# Market Commentary: The Complexities of Innovation: FTX vs. Quantum Computing

***November 2022***

A primary goal of private equity[1] is investing in future innovation. At the outset, this innovation can seem quite complicated. It is impossible to understand the true time to market or impact it will have. As a result, many of the companies invested in by early-stage private equity investors will go bankrupt. And that can be a healthy part of the process because some of the surviving companies will provide exponential returns. A maximum loss on an investment is 100%, while the upside on a winner can be many times that. Let's illustrate the math on that with a hypothetical set of five investments, four of which fail completely, and one which does really well:[2]

**5 years, 15% annualized: 4 failures and a 10-bagger**

| Company | Initial Investment | Period Return | Value Year 5 |
|---|---|---|---|
| A | $100 | -100% | $0 |
| B | 100 | -100% | 0 |
| C | 100 | -100% | 0 |
| D | 100 | -100% | 0 |
| E | 100 | 1000% | 1,000 |
| | $500 | | $1,000 |
| | | **Annual Ret.** | **14.87%** |

The spectacular descent of once prominent companies can surely grab media headlines and investor attention. Fraudulent blow-ups like Theranos and Enron tend to have incredibly compelling leaders providing a spellbinding story of innovation with the promise of huge success. Sam Bankman-Fried, who led FTX, was no different than Elizabeth Holmes or Kenneth Lay in that respect. Upon further analysis, we can draw differences between Theranos, who claimed a totally new, complex innovation, and FTX and Enron, which both operated in an existing medium. While the world of cryptocurrency is certainly still in its early phases, FTX looks closer to a simplified Enron than Theranos in that it simply claimed to be very good at running an exchange and brokerage operation –albeit within the world of cryptocurrency[3].

Quantum computing, as highlighted in the November 28 issue of Barron's, is a true leap forward in potential computing power. This potential is more in line with the Theranos narrative (if true) as compared to FTX. It is an entirely new concept – an innovation the world has not seen previously – adding a level of complexity in understanding its use cases and future application. To put quantum computing in context we need to revisit the power of the transistor.
Sixty years ago, four transistors could fit on a chip. Today you can get 11.8 billion on one – proving out Moore's Law.[4] That ability has directly led to us all having very powerful computers in our pocket (e.g. an iPhone). But transistors are limited in their binary nature – a transistor can be switched between two binary states – 0 and 1. More transistors create linear power which limits our ability to tackle truly large problems.

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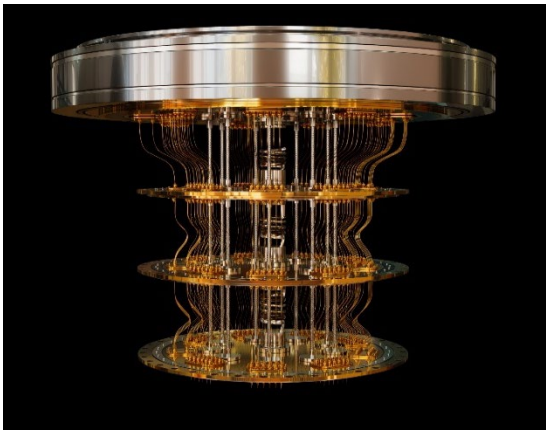
[1] Private equity can be a high-risk endeavor with low to no liquidity, especially if the private equity investment is in a very early-stage company

[2] This is not intended to represent Fountainhead's performance or the performance of any actual investment. It is purely illustrative of how the math works.

[3] Cryptocurrencies themselves ,and some of the financial activities surrounding them, may feel complex but they are iterations of existing concepts in finance. The Crypto Story by Matt Levine **is** a cover-to-cover primer on Crypto in Businessweek – a very worthwhile read.

[4] Moore's Law was an observation that turned out to be quite true where the number of transistors on an integrated circuit would double every two years. For more on this concept, *Chip War* by Chris Miller promises to be a really interesting book – the next book I read. Chips are most likely the important innovation in the last 60 years.

# FOUNTAINHEAD INSIGHTS



Quantum computing solves the limitations of transistors. Rather than a "bit," quantum computing uses Qubits. One can think of a bit as an integer (either 0 or 1) and a qubit as a real number between 0 and 1 (e.g., 0.35). Due to this extra ability, Quantum computing is not limited to the linear byte, creating an exponential (rather than linear) quality to its calculating ability. Perhaps the easiest way to illustrate this is that it is considered impossible for a classical computer to crack a 2,048 long number code, which is the basis for a type of encryption used ("encryption key"). Most experts believe that a quantum computer will be able to break the 2,048-bit encryption key in under 24 hours within the next 15 years. The impossible will become possible.

Quantum computing is hard to comprehend. It is a brand-new technology. It seems exciting and, assuming it reaches the potential many believe it can, it will solve real world issues that are not feasible today. Think of the near infinite combinations of potential chemical reactions and simulations which a quantum computer may tackle in creating new treatments or assisting in the most beneficial treatment for a patient based on some huge subset of inputs. As history has shown us with all innovation, it can be difficult to separate the winners from the losers, promising opportunities from potential scams, time to market, winning technology and so on. Quantum computing is real, though a fraud in this area claiming some technological breakthrough would be hard for most to understand, much less uncover. Ultimately, though, it is the continued drumbeat of innovation and human achievement which has generally increased overall wealth and quality of life.

Both FTX and Quantum computing illustrate the complexity and excitement (given innovation) of investing. The blue-chip private equity firms that got egg on their face for investing in FTX were not lambasted for sticking their neck out on an aggressive, low-odds investment, but due to the holes in their due diligence. They got taken by a fraudster and did not recognize some of the red flags present, such as the conflicts presented by the intermingling of assets between the FTX exchange, brokerage, and hedge fund of Sam Bankman-Fried, among other issues. But none of those private equity firms lost a material amount of their assets under management because they are **diversified**. They understand that even they, alphas of the financial universe, cannot pick winners with surety. The blue-chip private equity firms affected will all upgrade their processes and live another day. And they will most likely all invest in a **portfolio** of quantum computing firms with a calculated exposure that fits the opportunity and further diversifies their holdings. After all, appropriate diversification and sizing are the key elements of a portfolio regardless of whether the portfolio is constructed for the smallest of retail investors or the largest and mightiest of the private equity firms.