications at the time of their capital raise. Over the last decade, approximately 50 angel- and seed-stage startups per year had 10 or more patents or patent applications at the time that they raised capital. This compares to 100 to 120 early-stage startups per year, 220 to 270 late-stage startups per year, and 150 to 200 venture-growth companies per year.

Percent of startups with 10 or more patents or patent applications by stage

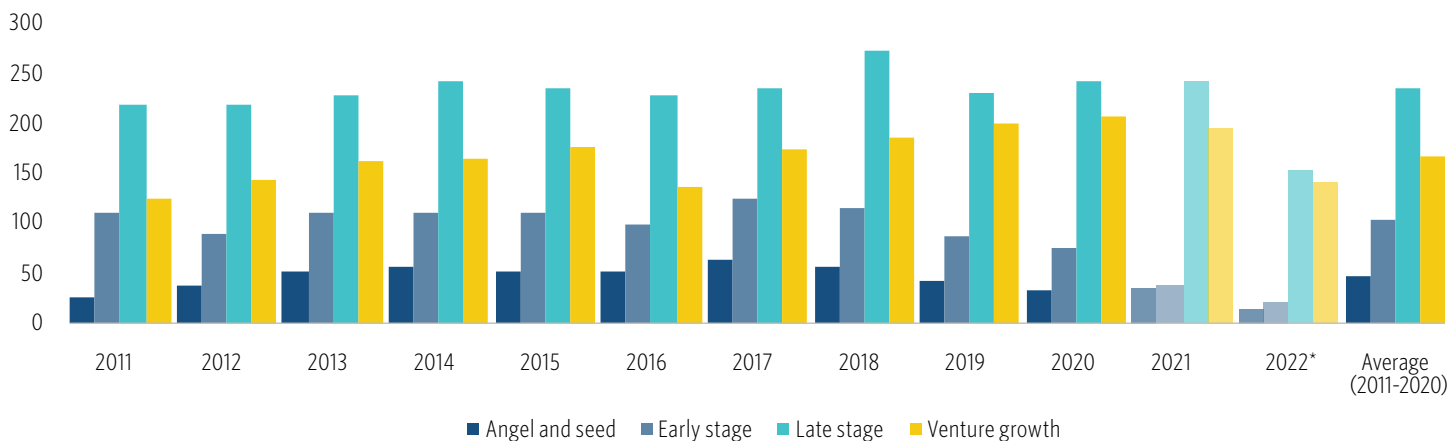
Stage	Percent of startups
Angel and seed	1%
Early stage	3% to 4%
Late stage	10% to 14%
Venture growth	30% to 34%

Source: PitchBook | Geography: US

*As of December 31, 2022

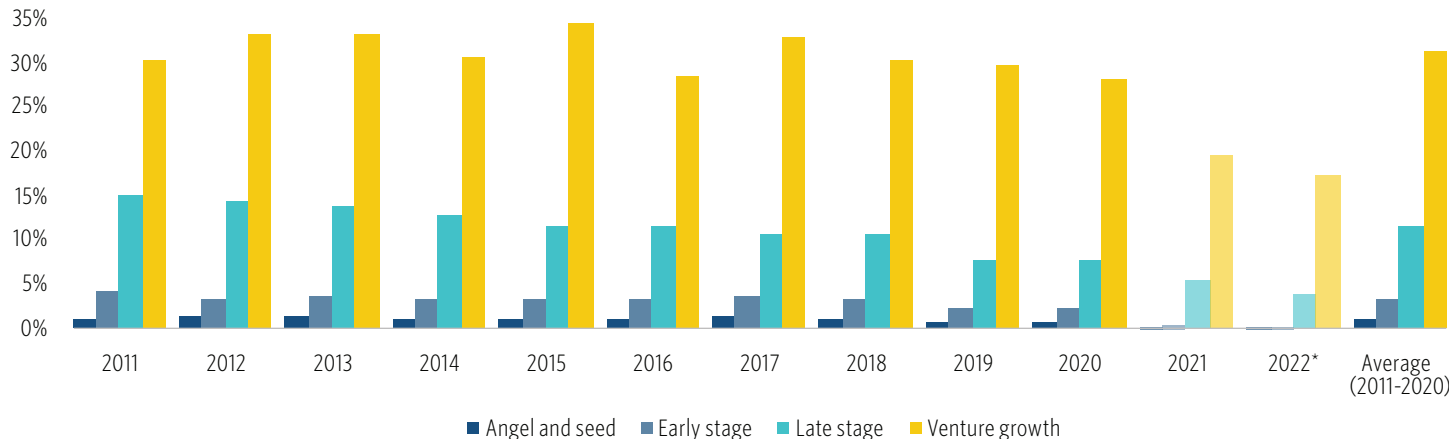
About 1% of startups raising angel and seed rounds have 10 or more patent applications and grants at the time of their capital raise. This number rises to 3% to 4% for early-stage startups, 10% to 14% for late-stage startups, and 30% to 34% for venture-growth firms.

