

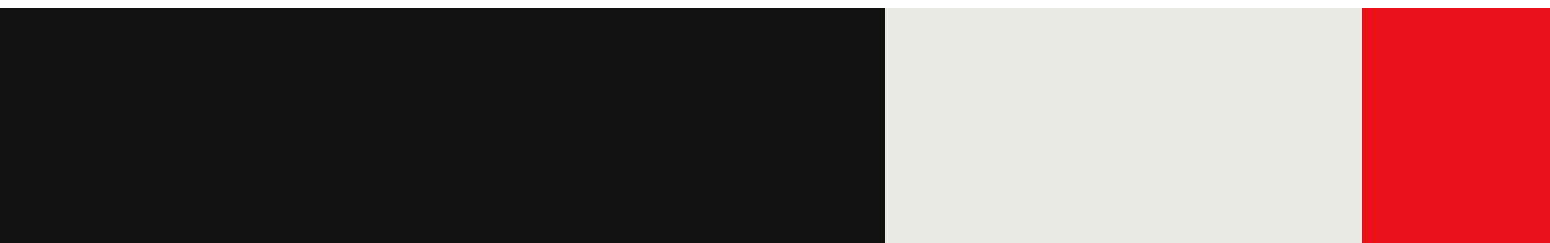
Quantum computing in banking heats up with another entrant

Article



The news: Ally Financial partnered with **Multiverse Computing** to explore creating investment portfolios using [quantum computing](#)—yet another instance of a bank joining the quantum computing race.

What is quantum computing? The technology requires special [quantum computing machines](#) that can solve more complex problems than a traditional computer is capable of solving.



- Quantum computers break down information into units called quantum bits, or **qubits**. Instead of seeing the information as a 0 or a 1, it sees information as a 0 and a 1 and everything in between.
- This allows the computers to analyze the problem in new ways, and solve it with fewer equations and in much less time.

Why are banks investing in quantum computing? Many banks have started working on quantum computing projects that could one day become part of their normal operations. The speed-up in computing time is applicable to many problems in financial services.

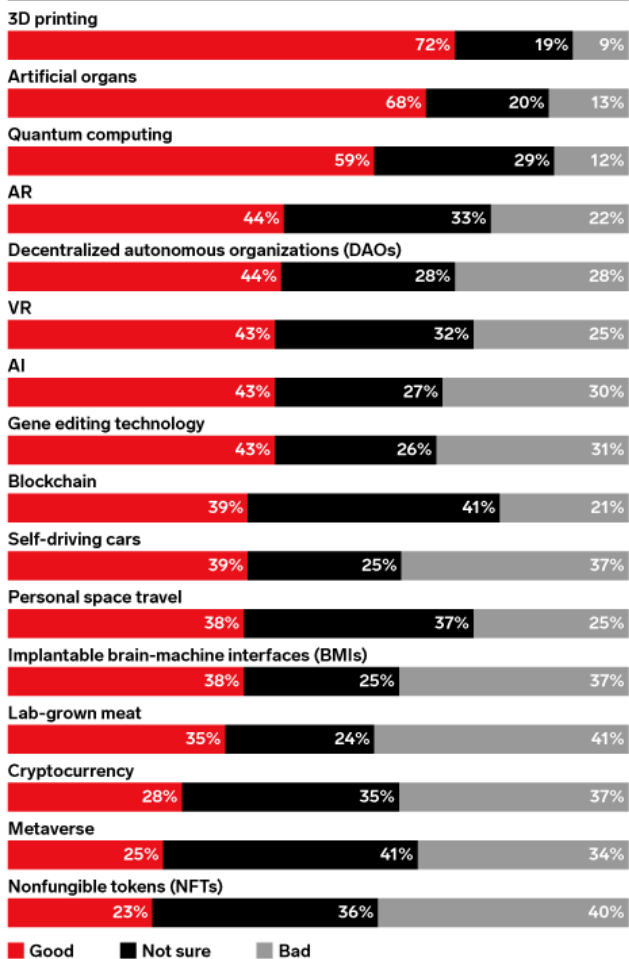
- **Portfolio optimization:** Quantum computers can run Monte Carlo simulations in impressive time. These simulations analyze risk-and-return trade-offs on combinations of investments to optimize a portfolio based on a customer's goals and risk tolerance.
- **Derivatives pricing:** This is a complex undertaking because the price of derivative instruments depends on the price of an underlying asset. Variable factors like counterparty risk, time to expiration, and interest rates all **influence** the price. Quantum computing can simulate a large number of scenarios in seconds to determine an appropriate price.
- **Cybersecurity:** Quantum computing would enable fraudsters and bad actors to build a program that could **break down** the cryptography—the mathematical codes used to encrypt communications—of a cybersecurity program in seconds. But alternatively, the technology could be used to create an **unbreakable defense** that no malicious actor could get through.

Quantum computing offers a competitive advantage: Banks and financial institutions that are able to implement it in their daily practices could get a leg up on their competitors.

- They could reduce the processing time for many daily tasks to mere seconds. For example, customers that request a derivative price must wait hours for the FI's machines to compute the price. With quantum computing, an investor could call and receive the price in real time, allowing them to invest quicker.
- Reduced processing time would also reduce the resources needed to complete many tasks. Quantum computers also require less energy since they do more work in far less time, cutting costs and emissions.

US Adults Who Think Select Emerging Technologies Will Be Good vs. Bad for Society, April 2022

% of respondents



Note: ages 18+; numbers may not add up to 100% due to rounding
 Source: YouGov as cited in company blog, April 27, 2022

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What are the challenges of implementing quantum computing? It's a young technology that was first studied in the early 1980s. Quantum computers are generally designed to solve very specific problems, and they are sensitive to any kind of disturbance, like noise and dust. Banks also face some hurdles in seamlessly implementing the technology.

- Because quantum computers are finicky, banks will likely tap into the machines through a partnership with a quantum computing fintech that's able to maintain them. This means banks will need a flexible tech stack that most likely runs via APIs and the cloud and can handle common coding languages like Python and C++.

- Banks also function under tight regulatory scrutiny. Using quantum models will require banks to have a firm grasp on what exactly the models are doing and how they're using customer information.

Which banks are using quantum computing? Worldwide [spending on quantum computing](#) is expected to reach \$630 million by 2027 and \$2.2 billion by 2030, according to Inside Quantum Technology. Here are some banks that have already jumped in, and what they are doing:

- [HSBC partnered with IBM](#) for a three-year project to explore pricing and portfolio optimization using quantum computing.
- [Goldman Sachs and quantum startup QC Ware](#) have done extensive joint research into the application of quantum computing to Monte Carlo simulations. The bank believes this will accelerate its entrance into quantum computing.
- [JPMorgan hired a quantum computing expert](#) earlier this year who specializes in cryptography. That team is dedicated to exploring secure ways of communication to protect the bank from cyber attacks as quantum computing technology becomes stronger.
- [Caixa Bank partnered with quantum computing firm D-Wave Systems](#) to build out a new process for portfolio hedging. By using quantum computing, the bank has seen an up to 90% decrease in time-to-solution for investment portfolio hedging.

Our take: Many experts estimate commercialized use of quantum computing is still about a decade away. The hurdles banks face in its adoption will resemble the challenges they've had to overcome when migrating their mainframe system to the [cloud](#)—like service disruptions, legacy technology barriers, and resistance to buy-in for long-term projects. That means banks need to start preparing for the technology now.

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