Reading Part 4

Read the text and answer the questions. Use a maximum of five words for each question.

Borrowing techniques from seismology to calculate the likely frequency of market fluctuations is all very well, but it has the same fundamental limitation as earthquake prediction. It does not tell us what we really want to know: exactly when and where the next cataclysmic event will be. That kind of predictive capability would demand what seems an unobtainable wish – a comprehensive, bottom-up theory of why markets move as they do.

At the moment, that ideal is confounded by the fact that in any one real-life market there is a huge number of interactions that are unique and individual. The result is a gaping divide between macroeconomics (the study of movements in economy-wide indicators such as GDP, inflation and unemployment) and microeconomics (the study of how individual people and companies in a market make decisions to buy and sell). Trends in macroeconomics are the sum of microeconomic decisions but attempts to extrapolate from the one to the other are by necessity grossly oversimplified, says Eric Weinstein, a physicist who works for the Natron Group, a hedge fund in New York City.

They often assume, for example, that agents in a market all have an unchanging list of all the things they want. There's no room for them to change those preferences, by learning, for example, or becoming interested in new products. That puts all of economic theory out of kilter at the first step.

Might physics help in bridging the divide? Physics also deals separately with the microscopic – the individual movements of particles in a gas, say – and the macroscopic, for example when the sum of those movements creates a pressure that enables a gas to push a piston. But it also has mathematical frameworks, such as statistical mechanics, capable of bridging the gap between them.

Weinstein has been involved in one of the most audacious attempts to meld physics and economics: showing how gauge theory, the mathematical underpinning of the quantum field theories of the standard model of particle physics, might be the key to a rational theory of economics based only on physically observable quantities, rather than hypotheticals akin to the economists' list of ordered preferences. Impressed by this idea, physicist Lee Smolin of the Perimeter Institute in Waterloo, Ontario, Canada, has recently studied how gauge theory ideas might be incorporated into some basic economic theories about how markets work.

It is part of a wider movement towards 'agent-based' models that are better equipped to deal with the non-equilibrium behaviour of markets. In these models agents are treated as particles, albeit ones imbued with adaptive behaviour. They make mistakes, try to learn from them, and change their beliefs and expectations about the market on the fly. Because most humans tick in broadly similar ways, all those behaviours can be dealt with statistically.

1. What have techniques from seismology been used to predict?

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2. What needs to be in place before accurate predictions can be made?

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3. What do markets comprise?

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4. What is the name for the academic study of purchasing decisions?

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5. What does macroeconomics fail to take account of?

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6. What additional tool does physics have in order to investigate the relationship between the micro and the macro?

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7. What has Weinstein been trying to apply to economics?

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8. What do economic agents have, that particles do not?

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