VC deal count by stage for companies with 10+ patents



Source: PitchBook | Geography: US
*As of December 31, 2022

Share of VC deal count by stage for companies with 10+ patents



Source: PitchBook | Geography: US
*As of December 31, 2022

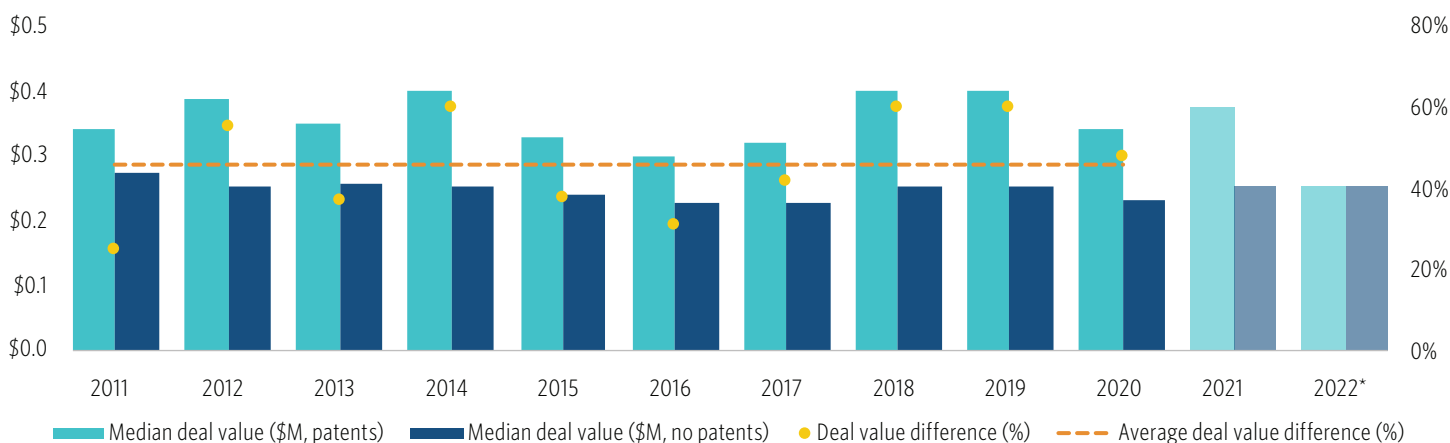
Deal sizes

Section takeaways

- Between 2011 and 2020, deal sizes for patent startups were 40% to 60% larger than those for nonpatent startups in a given year.
- By stage, those deal sizes for patent startups are on average 45.4% larger for angel, 51.5% larger for seed, 73.2% larger for early stage, 71.2% larger for late stage, and 46.0% larger for venture growth.

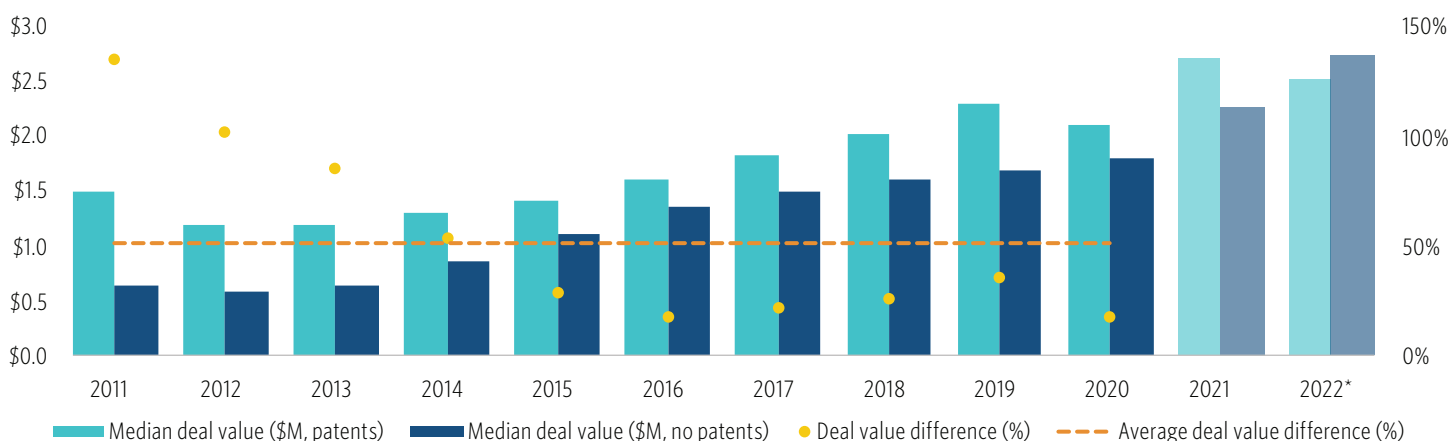
The data is clear on the presence of patents and the amount of capital raised. Patent startups raise more money than their nonpatent peers at all funding stages: seed, angel, early, late, and venture growth.

Median angel VC deal value (\$M) for patent startups and nonpatent startups



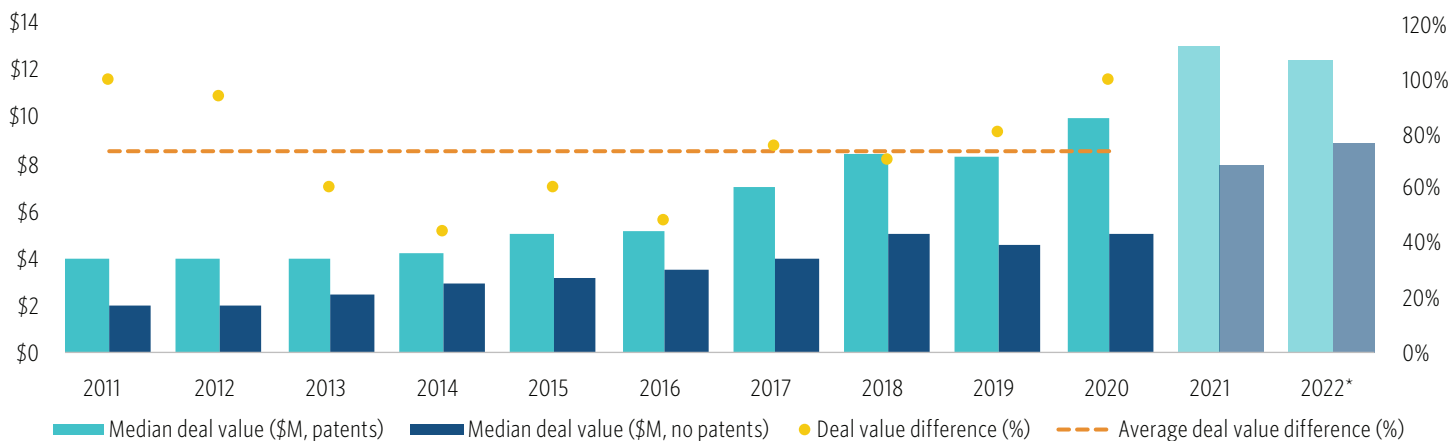
Source: PitchBook | Geography: US
*As of December 31, 2022

