Deep Tech Report

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Methods vs. Outcome

When Arthur Rock liberated the Traitorous Eight from an authoritarian William Shockley in 1957, the ensuing saga near-accidentally birthed the Venture Capital industry and many of its giants. Don Valentine, the father of activist investing, convicted the young Jobs of lacking managerial talent and showmanship, turning down Apple twice; NEA's Dick Kramlich nearly missed out on Bob Metcalfe's Ethernet because he thought 3Com was worth $3.7M instead of $6M; Jim Swartz's Accel Telecom, the first specialized-fund, passed up Cisco for its contrarian founders. In all of VC's unpredictabilities, a scientific approach to dissecting a class of startups might unveil some patterns behind the scenes. In this report, we dive into the successes and shortcomings of 123 deep tech startups, including 96 from Lux's portfolio, in search of a better *method* for better *outcomes*.

The Approach

To conjure the formula for successful deep tech startups, we combine insights from the faults of failed ones. We separate our startup dataset of 210 into two groups: post-Series B (123) and pre-Series B (87). This allows us to draw conclusions from sufficient data and extrapolate for those with a lack of. Next, we further break down the population by industry, age, R&D origin, product type, customer type, revenue model, and team characteristics, all benchmarked against performance metrics YTD valuation and YTD multiple from first round. A similar process is repeated for startups with an indicated investor from Lux. (Raw data here).

The Result

Several counter-intuitive patterns were observed:

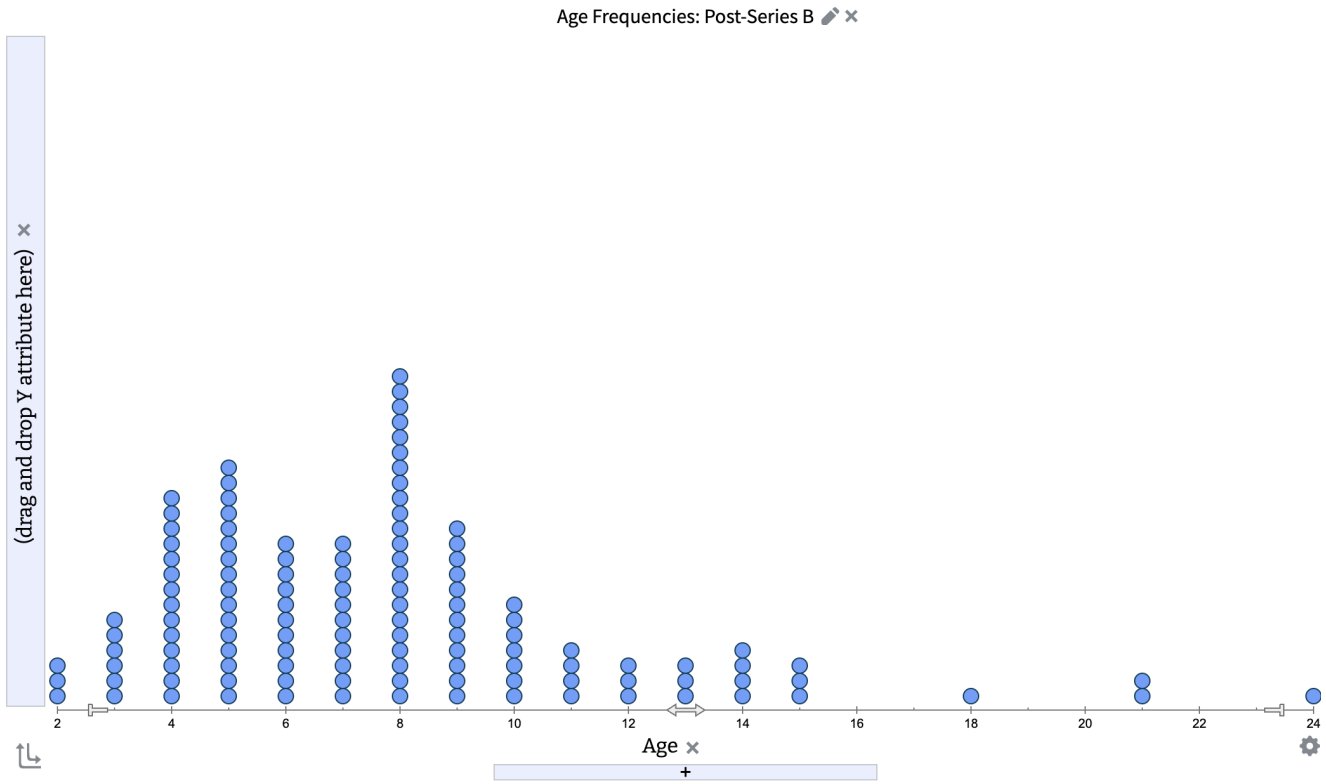
1. Professional background relevance is inversely related to venture capital success metrics.
2. Highly technical founding teams perform among the worst against VC success metrics.
3. Founders who have exited in the past obtain the worst VC success metrics compared to first-time and failed founders.
4. Academia spinouts enjoy the least VC success.
5. Number of patents held has no correlation with deep tech startup success.

These findings reveal that past successes, professional name-brands, and technical defensibilities are over-indexed while new perspectives are under-appreciated. *This supports Lux's contrarian thesis*.

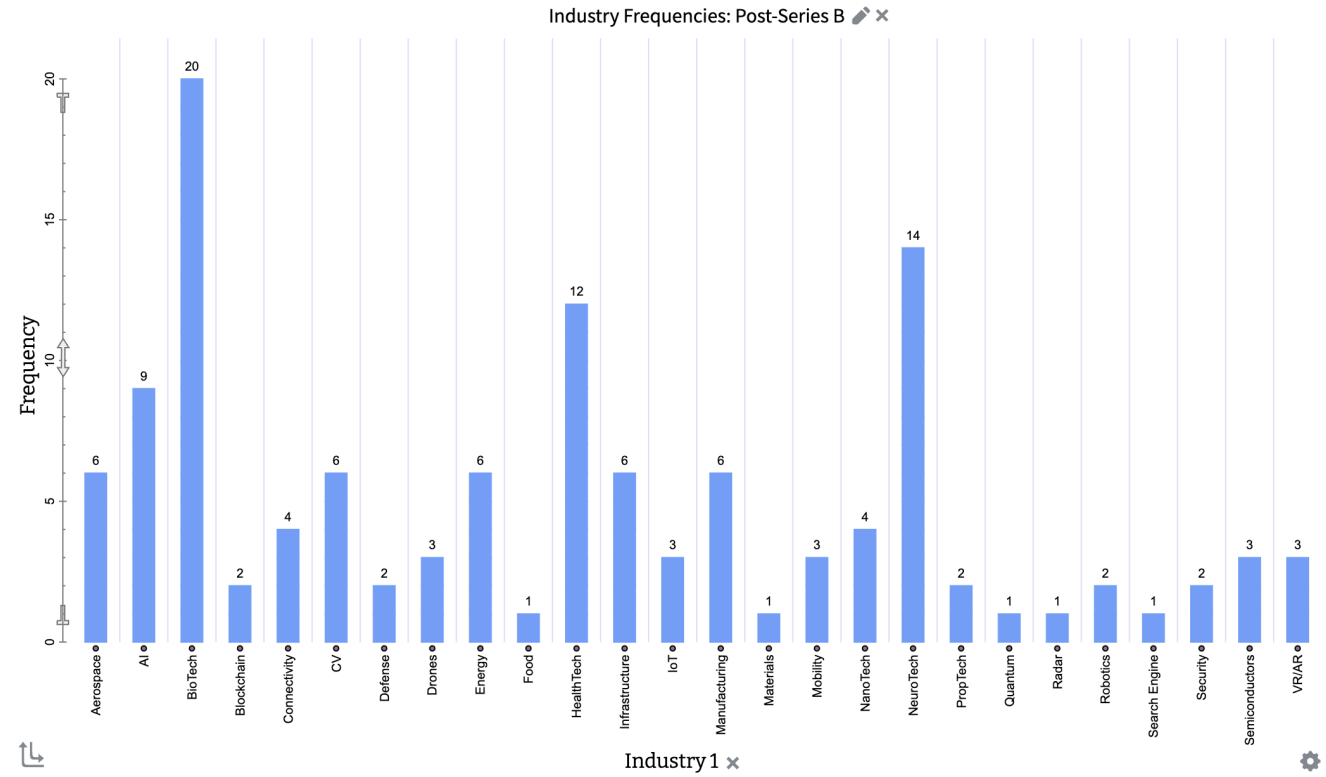
Limitations

This study suffers from a small sample size (123), uneven distribution of industries, and bias. As data is collected from various firms' websites, and most firms tend to only list successful portcos, the sample is not representative of all deep tech startups a partner would encounter in the wild. Further, conjectures were made in determining each startup's R&D origin and revenue model. Founder metrics are also summarized from reading LinkedIn profiles and online descriptions, and assignment of the "main founder" is often subjective, thus may not be indicative of the truth. Lastly, funding data are collected via Pitchbook and Crunchbase and may not be comprehensive. Please observe the "sample size" row presented atop most charts, as values derived from only a few samples are disregarded in the conclusions drawn. Regarding the Lux-specific section, it's important to note that some portcos don't have lead partners and co-leads are assigned to only one partner.

Dataset Overview: Post-Series B

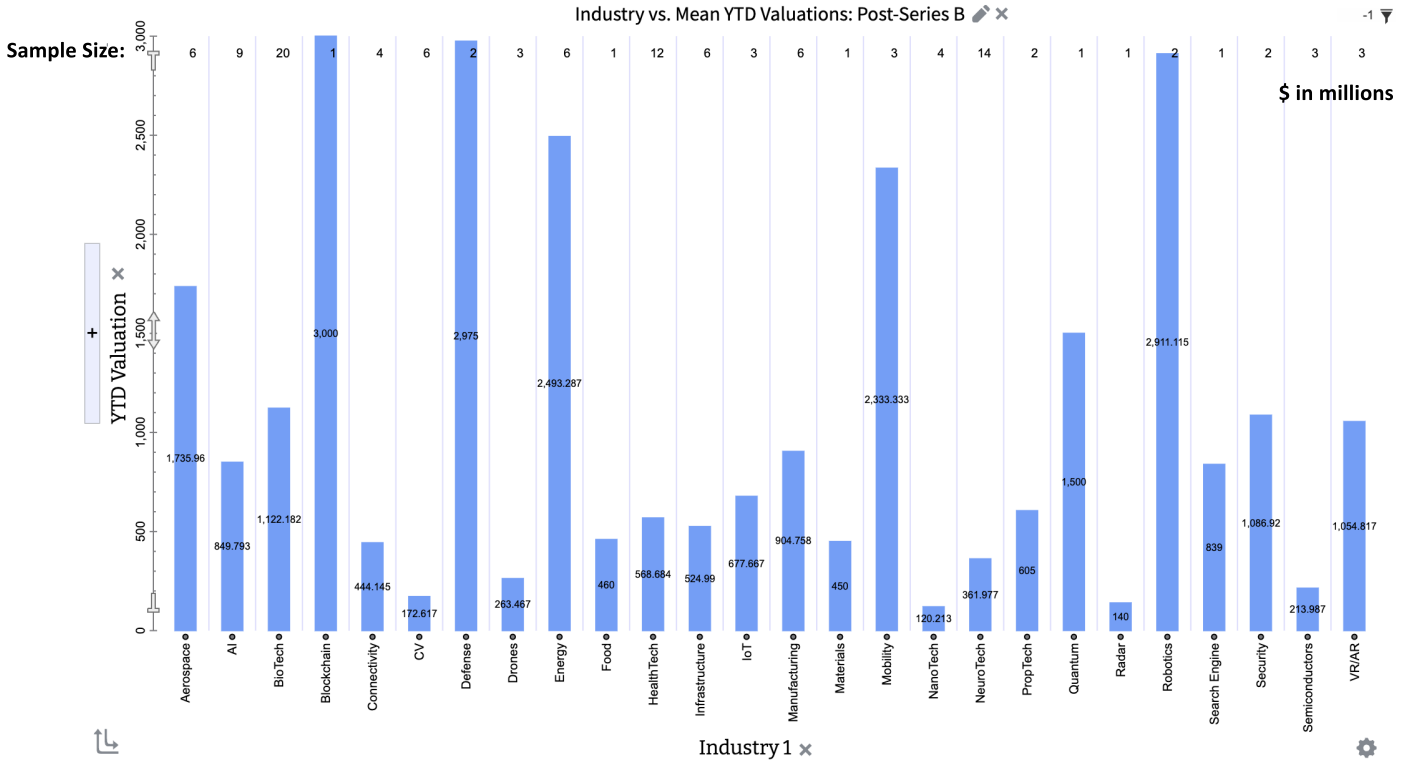


The majority of startups in this study were founded 4-9 years ago (2013-2018).

