



The Quantum Leap July 21, 2022

Shifting Quantum Investment Dynamics

There have been an increasing number of articles describing a coming “Quantum Winter”. While I am still extremely bullish on the sector and do not believe the industry will suffer a full abandonment by investors, the blunt reality is that the investment winds are shifting and will require a more sober view on quantum companies in the near-term.

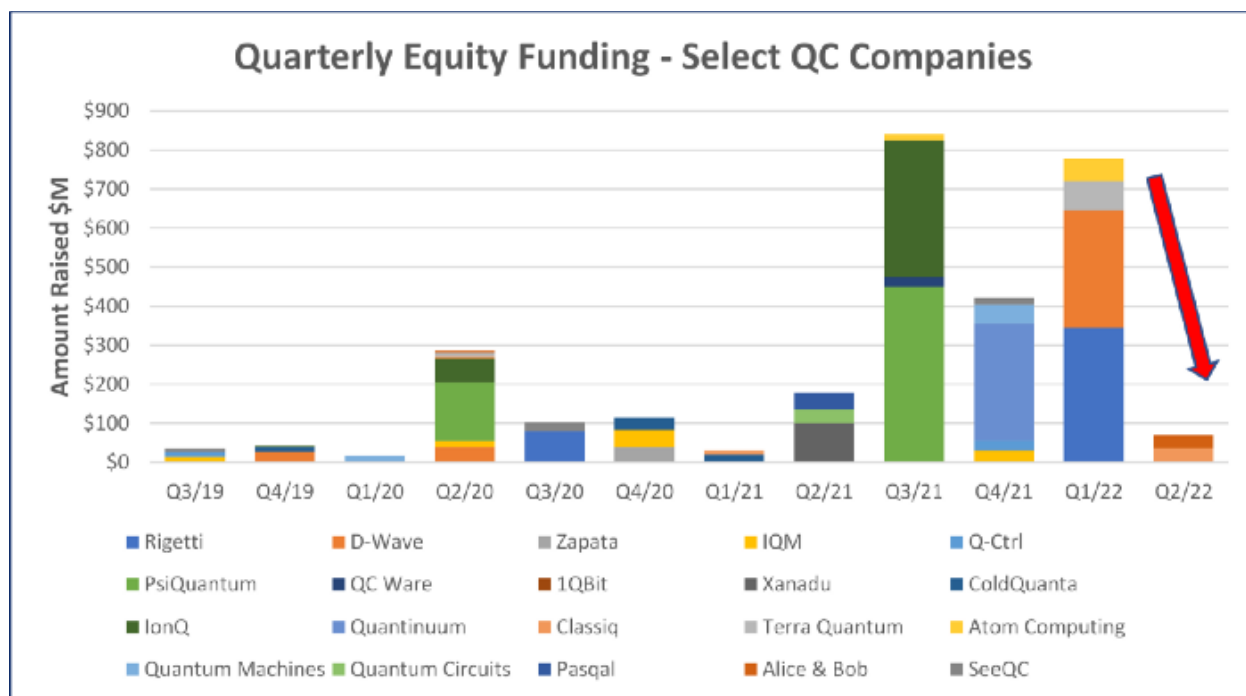
Here are two graphics to help frame this situation. The first depicts recent movements in the public markets, and the second traces key venture investments. Specifically, the table below highlights the decline in stock price of four publicly traded quantum computing companies including ATOS (European based broad information tech), IONQ (trapped ion quantum computers), Quantum Computing Inc. (quantum software provider) and Rigetti (superconducting full-stack quantum computers). Together, these companies are off 75% from their recent highs whereas the broader NASDAQ index is down 30%.

Company	52 Week High	11-18-22 Price	% Change
ATOS	47.16	11.16	-76%
IONQ	35.9	4.68	-87%
Quantum Computing	10.43	2.69	-74%
Rigetti	11.37	4.46	-61%
Average			-75%
NASDAQ	16212	11368	-30%

So, while the overall market is suffering a broad decline including the tech-heavy NASDAQ, this bucket of quantum stocks is down more than double the amount. It is somewhat encouraging that these firms were able to go public recently, but their poor stock performance will make it increasingly difficult for other early-stage quantum companies to follow suit. These four firms are a small sample of the overall quantum industry and the chart is not market-weighted, so this isn't a statistically clean analysis, but the undeniable conclusion is that investors in publicly traded quantum stocks are looking at a very steep hill regarding their quantum stock results (as are employees in these companies granted stock options at anything close to the IPO prices) and private quantum companies considering public markets as a way to raise operating capital will likely need to wait at least a few quarters, if not longer, before they could consider an IPO.

As for the private sector, venture funding of quantum companies had a break-out year in 2021 with nearly \$1.5 billion invested in the top 20 funded quantum businesses. And while 2022 had

started out strong, we've seen a significant decline in funding in the recently ended quarter, as highlighted in the last column below.



Source: PitchBook (excludes grants and debt financing)

A few additional observations:

- The largest equity rounds were for firms creating quantum hardware. **The bar to entry for others working on various qubit modalities is now exceptionally high.** This is not to say others won't be added to the list, but the days of seed-funded quantum hardware companies is likely over, rather major institutional support will be required.
- Venture led boards are beginning to urge an increase from 24 months of operating capital to 36 months, to ensure adequate runway. This will necessitate a lowering spend by portfolio companies which will translate into **longer milestone timelines.**
- Given the overall market malaise and recent pull-back by venture investors generally, new QC rounds will become more challenging, and down-rounds are likely. Down rounds have lingering and residual negative effects on capital markets, so this undoubtably will cause some heartburn in the industry.
- Given the existing dearth of talent in the quantum information industry, combined with rationalized firm valuations and needs to preserve capital, **I expect we'll see increasing M&A activity.**

It's well known that markets move in cycles, so difficult fundraising environments are to be expected. That said, I'm still extremely bullish on the space in general, especially taking a 5–10 year view which is the time range most often cited for achievement of consistent quantum advantage.

My general takeaway from this analysis is that valuations for quantum companies will become rationalized in the next few quarters, providing an attractive investment window. In addition, while quantum hardware companies have taken much of the spotlight, there are many other players in the quantum ecosystem that will benefit from broader industry adoption, particularly those involved with the “picks and shovels” of QC such as cryogenics, lasers, optics, controllers, vacuums, etc., and certainly for the software providers, especially those agnostic to the form of hardware used. Quantum sensing and communications are also appropriate focus areas.

In summary, I’m not a believer in a full-on quantum winter, but we are in for some near-term challenges and disruption in the Quantum Computing arena. Tighter budgets, more difficult access to funding, and laser-focus on milestone achievement will be the norm. Of course, the evaporating liquidity will make milestone achievement that much more difficult, so there is likely to be some negative feedback loop effect as well. However, in some sense, this will be positive long-term in that “survival of the fittest” will winnow away some of the marginal players. I predict and expect the industry will come away stronger and I look forward to the eventual “Quantum Spring”.

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