Median seed VC deal value (\$M) for patent startups and nonpatent startups



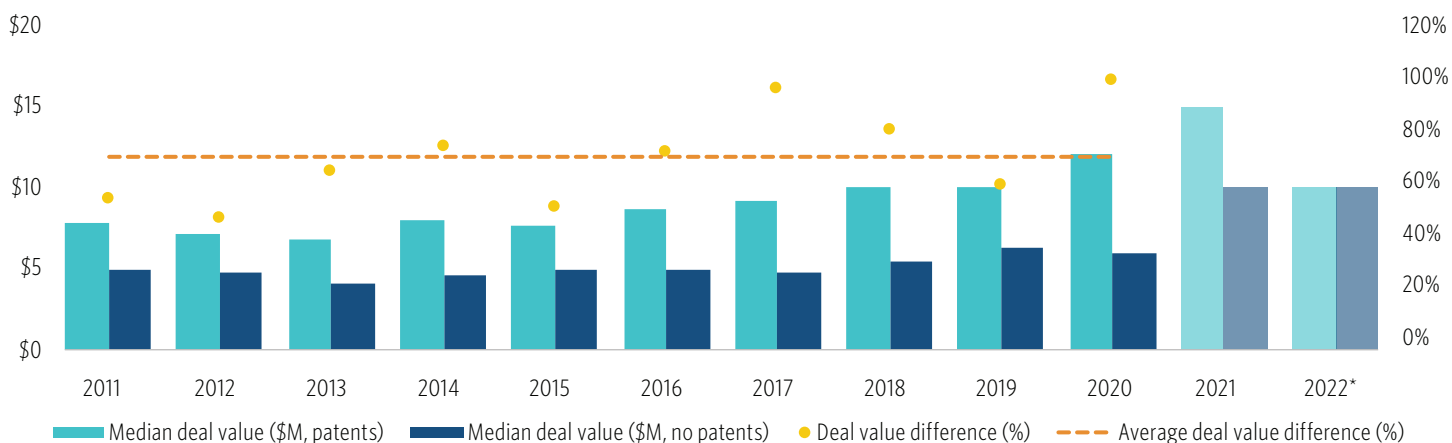
Source: PitchBook | Geography: US
*As of December 31, 2022

Median early-stage VC deal value (\$M) for patent startups and nonpatent startups



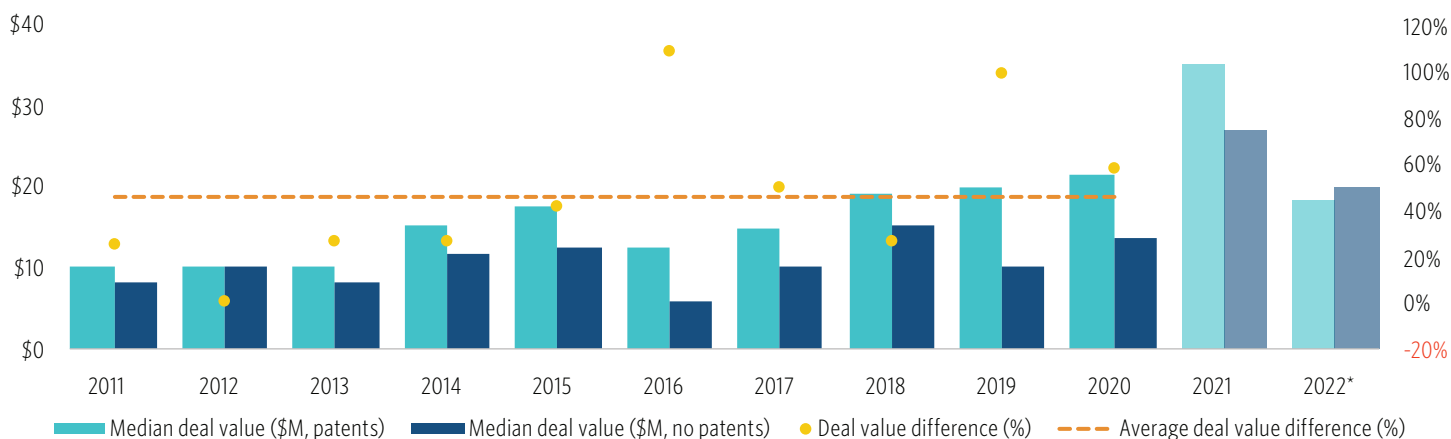
Source: PitchBook | Geography: US
*As of December 31, 2022

Median late-stage VC deal value (\$M) for patent startups and nonpatent startups



Source: PitchBook | Geography: US
*As of December 31, 2022

Median venture-growth VC deal value (\$M) for patent startups and nonpatent startups



Source: PitchBook | Geography: US
*As of December 31, 2022

From 2011 to 2020, the average annual median deal size for patent startups in the angel stage was \$357,000. This is 45.4% larger than the figure for their nonpatent peers, which was \$245,000. Similarly, the average annual median deal size for patent startups in the seed stage was \$1.6 million, 39.2% larger than the figure for nonpatent startups, which was \$1.2 million.

The difference in deal sizes between early-stage patent startups and nonpatent startups is larger than the difference between angel and seed rounds. From 2011 to 2020, the average annual median deal size for patent startups in the early stage was \$6.0 million, 73.4% larger than the figure for nonpatent startups, which was \$3.5 million.

The late-stage deal sizes for patent companies outpace the deal sizes of their nonpatent peers by 71.7%. This is slightly larger than the 73.4% difference in the early stage.

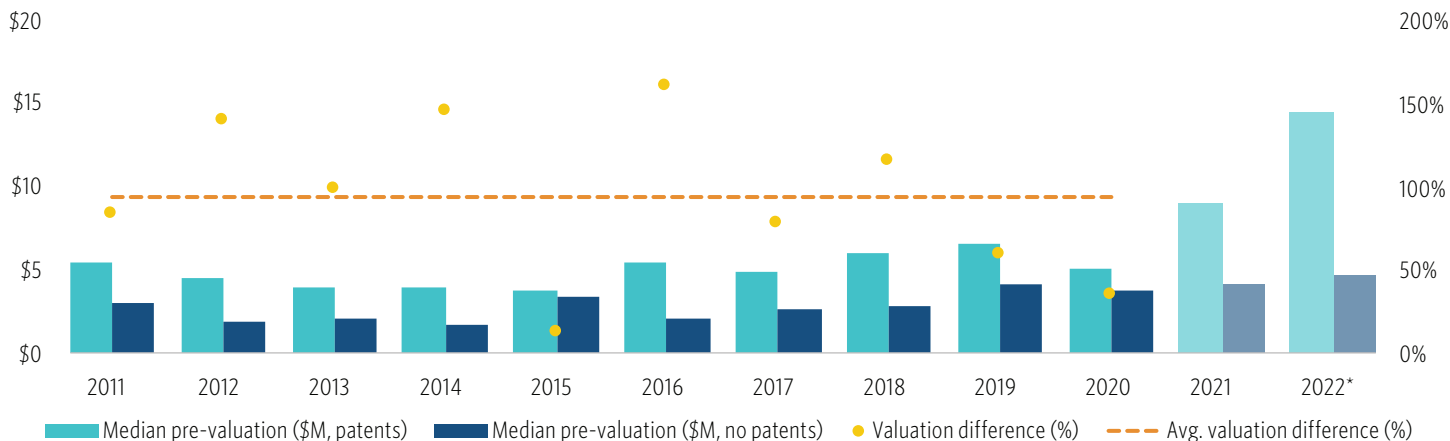
The differential declines at the venture-growth stage, where deal sizes for patent companies were 43% higher than those of deal sizes for nonpatent companies.