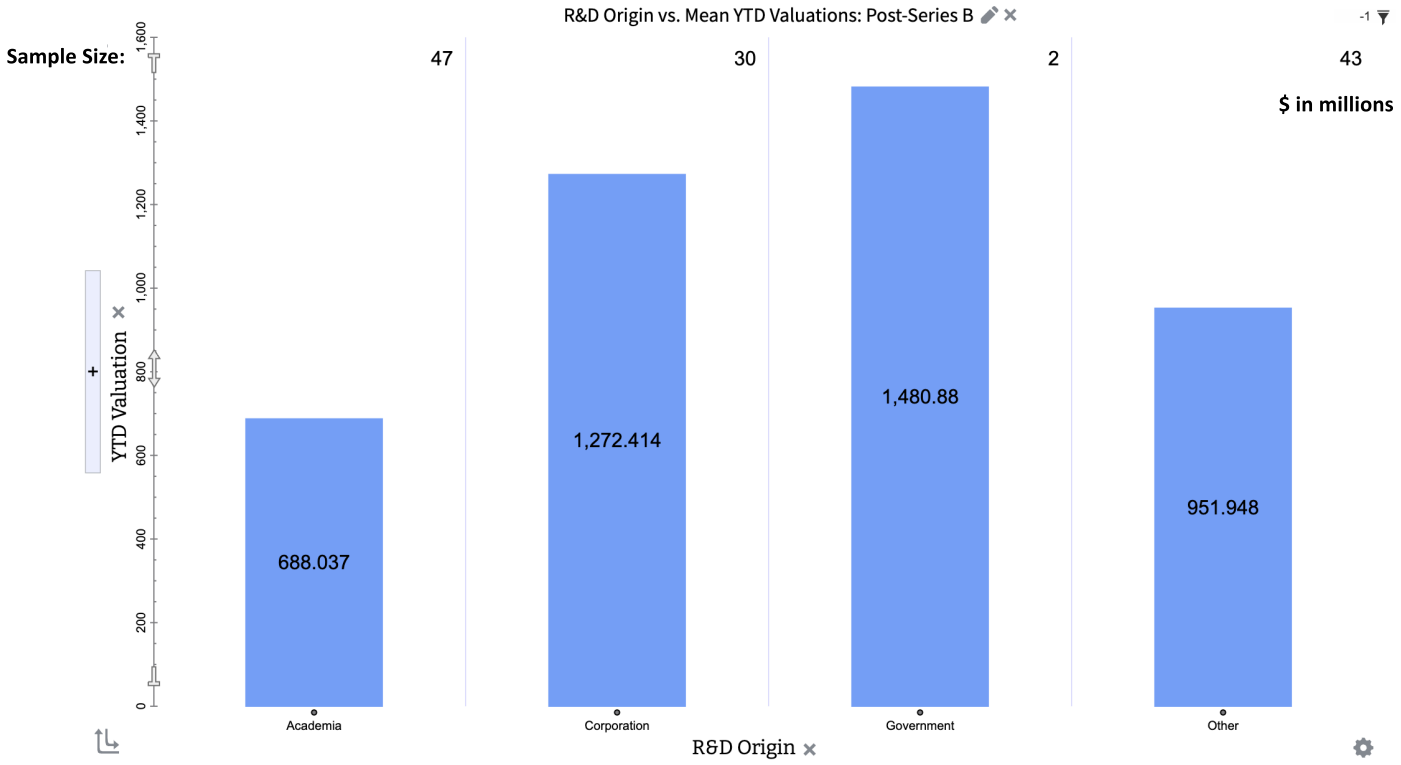


BioTech, HealthTech, and NeuroTech startups are most frequently studied in this report.

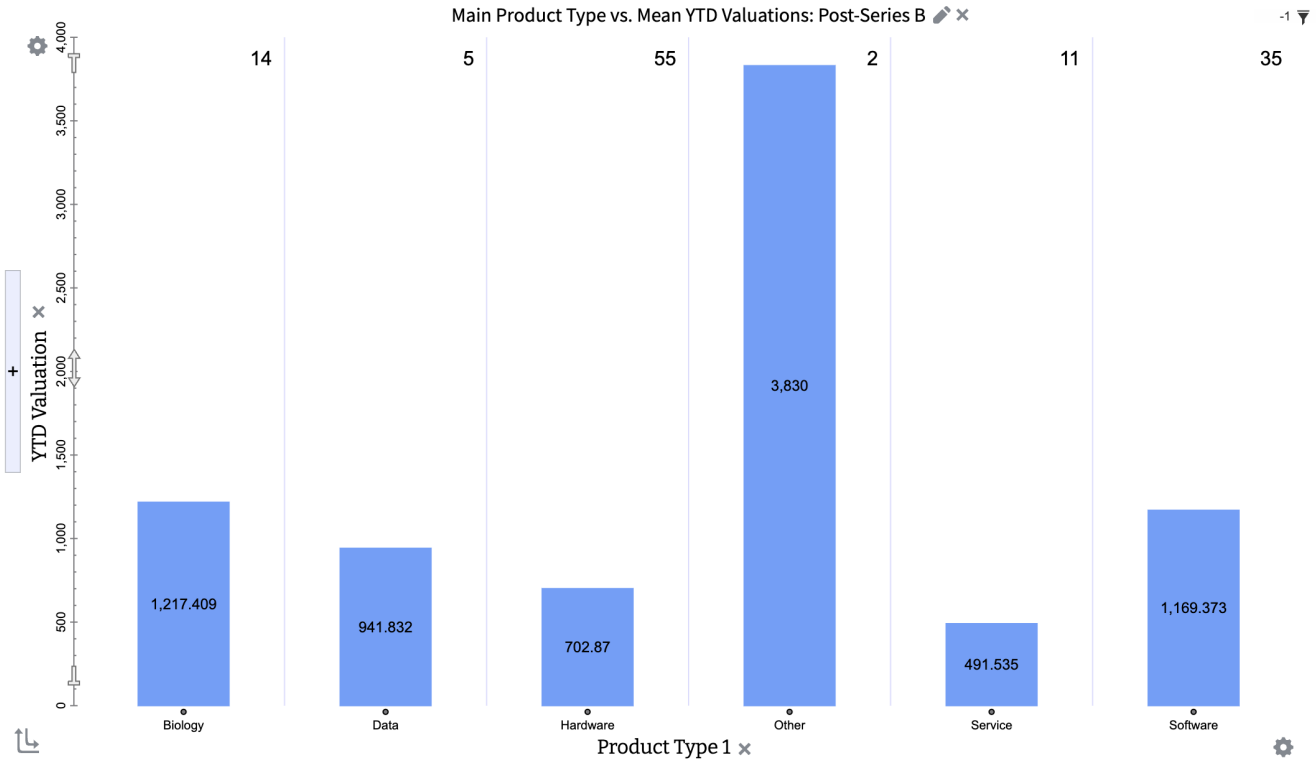
Metrics vs. YTD Valuation: Post-Series B



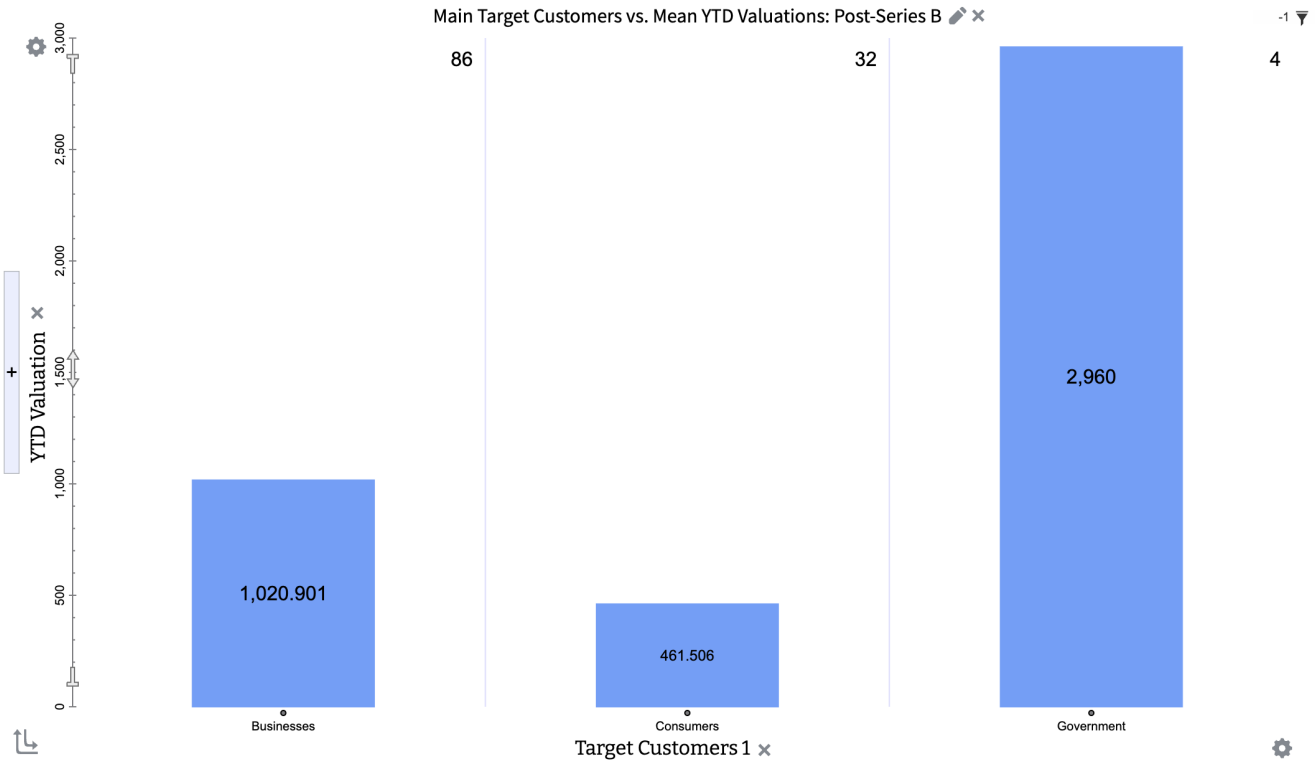
Aerospace, BioTech, and Manufacturing stand out as highest valuation industries.



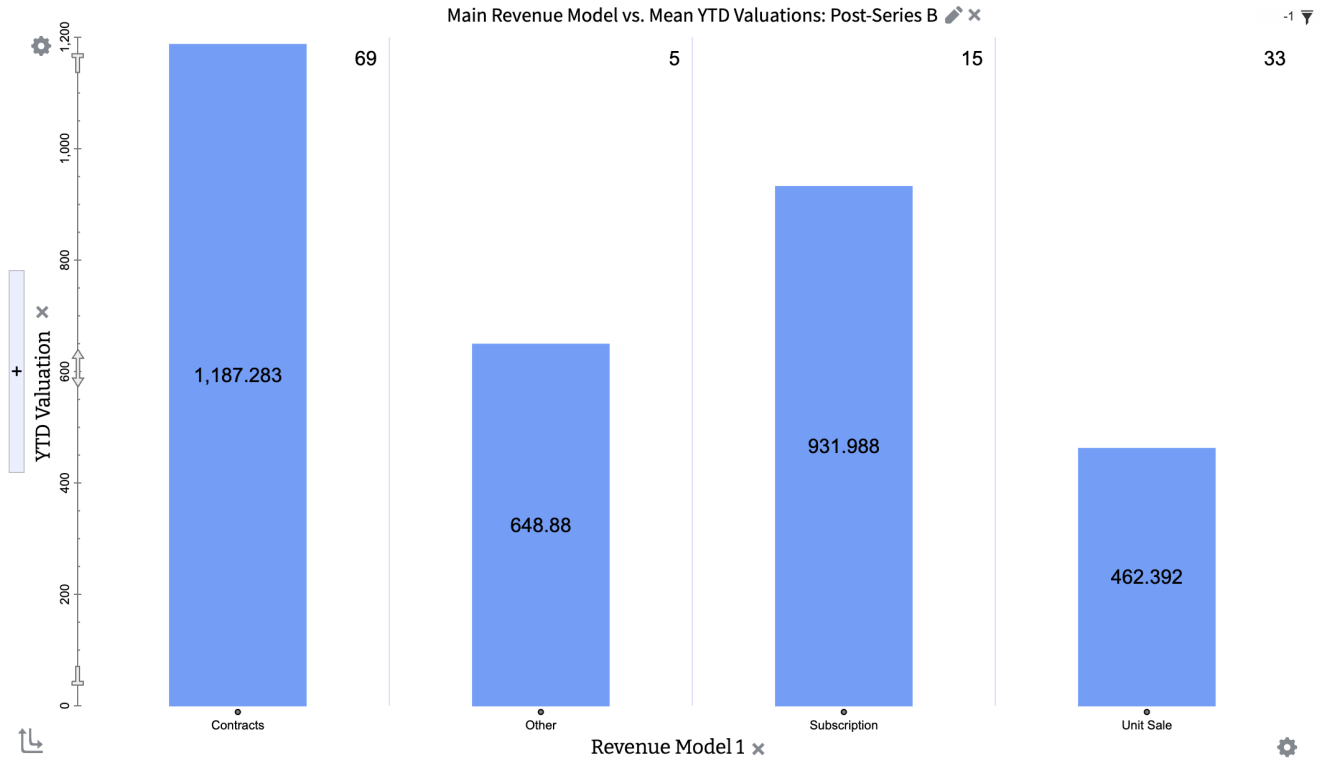
Corporation spinouts achieve the highest valuations.



