Question Report

#	Question	Answer
1	in entanglement, can change in q1 effect q0 or is it one way only?	This is an excellent question, and goes to the heart of the nature and power of quantum entanglement. In classical computing, the information would flow in one direction, if bit A controls bit B, flipping B never changes A. Quantum Entanglement is completely different. Once two qubits are entangled, their states become linked symmetrically. There's no longer a meaninful notion of 'q0 affects q1' or vice versa, they share a combined state. Measuring the state of one instantly causes the state of the other to jump. In the maximally entangled Bell pair we looked at, the 2 qubits behave as a single, unified quantum system rather than two seperate objects.
2	In addition to your paper, which sources would you recommend to build up knowledge in this area from beginner level?	There are a number of really good books. I would recommend the following: 1) Quantum Computing with Python and IBM Quantum Experience. This is to help you get started with hands on examples and Python programming if you haven't done it before. 2) Dancing with Qubits - Robert S Sutor - This is a really accessible introduction to quantum computing, and will help you grasp the theory. 3) Quantum Computation and Quantum Information - This is the ultimate textbook for all things quantum computing. It is very dense so might be worth waiting until you've developed some core skills to start this one.
3	How does the cost of running quantum models compare to using traditional computing	The short answer is that classical computing is currently far cheaper, mainly because it has been fully commoditised, while quantum computing is still at a very early stage. Classical hardware has benefited from decades of scaling and cost reduction, whereas quantum machines are still bespoke laboratory systems that require extreme cooling and precision control. This is reflected in cloud costs too: running a quantum circuit is far more expensive, though providers like IBM offer free monthly credits, which is plenty for beginners experimenting with small circuits.

4	Not so much a question, but a thought Experiment: Is Quantum Computing viable to calculate almost near time risk -- moment by moment -- of a fleet of vehicles that are sharing their data (location, acceleration, braking, etc.) telematically? And price that risk for insurance purposes? Your thoughts please, thanks.	My counter-question would be: *what exactly can't we do with classical computing today* for that use case? If the challenge is one of scale, optimisation, or dimensionality, then quantum computing could one day accelerate certain sub-problems. Rememer, similar to Quantum Internal Models, the best use case for quantum isn't about replacing the entire workflow with a quantum version; it's about selectively accelerating the computational bottlenecks where quantum algorithms can genuinely outperform classical ones. So, in a telematics-based, near-real-time pricing setup, I expect most of the system, the data ingestion, cleaning, and inference would remain classical in the same way as in the QIM example, the calibrations, etc remained classical. Quantum might eventually help behind the scenes, for e.g. in model training or optimisation, but I expect not in the live operational layer.
5	How likely do we think we are to get the required hardware to be using quantum computers within the next 10-20 years?	It really depends on the use case. For certain types of optimisation problems, quantum hardware such as annealers, like those from D-Wave are already capable of providing solutions today. They're not universal quantum computers, but they do offer practical value for specific classes of problems, especially combinatorial optimisation. If the aim is to use true randomness rather than pseudo-random generators, for example, in encryption, sampling, or risk modelling that's also something we can already achieve with today's hardware through quantum random number generators. These are commercially available and even integrated via APIs, and they have use cases beyond finance, including cybersecurity and secure communications. For full fault-tolerant, general-purpose quantum computers, we're likely still a decade or two away, but progress is steady and we're already seeing intermediate, hybrid approaches emerging where quantum devices complement classical systems rather than replace them.

6	Good point Amjad, about flipping. My thought is there are a few millions of vehicles in a typical book of business for very large insurance companies.	Once we start talking about millions of vehicles, we're firmly in the realm of massive parallel inference and data streaming, which classical computing, especially distributed and cloud-based architectures, already handle extremely well. Quantum computing doesn't really scale in that way yet, it doesn't process millions of data points in parallel like a GPU cluster would. Instead, its power comes from state-space parallelism, the ability to represent many possible states or outcomes simultaneously and manipulate them concurrently through quantum algorithms. So rather than running risk calculations vehicle by vehicle, a more plausible use case would be to encode aggregate relationships or correlations across the fleet, or to optimise higher-level decisions like portfolio-level reinsurance or dynamic pricing strategies. In other words, quantum might eventually help learn from all those vehicles rather than track them all individually in real time.