Valuations

Section takeaways

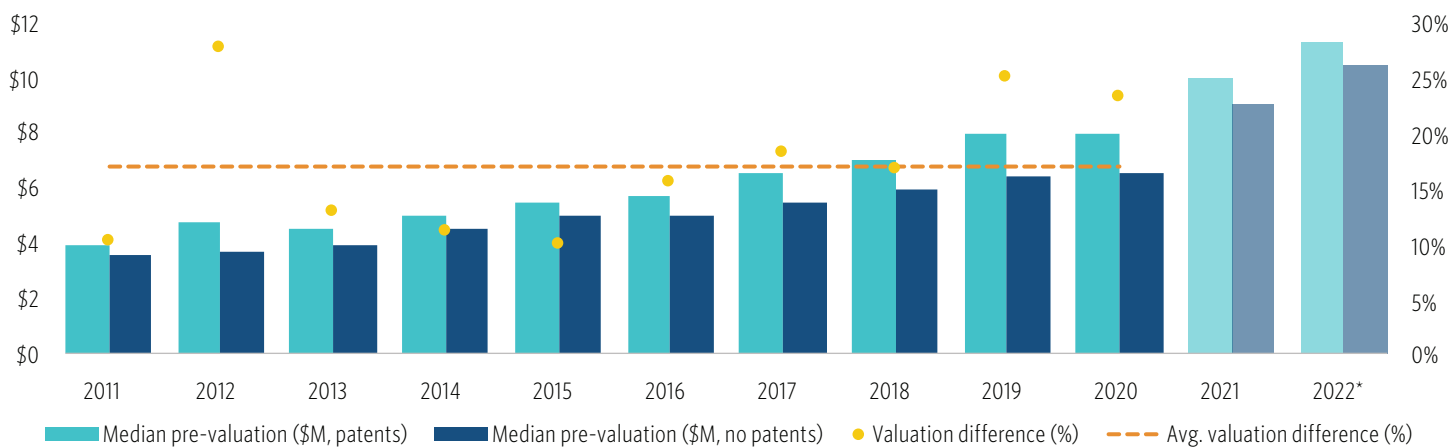
- Across stages, patent companies raise capital at notably higher valuations than nonpatent companies. Angel deals show the largest difference (the annual median deal is 93.2% larger on average), and late-stage deals clock the second-highest figure (the annual median deal is 51.2% larger on average).
- Venture-growth deals see a slight deterioration in excess valuation by patent companies. This may be due to companies of this maturity having relatively more information with which to make valuation decisions.

Median angel VC pre-money valuation (\$M) for patent startups and nonpatent startups



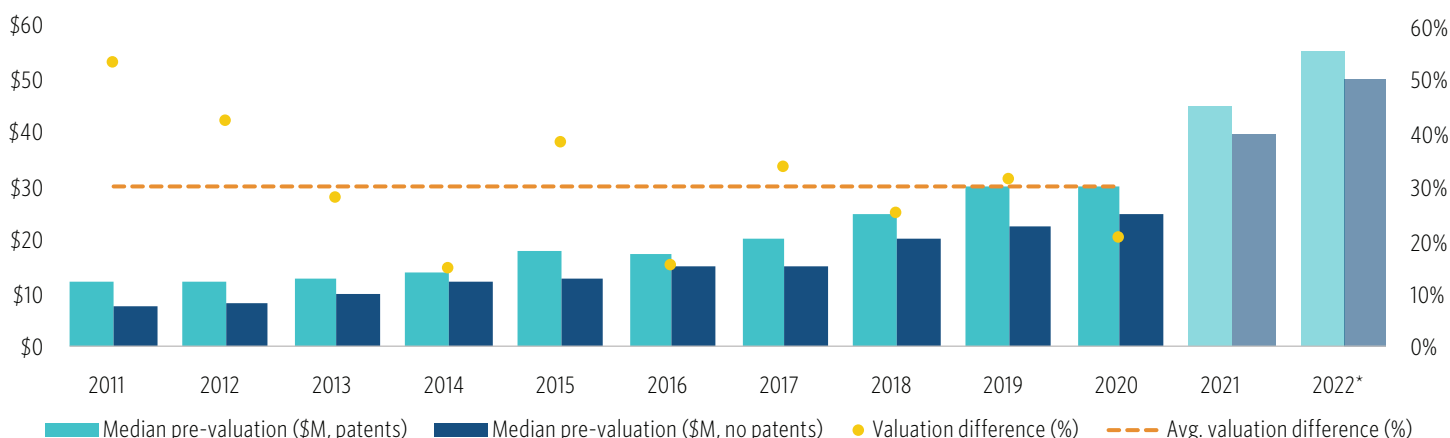
Source: PitchBook | Geography: US
*As of December 31, 2022

Median seed VC pre-money valuation (\$M) for patent startups and nonpatent startups



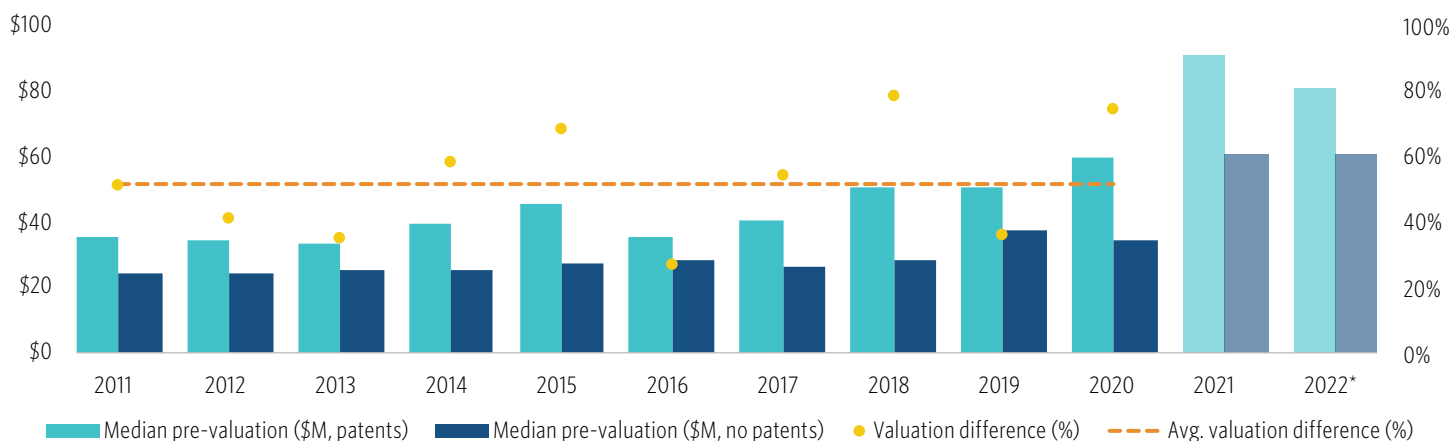
Source: PitchBook | Geography: US
*As of December 31, 2022