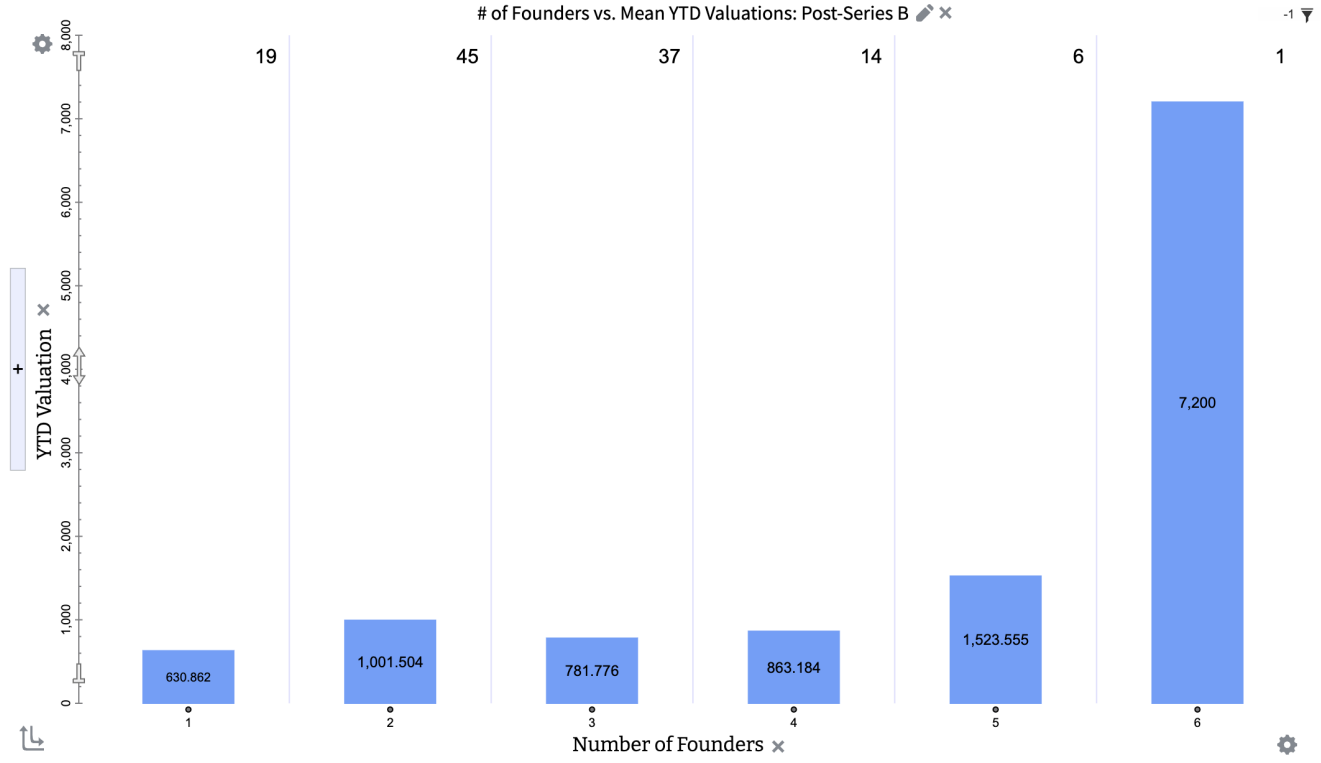
Startups selling Software and Biology products attains the highest valuations.



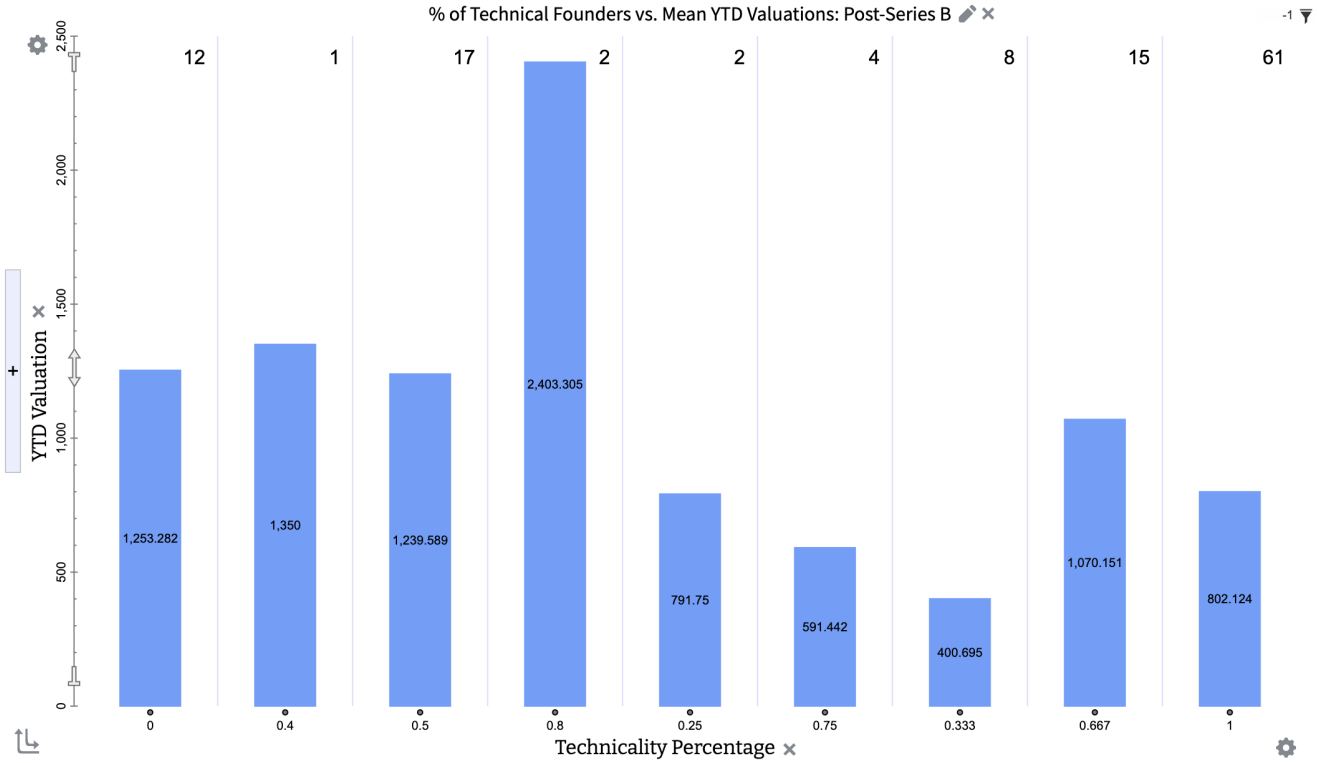
B2B model outperforms B2C, while B2G model suffers an insufficient sample size.



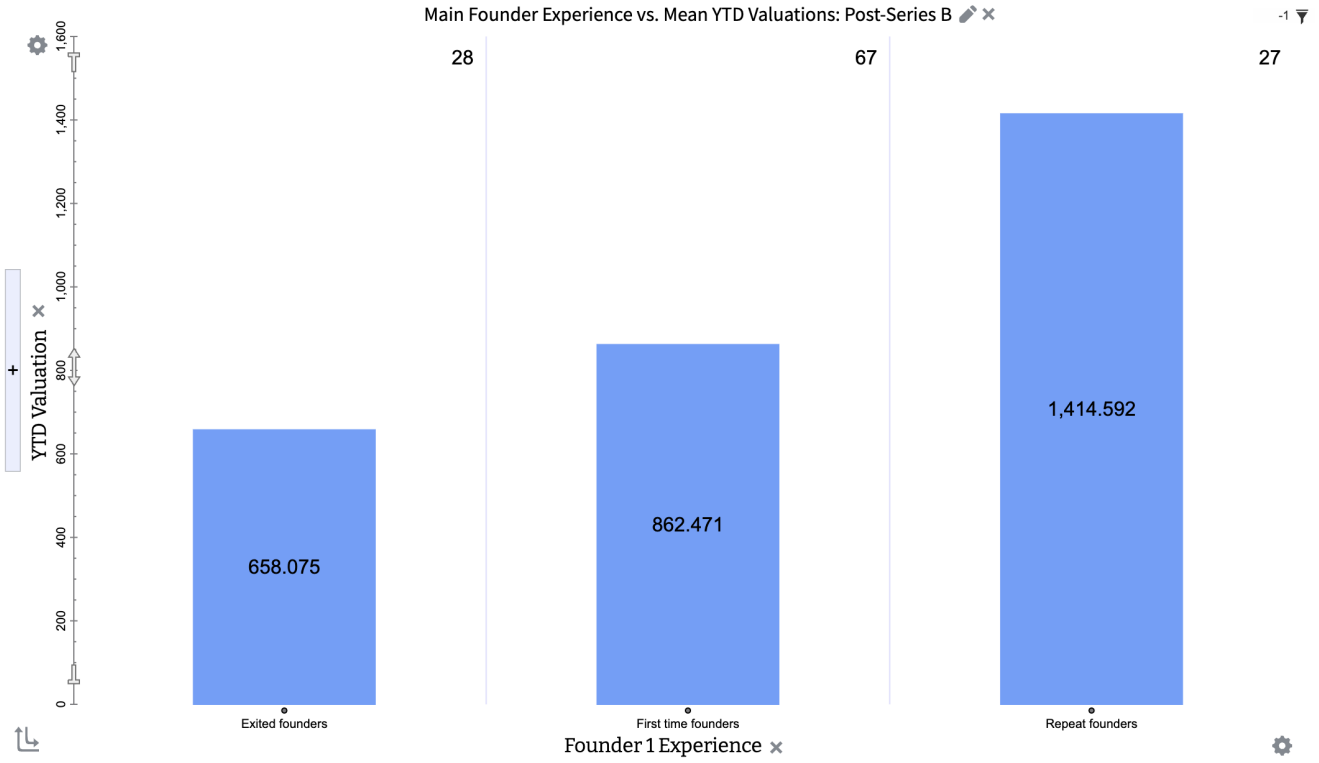
Contract-based revenue models correlate with the highest valuations.



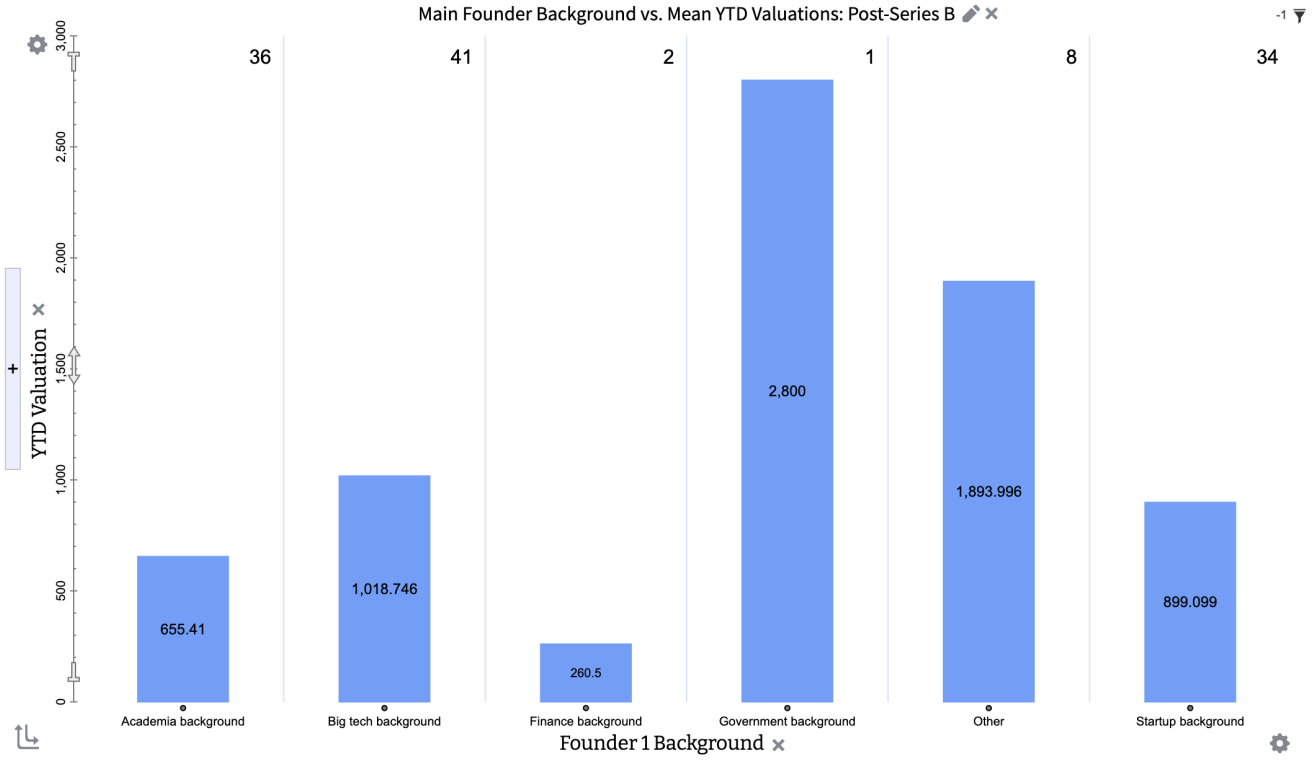
5- and 2-founder teams yield the highest valuations.



