Probability as input or output of a social science model?

Emmanuel Haven - FBA and IQSCS - Memorial University, Canada.

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- *The model informs the probability: i) assume identical distributions and; ii) the distribution is...*

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- quantum physics delivers a consistent calculus of probability for a **certain kind of experiment involving a system and apparatus** (Susskind)

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- Quantum probability expresses a deeper level of uncertainty?

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- Quantum-like is defined how though? Wave as carrier of information? A deeper level of uncertainty?

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- When both functions interfere, they produce uncertainty in both the participants' understanding and the actual course of events

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- We could identify the existence of a negative (or positive) feedback with the width of an amplitude function

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- If this wave function is dependent on price, the *probability* of mispricing would be high indeed (noise trading)

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- The approach here, is bottom up: positive or negative feedback effects are linked to levels of erroneous information

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- The wave function is still linked to probability but now also guides the particle

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- For instance, this real potential could be an option intrinsic value

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- Fisher information is also linked to the quantum potential of Bohm
- Average value of the quantum potential is proportional to Fisher information

When not looking: the 'less randomness' case: c2) example 2 (the macroscopic lab setting)

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- The motion of a droplet is driven by an interaction with a superposition of waves emitted by the points the droplet has visited previously
- Brady and Anderson show that the droplets follow an analogue of the Schrödinger equation (with a constant of motion which is not h - of course)

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- If this were true - it is powerful: this means that there is a firm green light to interpret classical stochastic forces as inputs to information (recall the relation between quantum potential and Fisher information)
- This model is holding great potential as an explicit formalism to model information in an economics/finance setting

When not looking: the 'less randomness' case: c3) example 3 (public information differentiation)

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- Some interesting results came forward (and more work is currently performed)

When not looking: the 'less randomness' case: c3) example 3 (public information differentiation)

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- If the returns try to jump well out of range, a strong negative reaction force will pull those returns back
- Both forces (blue is force linked to quantum potential) restrict the variation of returns in a range
- Non-zero slope indicates some sort of mechanism: which keeps returns within bounds (in fact check bottom of quantum potential versus bottom of real potential)

When not looking: the 'less randomness' case: c3) example 3 (public information differentiation)

- For in-range values, gradient of force associated to real potential is larger than the gradient of force associated to quantum potential

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- For in-range values, gradient of force associated to real potential is larger than the gradient of force associated to quantum potential
- Two types of public information?

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- Hermiticity is an issue
- For instance the Hamiltonian of Black-Scholes is non Hermitian

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- for applications in economics, as an information modelling 'machine'
- Also in other areas:
- Finally, we did not discuss 'Why quantum' in this talk. This is the title of a chapter in Andrei's Handbook (Palgrave MacMillan) where quantum in biology is discussed

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THANK YOU!!!