Median early-stage VC pre-money valuation (\$M) for patent startups and nonpatent startups



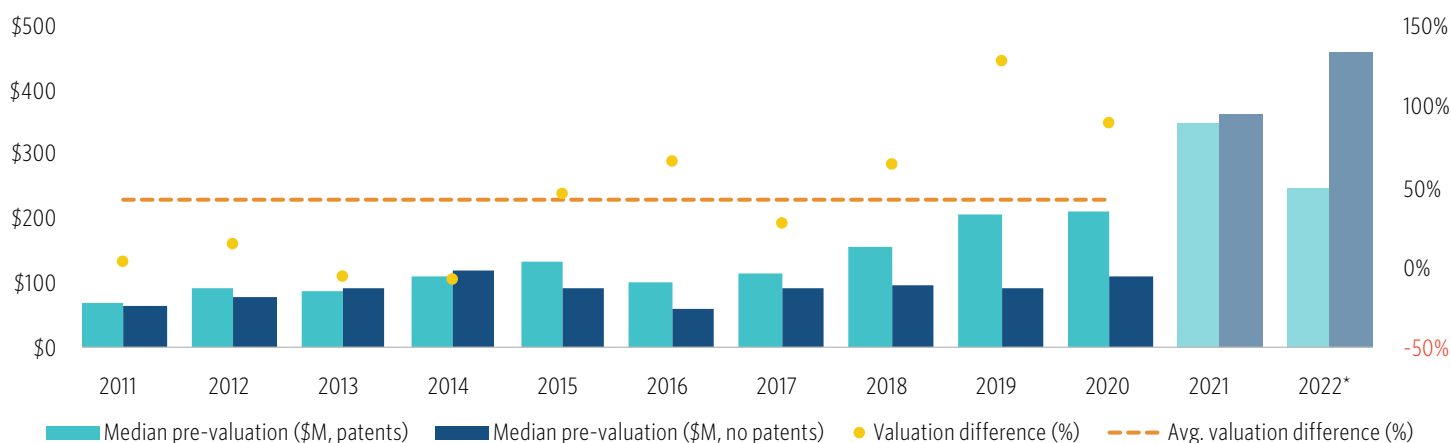
Source: PitchBook | Geography: US
*As of December 31, 2022

Median late-stage VC pre-money valuation (\$M) for patent startups and nonpatent startups



Source: PitchBook | Geography: US
*As of December 31, 2022

Median venture-growth VC pre-money valuation (\$M) for patent startups and nonpatent startups



Source: PitchBook | Geography: US
*As of December 31, 2022

The deal data in the previous section demonstrates that there is a clear discrepancy between the patent set and the nonpatent set, with investors writing larger checks for patent-seeking firms. Check size alone does not mean that investors value patent startups more highly, as a larger check size may just mean a larger portion of ownership for the investor. Thus, it is important to examine valuation trends as well.

From the seed stage through the late stage, median valuations for companies seeking patents were consistently higher than those for non-patent-seeking companies between 2011 and 2020. The average difference in annual median valuations moves up from 17.0% at the seed stage, to 30.0% at the early stage, and to 51.2% at the late stage. This march upward may suggest that as companies become more established in their field, investors place higher value on IP protections to remain competitive and defend moats. However, the presence of patents and patent applications might easily signal intelligent, organized management, which should also translate into higher valuations. Higher deal sizes and valuations could also signal larger corporate counsel budgets and/or larger venture capitalists who might push a founder to seek patent protection.

Interestingly, we see the largest discrepancy in valuations at the angel stage. From 2011 to 2020, the difference between the annual median pre-money valuation for patent companies and that of nonpatent companies was a whopping 93.2%. This makes sense, as companies at this stage are more likely to be pre-revenue and/or pre-product, thus patenting activity would serve as a strong signal for investors.

Valuations at the venture-growth stage are more of a mixed bag. While most years show higher median valuations for the patent set, that is not always the case. Notably, 2021 and 2022 flip in favor of the nonpatent companies, though these figures rely on incomplete data due to publication lags. Also, the average difference in median valuations declines from 51.2% for late-stage startups to 42.4% for venture-growth startups; the latter figure is bolstered by large values in 2019 and 2020 of 127.8% and 88.9%, respectively. As we have noted before, causation is difficult to establish in this analysis, but it seems reasonable that companies at the venture-growth stage have reached a level of traction and scale and are generating financial metrics at which IP protections may be a less important signal to investors.