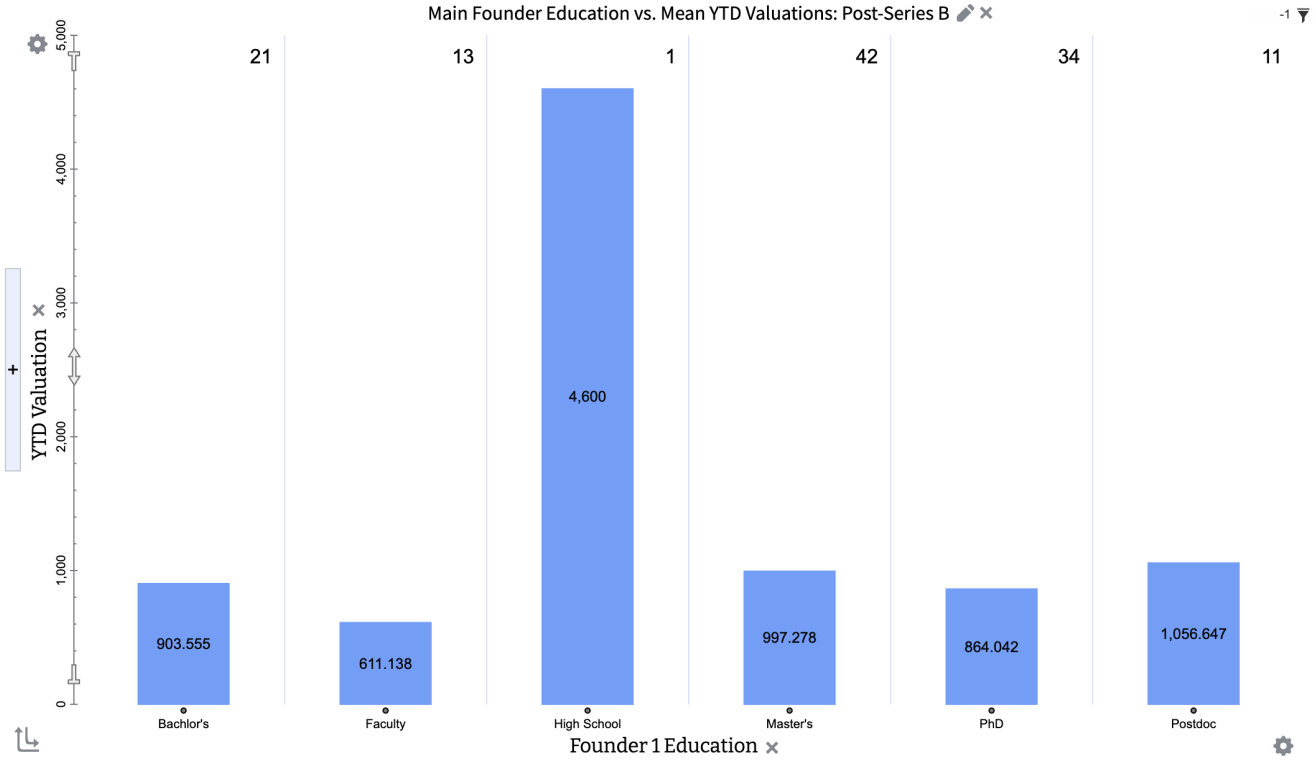
Teams with 0% and 50% technical founders obtain the highest valuations.



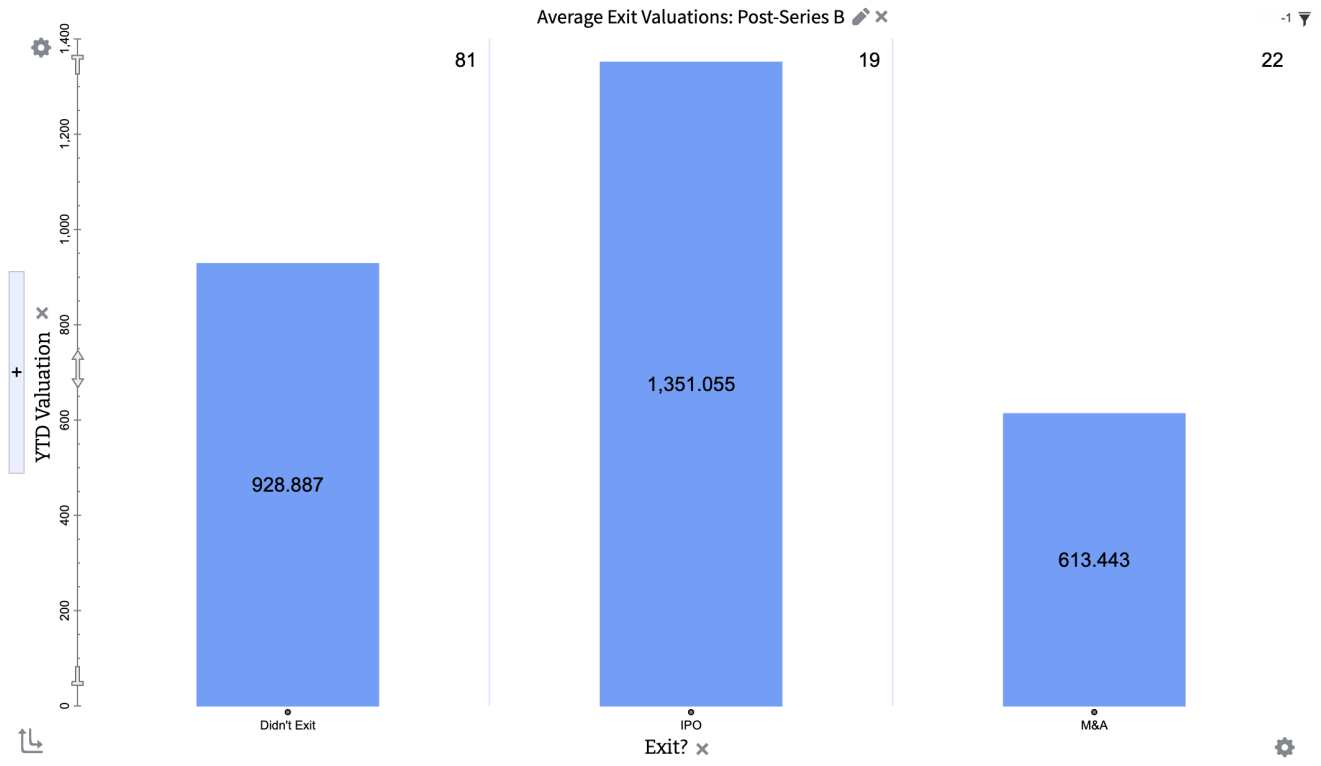
Previously failed founders find the highest valuations, and exited founders surprisingly the lowest.



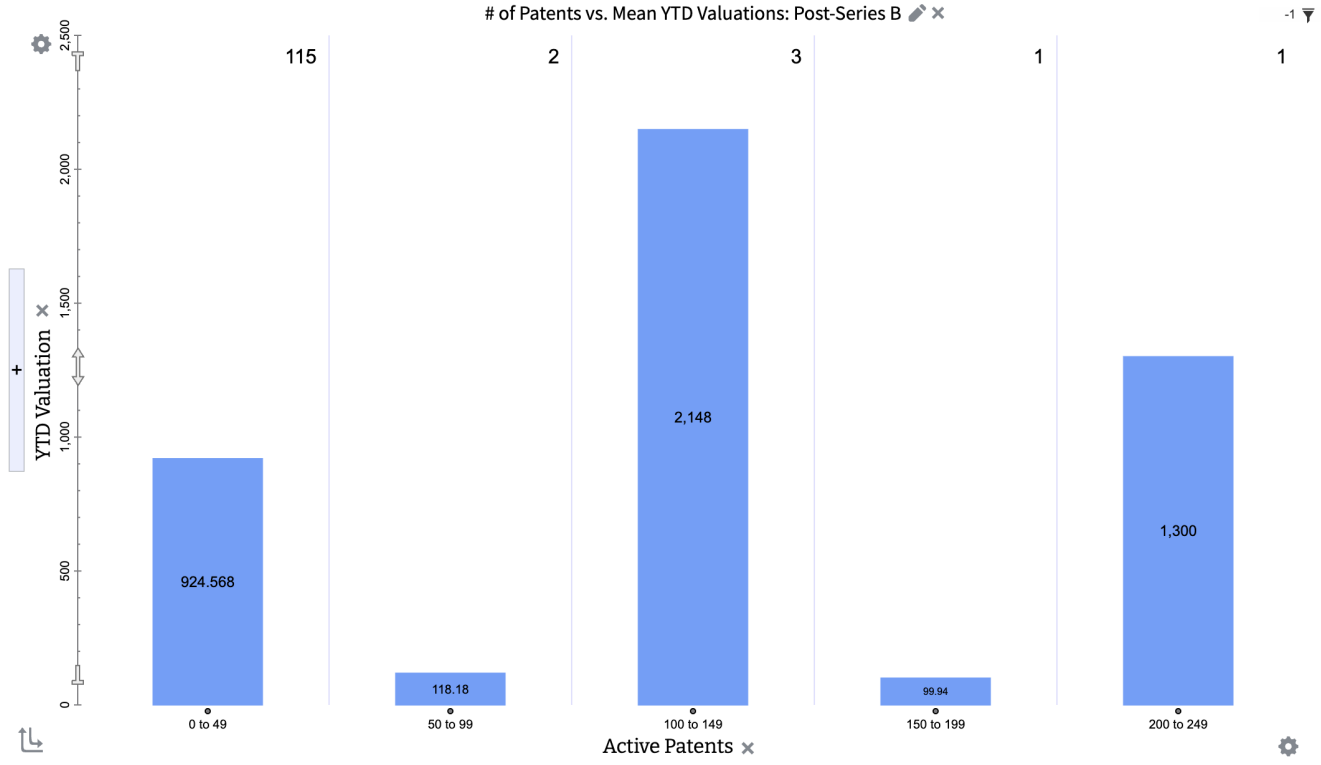
Founders with unconventional backgrounds attain the highest valuations with academics the lowest.



Founders with Master's degrees and postdocs find the highest valuations.

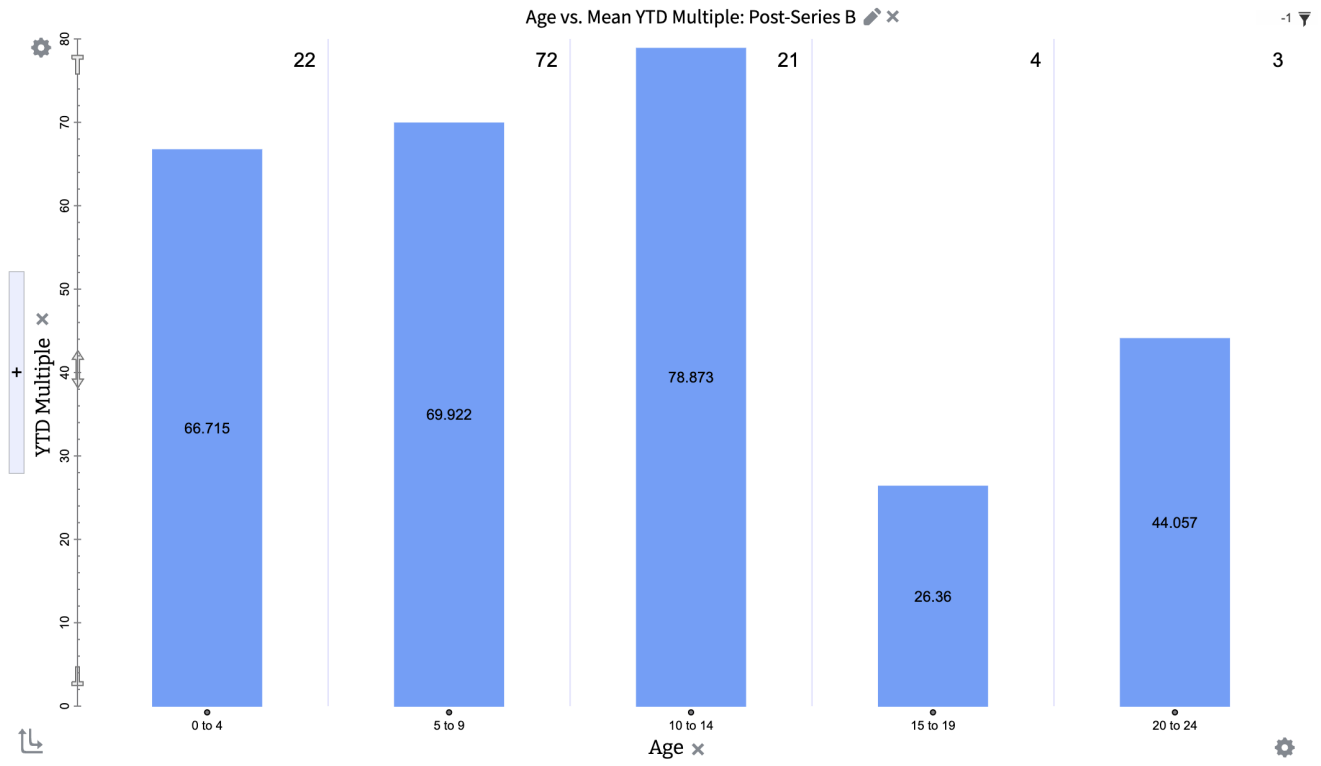


Startups who IPO exit at the highest valuations.

