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JPMorgan Years Away From Seeing Quantum-Computing Dividends

The bank and IBM researchers are experimenting with the technology's uses



JPMorgan has been running tests on IBM's 20-qubit machine, shown here, via the cloud. PHOTO: IBM CORP.

By Sara Castellanos

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JPMorgan Chase & Co. sees potential in using quantum computing as a way to significantly speed up financial calculations, but it is still years away from deploying the technology.

Since late 2017, the bank has been collaborating with researchers at International Business Machines Corp. to experiment with quantum computing. JPMorgan has seen some minor successes, including one that proves, in theory, that quantum computing can radically speed up certain financial models.

But Ning Shen, managing director in quantitative research at JPMorgan's corporate and investment bank, said the technology will take several years to mature, in part because the hardware required is extremely complex and adapting and creating new quantum-based algorithms will take time.

• Cyborgs Need Not Apply

Cybersecurity teams can look forward to automation and technology advances that, if deployed effectively, can free them from repetitive tasks. Likewise, C-suites and boards can benefit if the cybersecurity function uses AI, robotic process automation, and other technologies to provide more insightful business and risk analysis.

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“You need a lot of knowledge, a lot of understanding before you really get to any real applications,” Mr. Shen said.

Experts say quantum computing can be orders of magnitude more powerful than traditional computers. By harnessing the properties of quantum physics, quantum computers have the potential to sort through a vast number of possibilities in nearly real time to come up with a probable solution. While traditional computers store information as either 0s or 1s, quantum computers use quantum bits, or qubits, which represent and store information as both 0s and 1s simultaneously.

Timelines regarding when companies will start to see measurable business value from quantum computing vary from about three years to a decade, but that’s not stopping companies such as JPMorgan from early experiments.

By 2023, 20% of organizations, including businesses or governments, are expected to budget for quantum-computing projects, up from less than 1% in 2018, according to Gartner Inc.

Lori Beer, JPMorgan’s global chief information officer, said in 2017 that the bank began experimenting with quantum computing to understand how it would affect the company and its customers. “We’re optimistic that this is a core capability we need to think about for the long term,” she said back then.

Mr. Shen now oversees a working group on quantum computing that includes employees from JPMorgan’s corporate and investment bank, asset and wealth management, and the consumer and community bank.

His team has been running tests via the cloud on IBM’s 20-qubit machine, suitable for small-scale experiments. Mr. Shen says using quantum computing to speed up computationally intensive option-pricing calculations is promising.

A computational algorithm known as Monte Carlo is used to calculate the theoretical value of an option, or a contract that gives individuals the right to buy or sell an underlying asset at a specific price and time.

These types of calculations can be time-consuming for traditional computers, which can take hours to compute option prices and risks for a large portfolio of complex trades, Mr. Shen said.

The team's experiments have proved that, in theory, a scalable, commercial-grade quantum computer could run similar calculations using quantum computing-based algorithms in seconds. "It [can] save us many hours and then we can change the business model completely," Mr. Shen said.

But first, quantum computers need to overcome problems related to error mitigation and quality of qubits, tasks that IBM has said it is working on to commercialize the technology. Qubits are delicate and easily disrupted by changes in temperature, noise, frequency and motion, which can derail a calculation.

Another area of opportunity involves using quantum computers to perform risk-assessment calculations in real time instead of the hours or days it can take for classical computers, Mr. Shen said. IBM has said it has developed quantum algorithms that could be used to significantly speed up risk assessments associated with, for example, investment portfolios, when commercial-grade quantum computers are available.

IBM is collaborating with more than 60 companies, national laboratories and academic institutions to experiment with its early-stage quantum-computing technology via the cloud.

Big companies are experimenting with the technology now because they understand the deep correlation between computation and business value, said Dario Gil, IBM's director of research.

It will likely take years to develop the right quantum algorithms and applications for this next-generation computing technology, he said. Companies, though, are already seeing business impact through early experimentation, Mr. Gil said. "The commercialization path to quantum, and the implication to the industry, is going to be a continuum, and it has already started," he added.

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