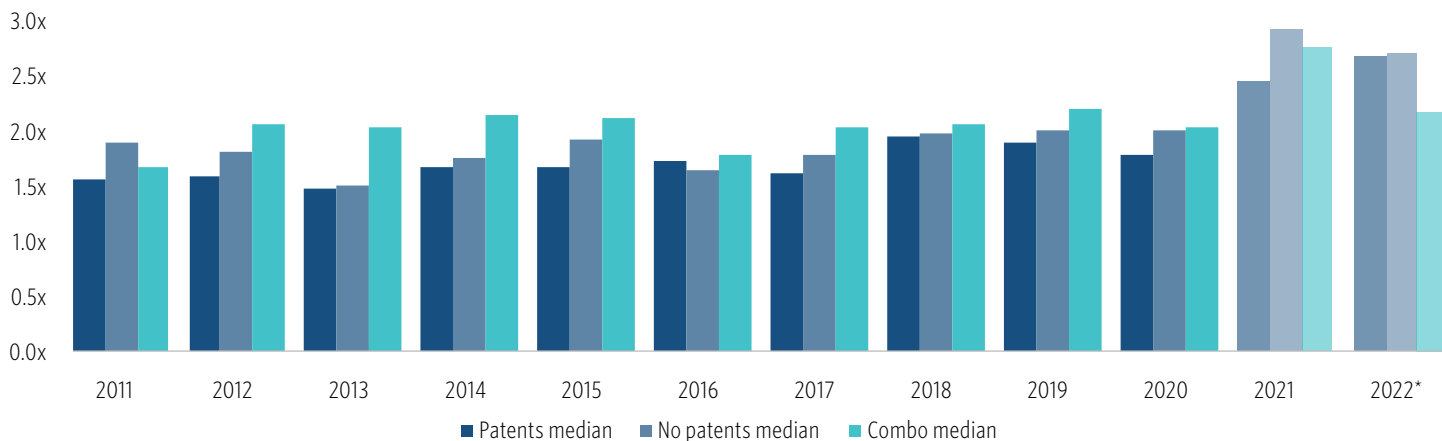
Valuation step-ups

Section takeaways

- Valuation step-ups from round to round are highest for companies that begin patenting activities between financings.
- Companies with sustained patenting activity register the smallest valuation jumps.

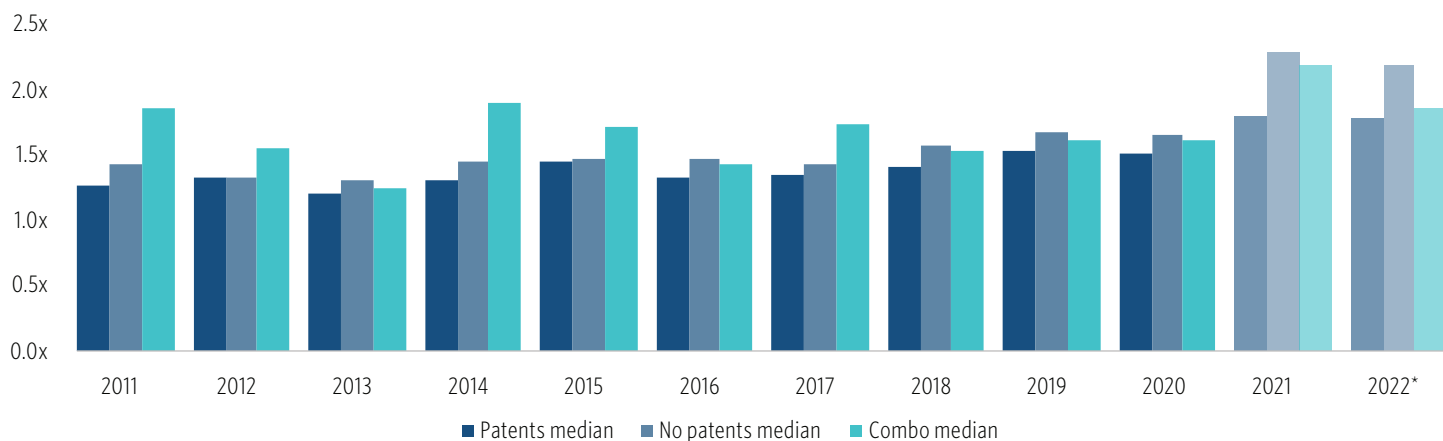
Valuation step-ups—the increase in post-money valuation from one funding round to the pre-money valuation in the next—provide interesting insights into the way that patent-seeking activities correlate with the trajectory of valuations through the venture funding cycle.

Median early-stage VC valuation step-up for startups by patent status between rounds



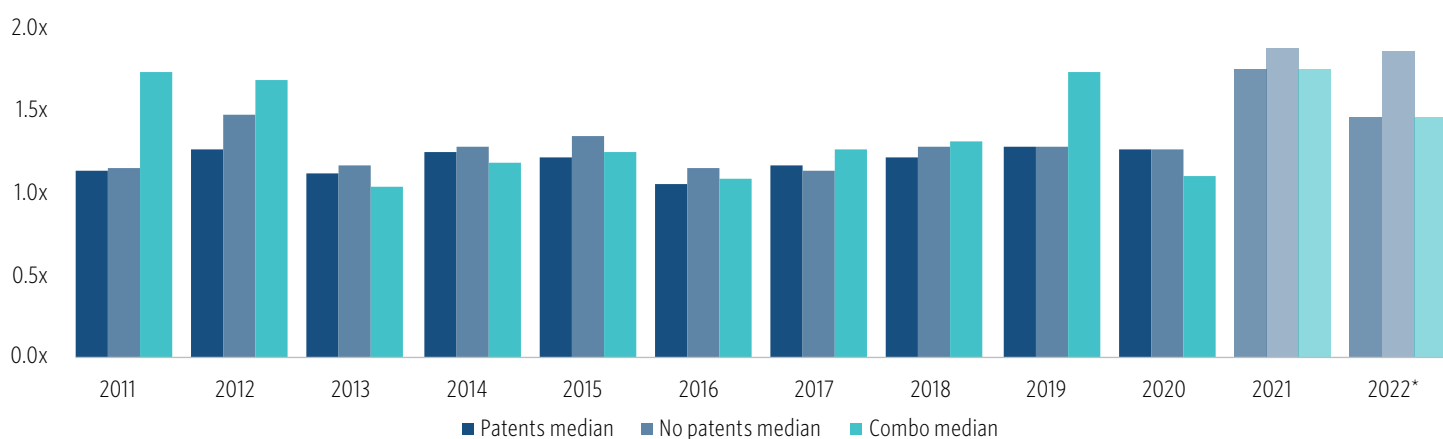
Source: PitchBook | Geography: US
*As of December 31, 2022

Median late-stage VC valuation step-up for startups by patent status between rounds



Source: PitchBook | Geography: US
*As of December 31, 2022

Median venture-growth VC valuation step-up for startups by patent status between rounds



Source: PitchBook | Geography: US
*As of December 31, 2022

For this analysis, an additional distinction beyond the simple patent-seeking yes/no binary is introduced: when a company does not have patents in the first round but does have patents in the second round. For example, a company raises a Series A at a point when it has not filed any patent applications. Subsequently, it raises a Series B, at which point it has filed patent applications. This scenario would fit into the “combo” category in the above charts. This is contrasted with companies that have no patents as of either round (the “no patents” category) and companies that have patents at the time of each round (the “patents” category).