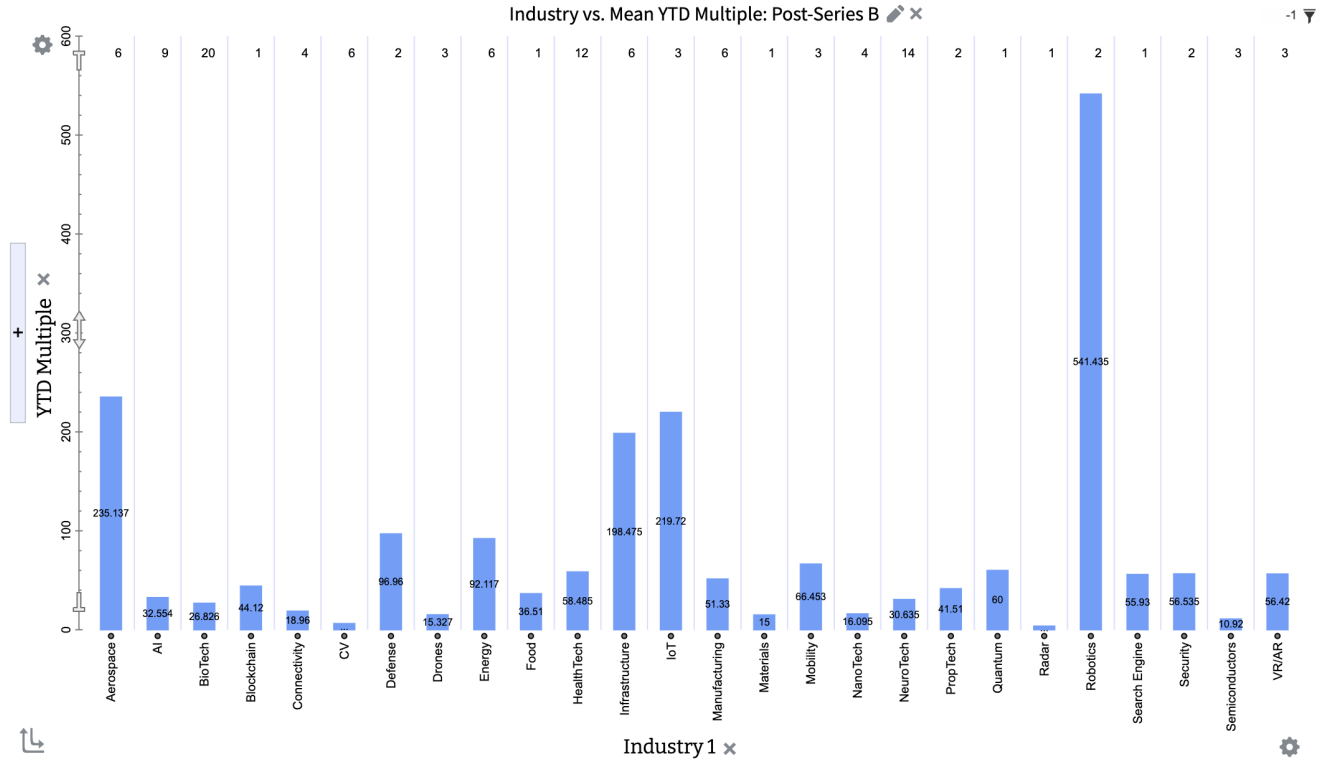


Number of patents held by deep tech startups surprisingly has no correlation with valuations.

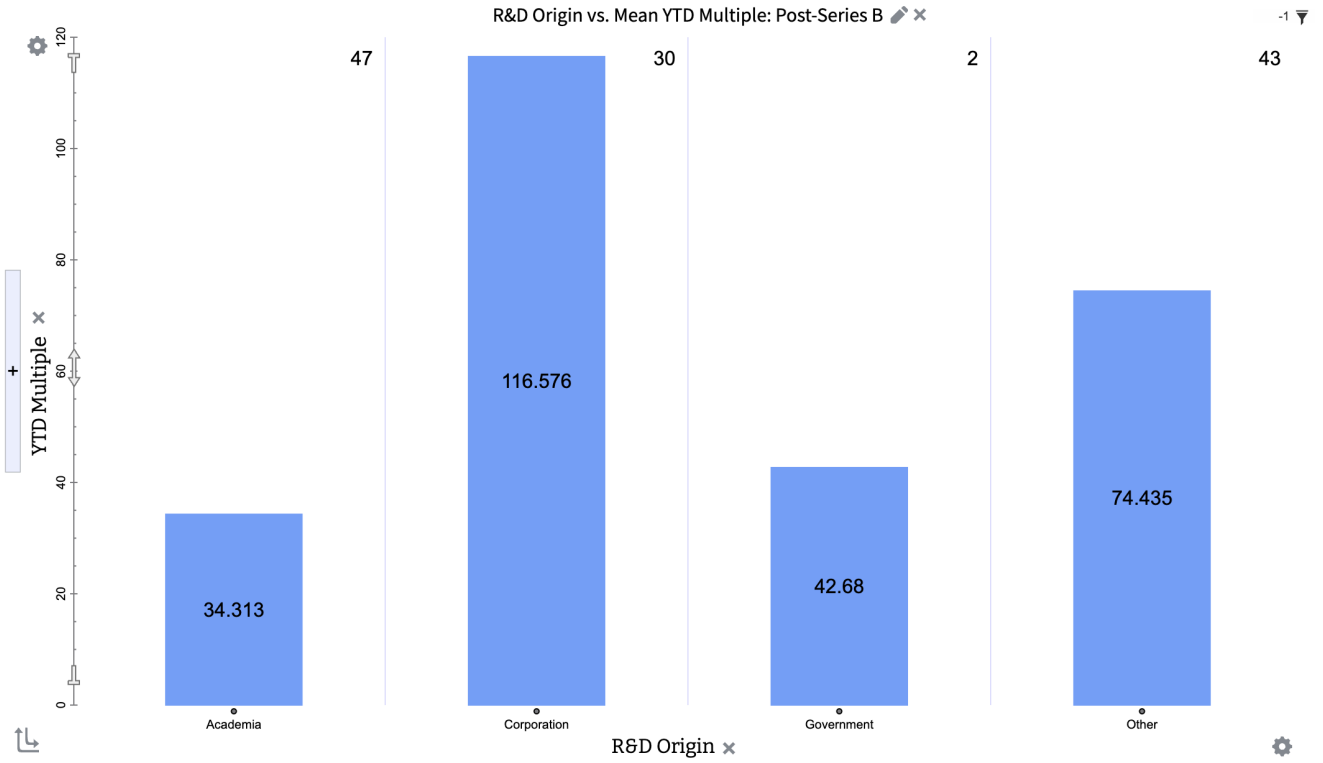
Metrics vs. YTD Multiple (from first round): Post-Series B



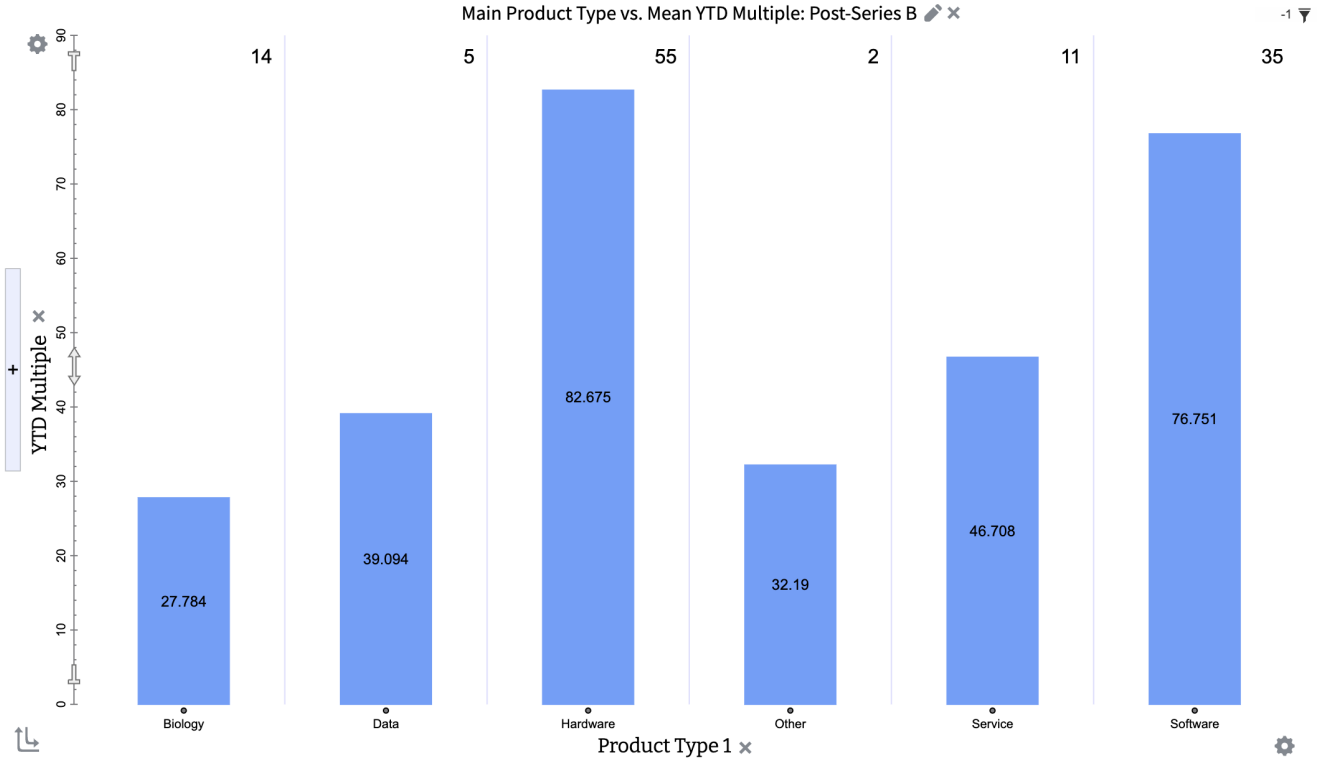
Startups achieve the highest valuation multiples 10-14 years after founding.



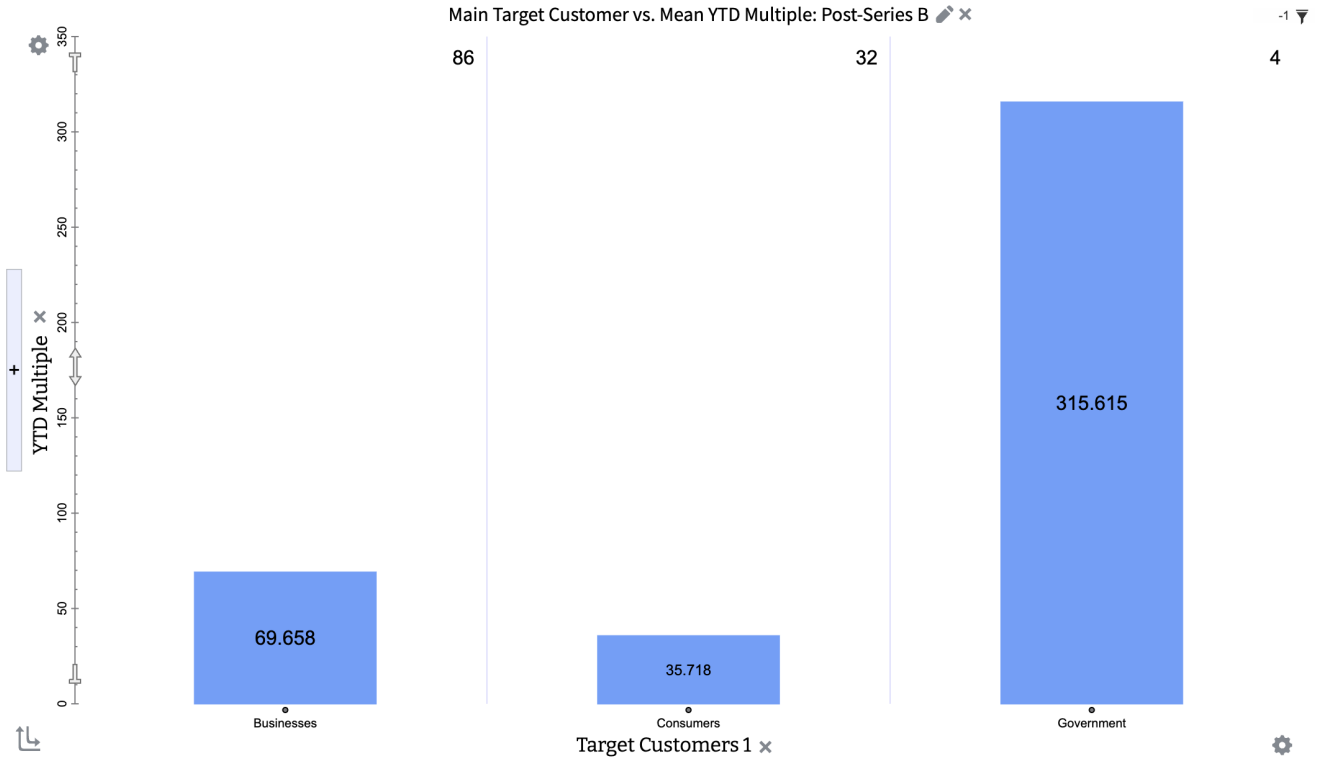
Aerospace and Manufacturing enjoy the highest multiples, while BioTech ranks among the lowest.