Given the difference in valuations shown in the prior section, one might expect the companies falling into the “combo” category to consistently show the highest valuation step-ups as they move from a cohort of lower valuations to one of higher valuations. At the early and late stages, this appears to be the case in many years, but it is not as stark a contrast as valuation metrics alone. It is not surprising that nonpatent companies show the highest step-ups in some years, as valuation

data would suggest that they are growing from a smaller valuation base. Again, the venture-growth stage is less consistent than earlier stages, as it has been established that valuations fluctuate more evenly across companies in that cohort.

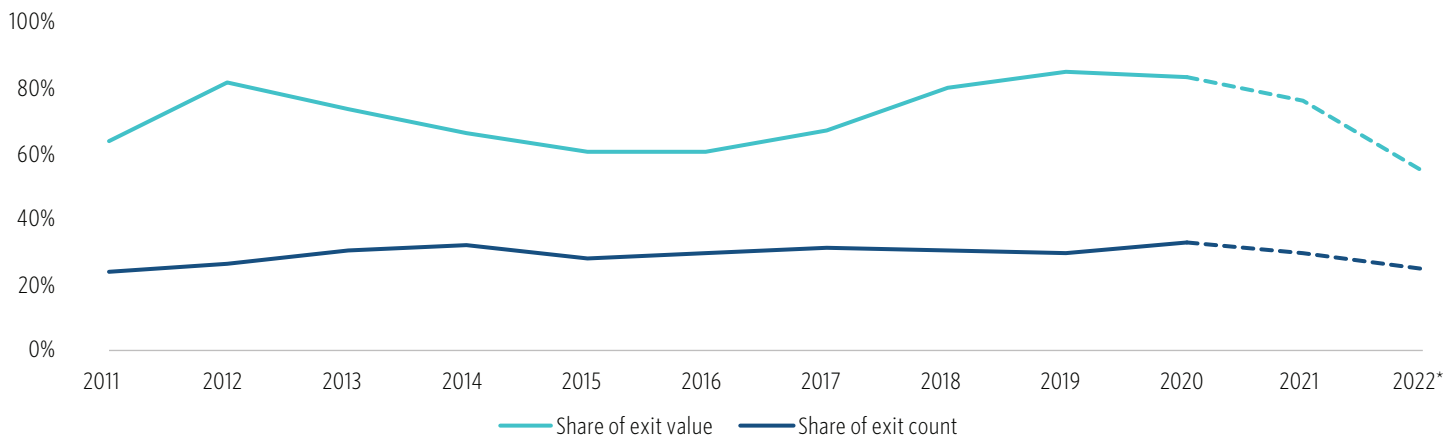
Exits

Section takeaways

- From 2011 to 2022, patent-seeking companies accounted for 78.6% of VC exit value but only 21.4% of VC exit count.
- Patent-seeking companies exit via the public markets at a rate more than five times higher than nonpatent-seeking companies (23.2% versus 4.0%).
- For acquisition exits, the median exit value for patent companies is 154.9% higher than it is for nonpatent companies per year on average. It is 48.2% higher for public listings.

As the prior sections have highlighted, startups pursuing patent protection for their IP have benefited from investor willingness to provide more capital, at higher valuations, as they make their way through the venture funding lifecycle. This leads to the logical question: Does the higher price tag translate to better exit outcomes?

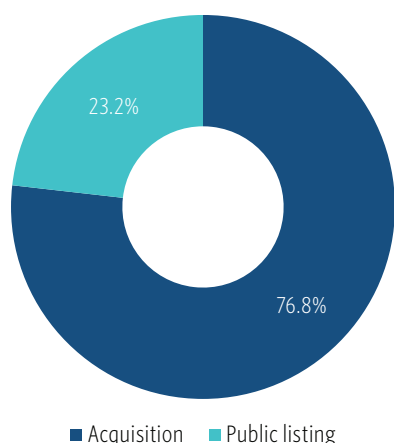
Patent company VC exit value and count as a share of all VC exit value and count



Source: PitchBook | Geography: US
*As of December 31, 2022

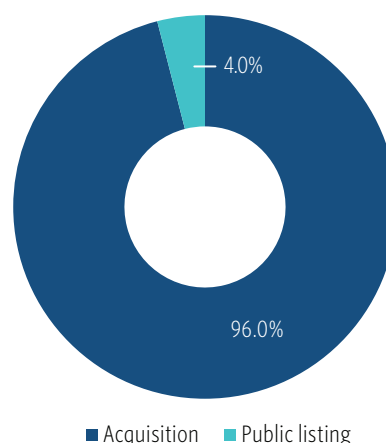
Exit activity of patent companies has consistently posted impressive sums, mirroring the broader VC-backed exit market. Patent startups represent 76.8% of total VC exit value from 2011 to 2022 but account for only 23.2% of the total VC exit count. This suggests that patent companies are punching well above their weight when it comes to exit value. However, aggregated data can be misleading, as the excess exit value could result from a few high-flying exits in any given year.

Share of US VC exit count by type (2011-2022) for patent companies*



Source: PitchBook | Geography: US
*As of December 31, 2022

Share of US VC exit count by type (2011-2022) for nonpatent companies*

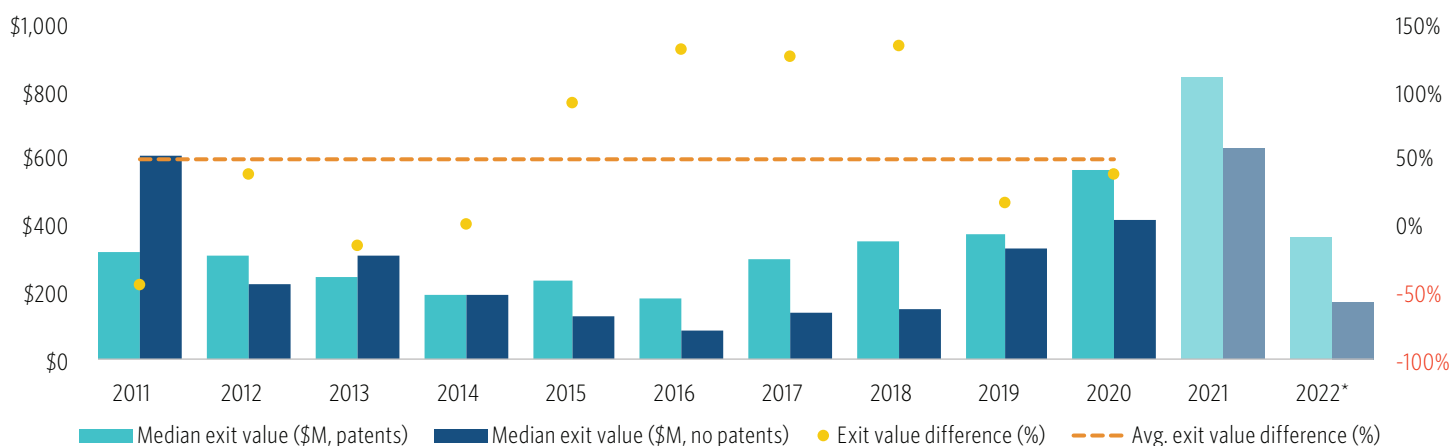


Source: PitchBook | Geography: US
*As of December 31, 2022

Comparing the mix of exit types (acquisition versus public listing) between the patent set and nonpatent set shows a share of patent companies exiting via the public markets that is more than five times greater than the share of nonpatent companies exiting via the public markets (23.2% versus 4.0%). This speaks directly to the outsize share of exit value that the patent set has relative to their share of deals, as public listing exits tend to be much larger than acquisition exits.

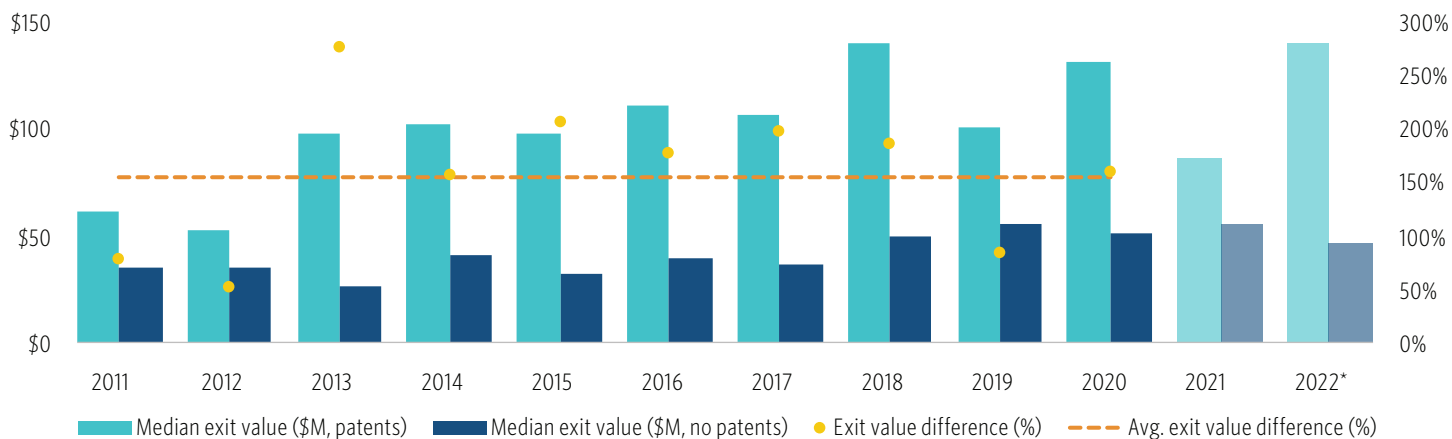
Preliminary research from PitchBook's Quantitative Research team suggests that a startup's number of patents and applications exhibits a modest positive correlation with an eventual public listing.

Median VC exit value (\$B) for patent startups and nonpatent startups that exited via public listing



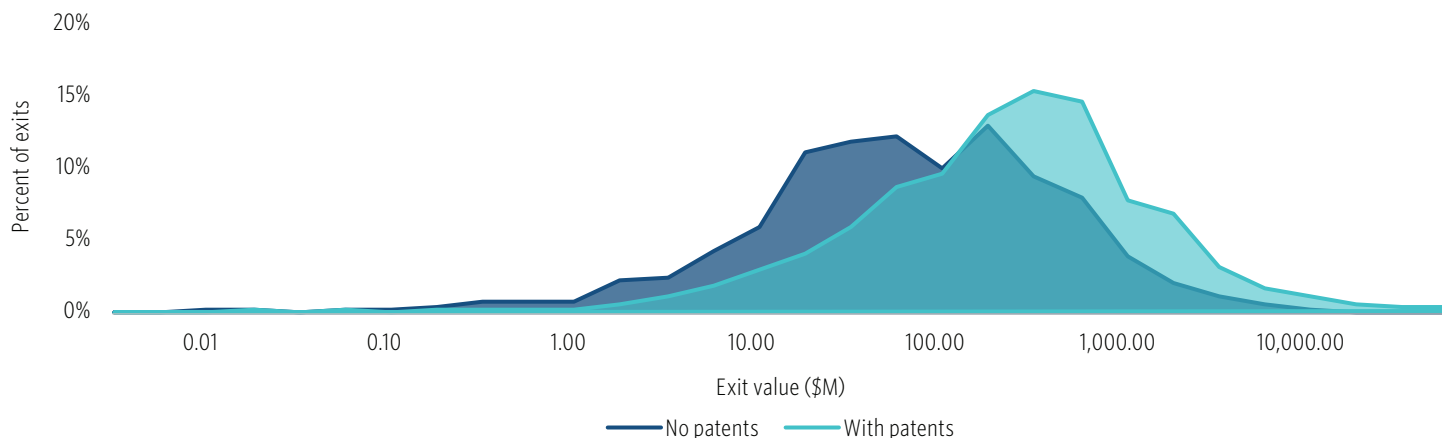
Source: PitchBook | Geography: US
*As of December 31, 2022

Median VC exit value (\$B) for patent startups and nonpatent startups that exited via acquisition



An examination of median exit values for public listings and acquisitions shows a distinct difference in exit values in favor of the patent set. The average difference in annual median values for the patent set and the nonpatent set is 48.2% for public listings and a massive 154.9% for acquisitions. Though we are not claiming causality, this suggests that there is meaningful value associated with firms seeking legal protection for their novel technology.

Distribution of log-adjusted VC exit values by presence of patents (2011-2022)



Plotting the log-adjusted distribution of exit values between the patent set and nonpatent set clearly shows the result of the patent set having both a significantly higher share of public market exits and higher valuations for both public listing and acquisition exits. These factors suggest that there is indeed a payoff for investors putting money into patent-seeking startups.