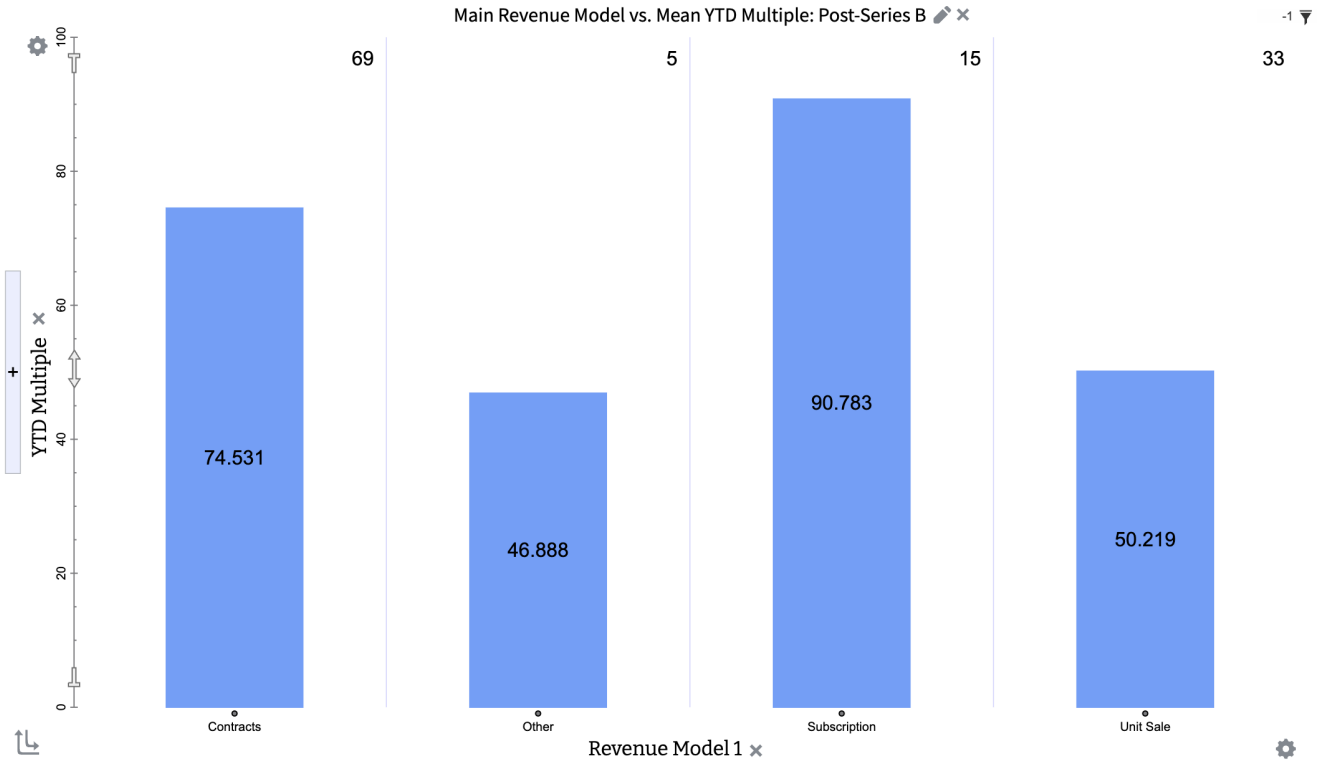
Corporation spinouts reach the highest valuation multiples, and academia the lowest.



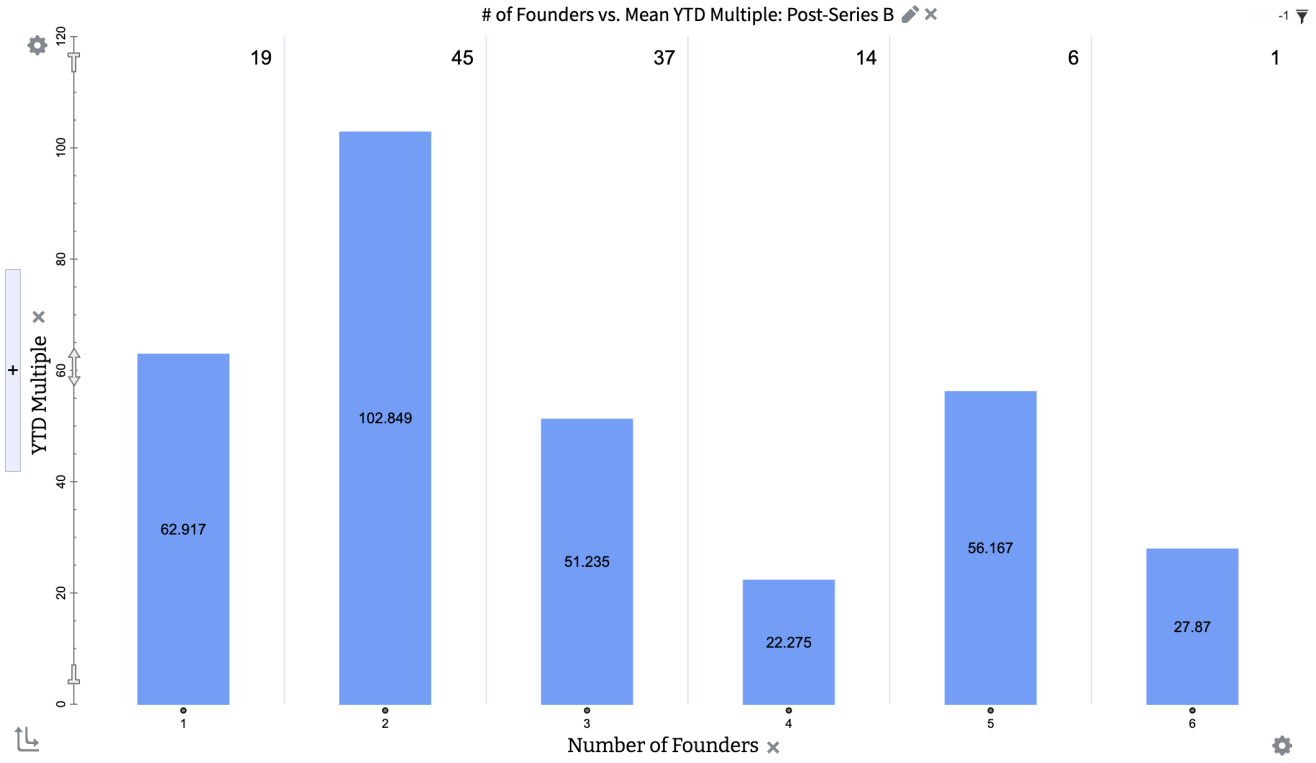
Hardware and Software startups accomplish the highest multiples, with BioTech the lowest.



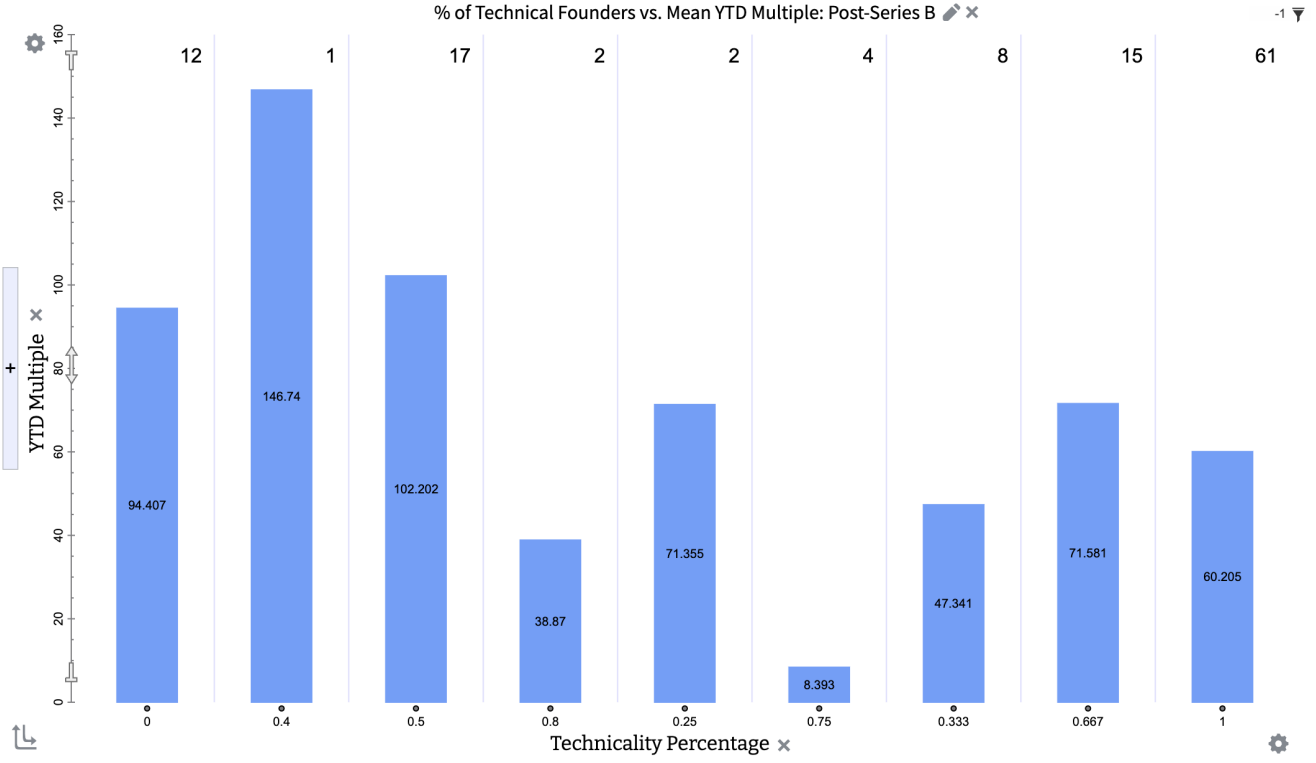
B2B models achieve significantly higher multiples than B2C.



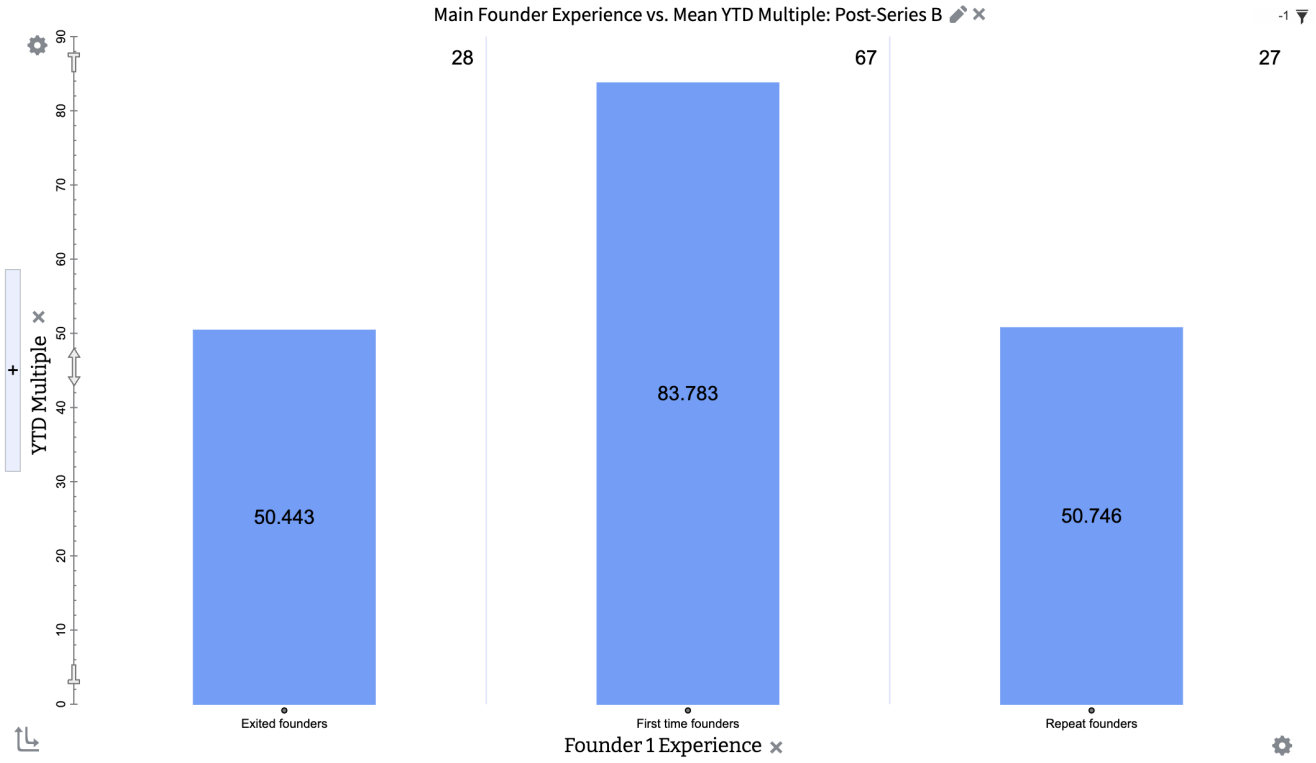
Subscription-based models reach significantly higher multiples compared to Unit-Sale-based.



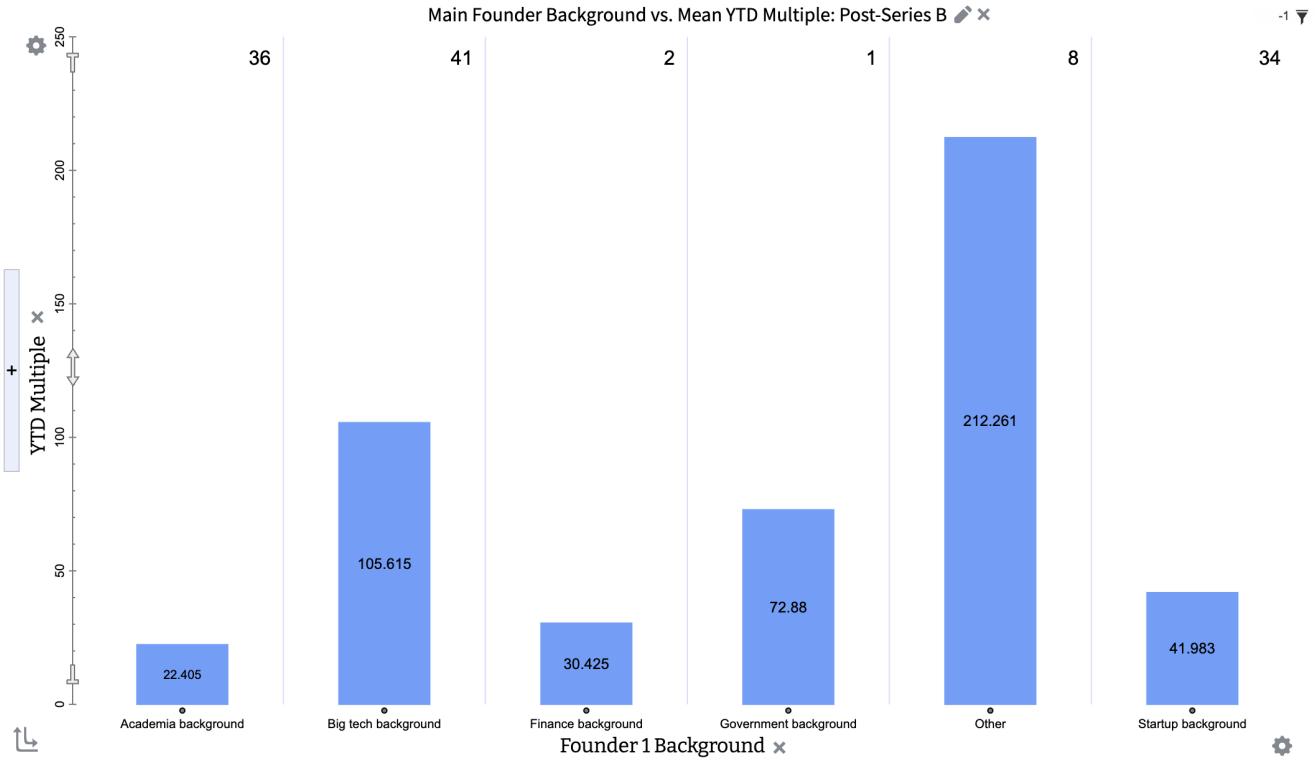
2-founder teams execute the highest valuation multiples with 4-founder teams the lowest.



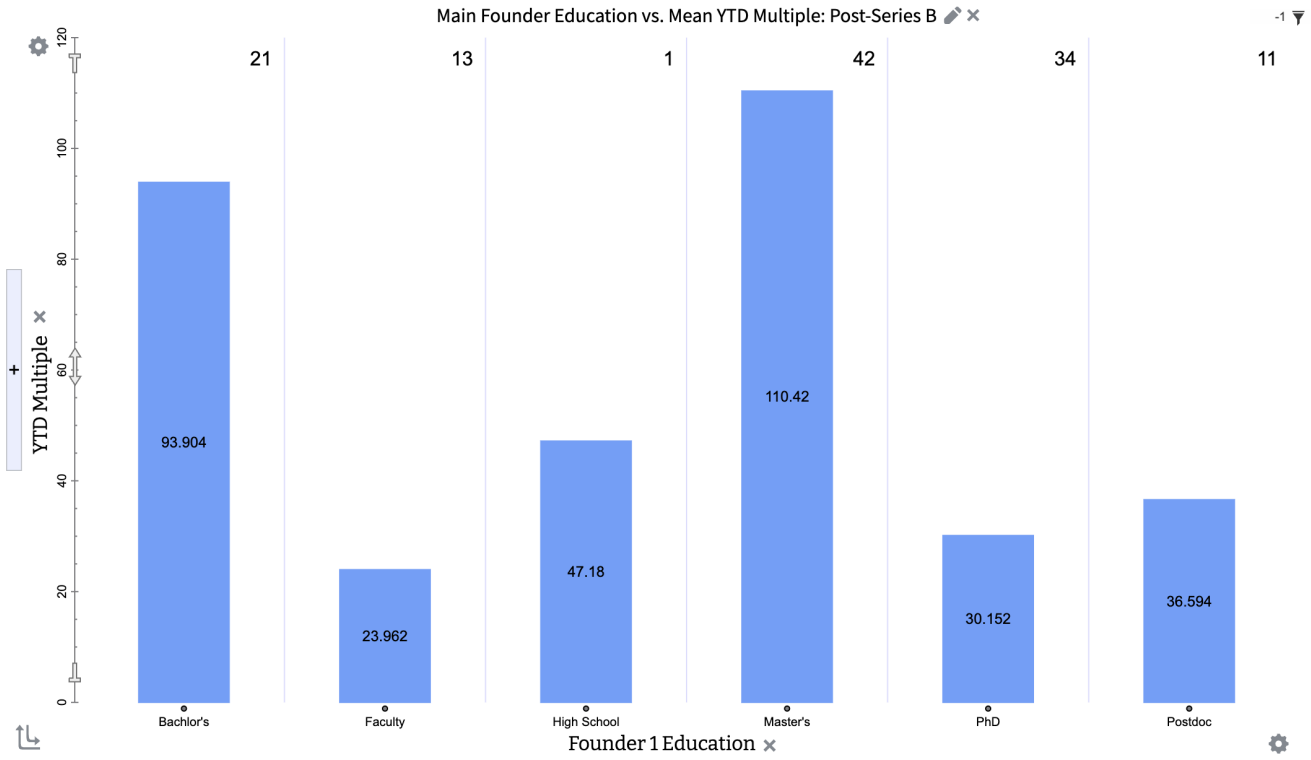
Teams with 100% technical founders perform significantly worse than teams with 50% and 0%.



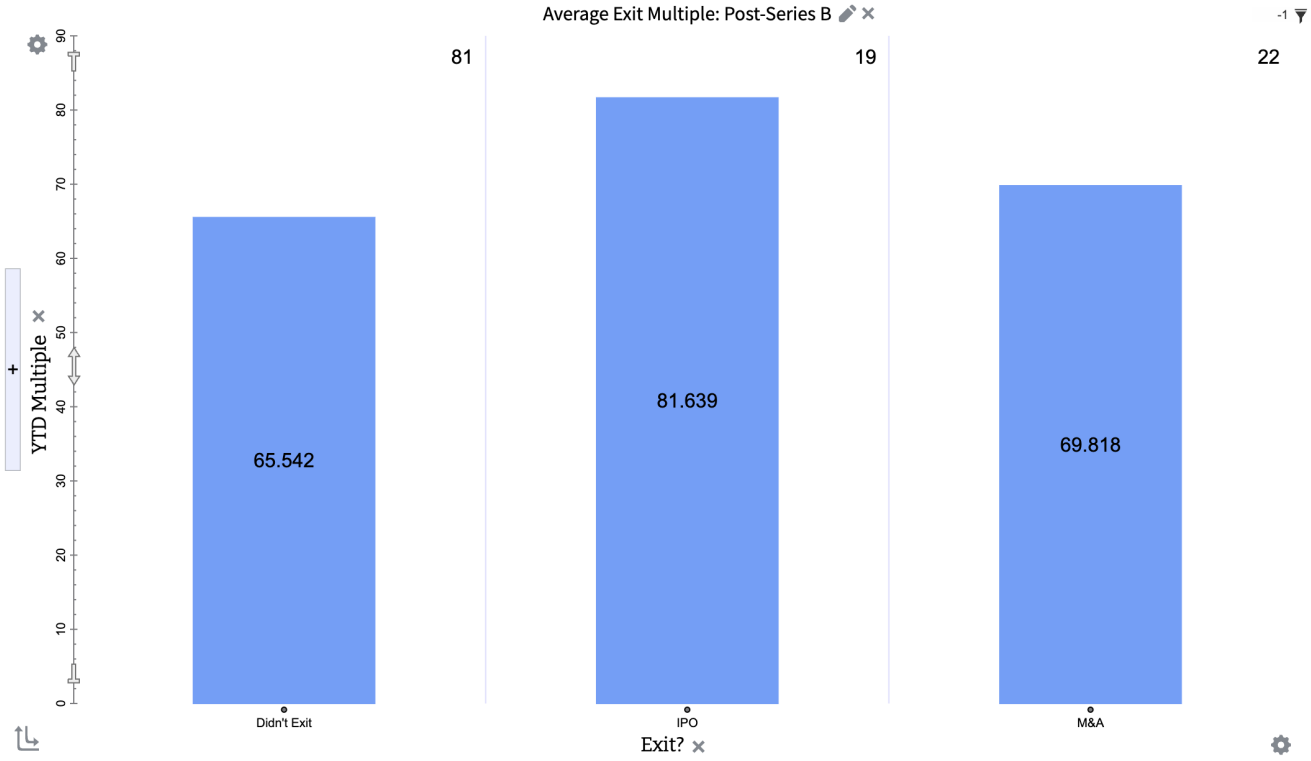
Teams headed by first time founders surprisingly return the highest multiples.



Unconventional founders outperform big-tech founders by 2x and academia founders by nearly 10x.

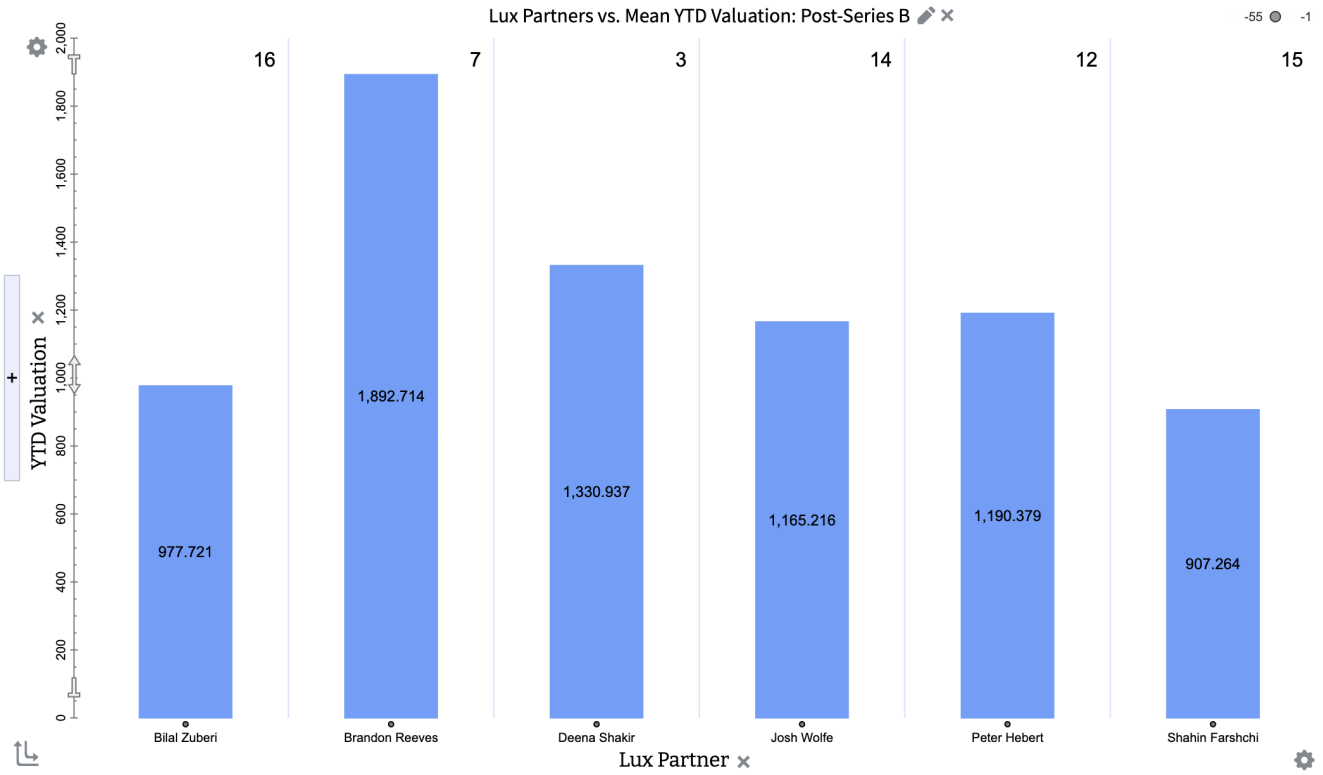


While postdoc founders booked the highest valuations, they're among the lowest in multiples.

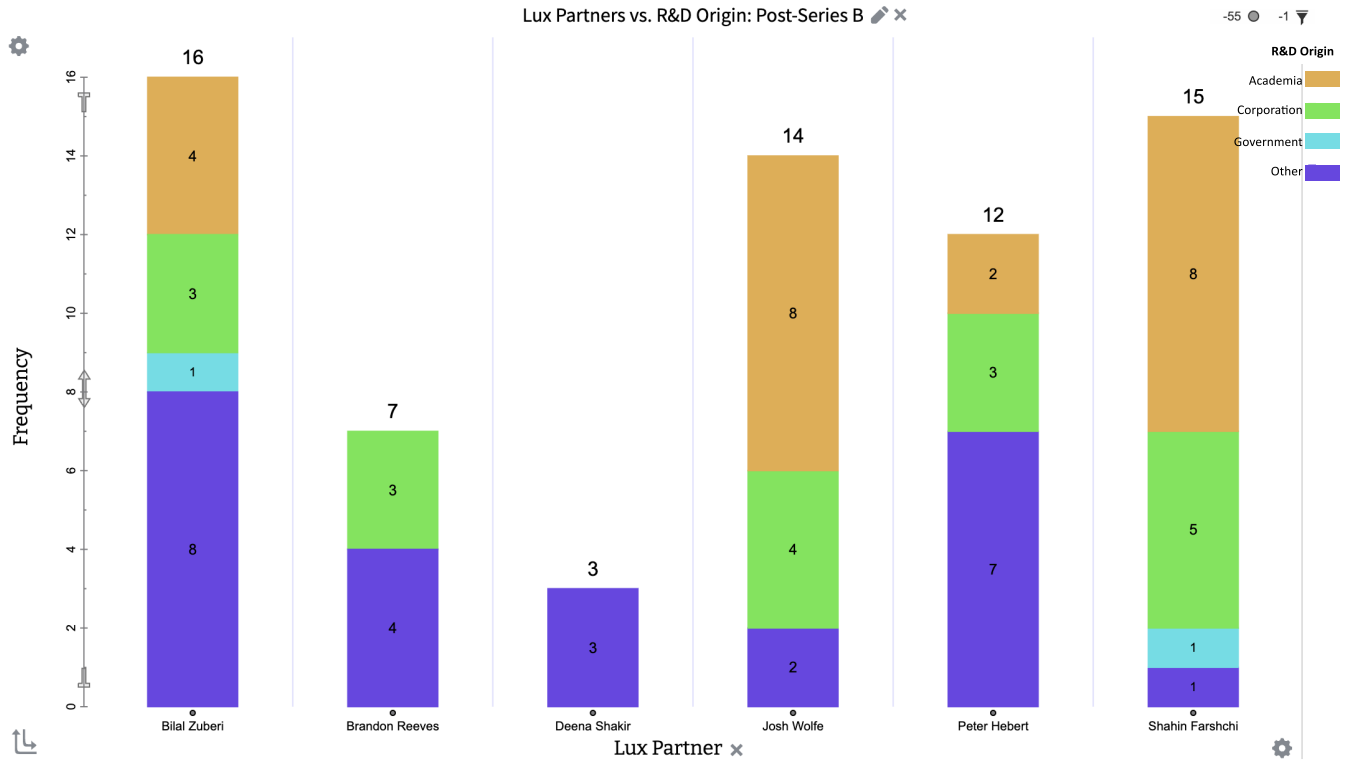


Startups who IPO enjoy the highest multiples.

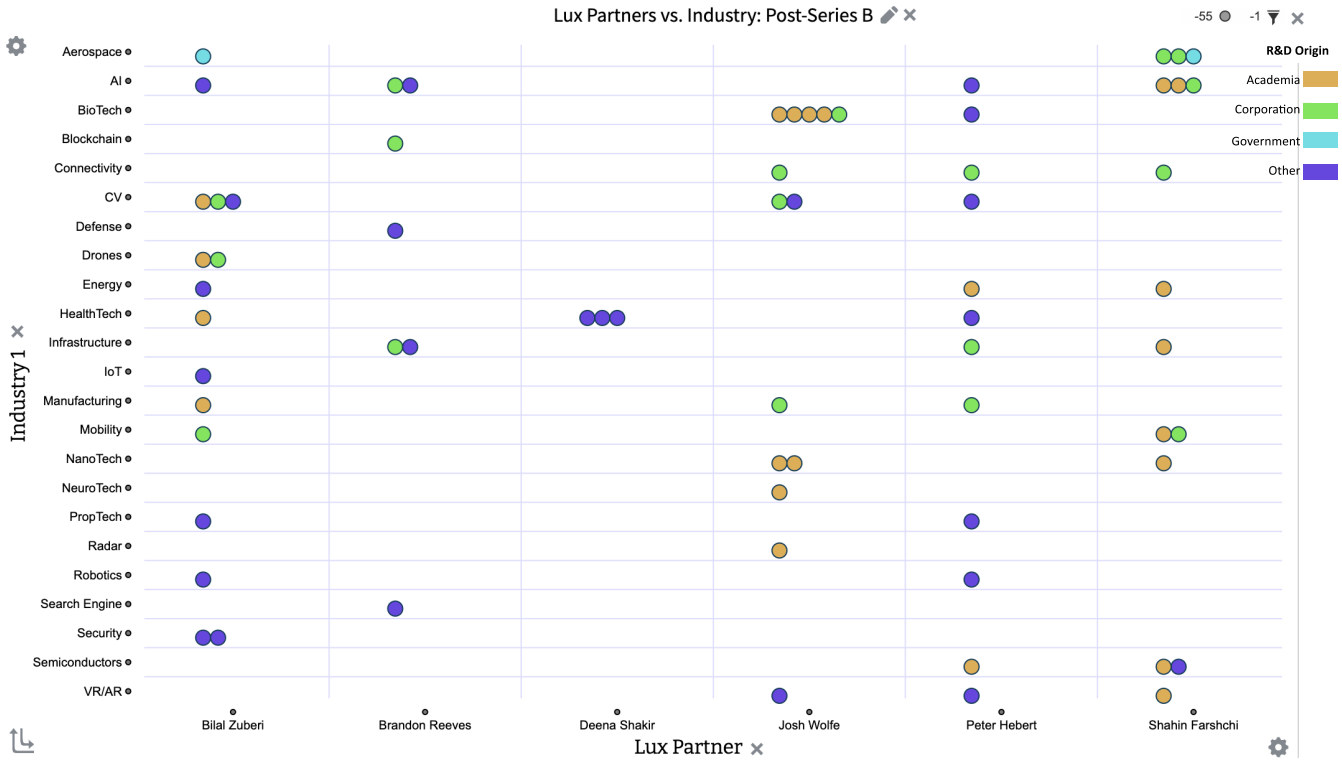
Lux Partners Investment Patterns: Post-Series B



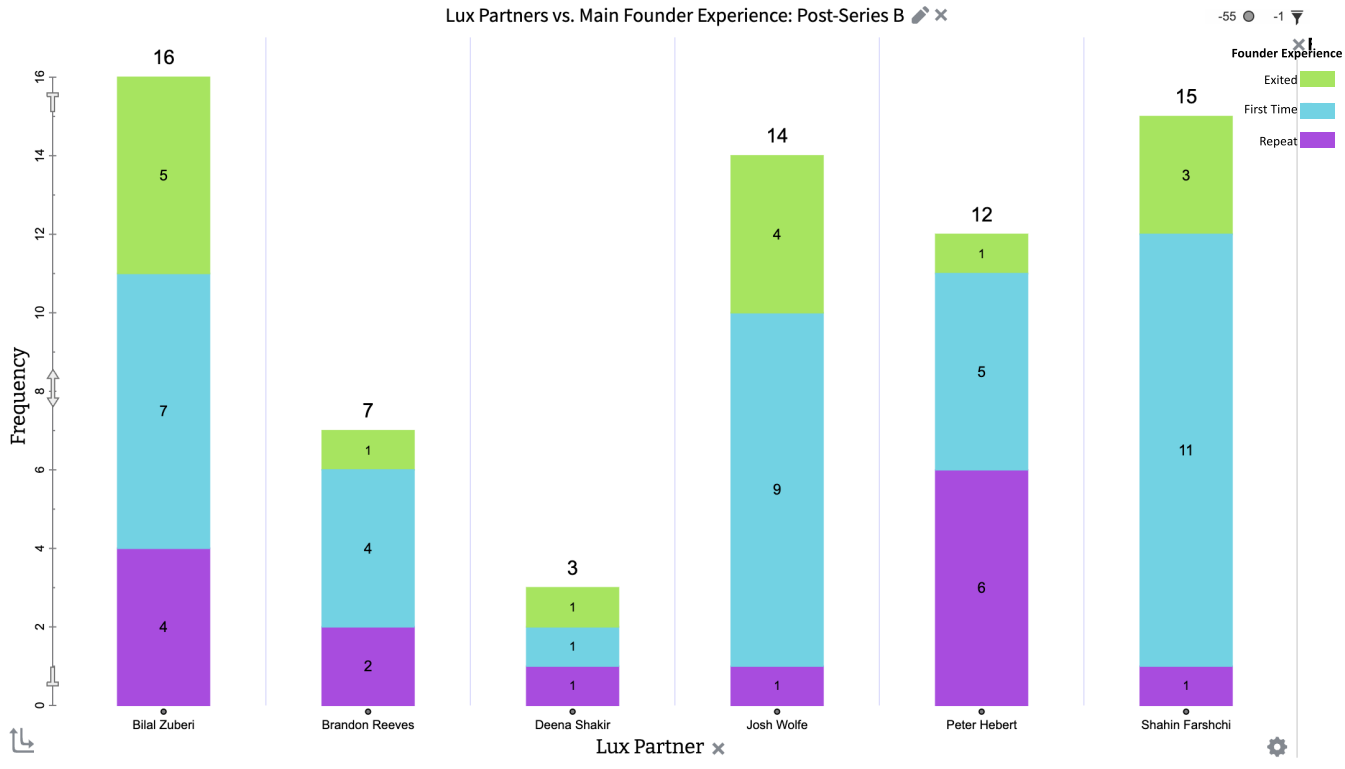
Note that the majority of Deena's portfolio was not included in this study.



Josh and Shahin have deep expertise working with academia-spin outs.



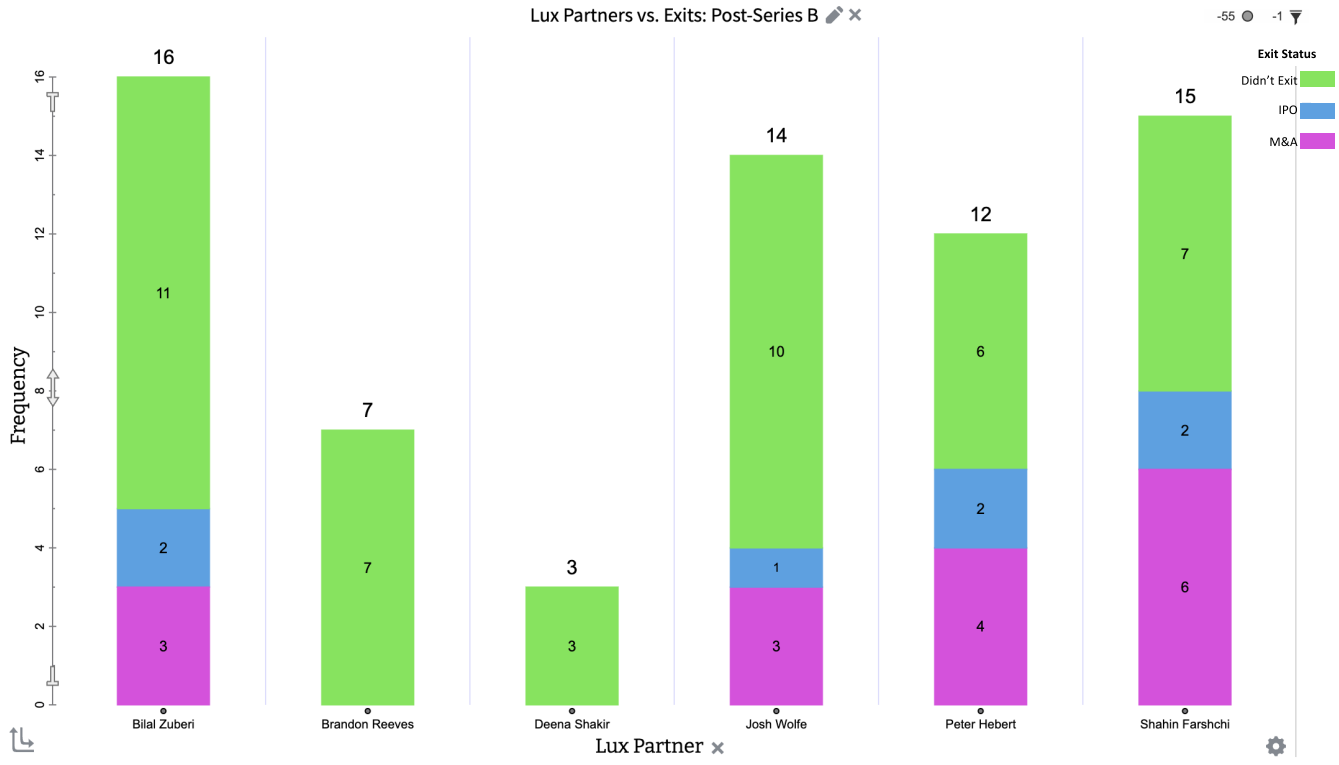
Bilal and Peter are generalist investors; Shahin excels at hardtech while Brandon sticks with software.



Peter mostly prefers repeat founders while Josh and Shahin often works with first time founders.

Lux Partners: Post-Series B

Bilal and Shahin frequently work with graduate-level founders, Josh specializes in faculty founders.



Note that not all portcos are included in this section since many weren't led by a single partner.