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The Gathering Clouds: The Case of Time and Digital Economics

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ABSTRACT

This paper examines two fundamental concepts of time in a typical economic process and their importance in digital economics. A model of time in economics and economics in time is developed. It argues that the Newtonian and Austrian models of time in economic analysis create economic vagueness, which has allowed a vacuum preventing mainstream economics from evolving and concludes that the basic or traditional concepts should be revisited in line with the current trends in the several industries so that economics as a body of knowledge is not caught in the dark.

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INTRODUCTION

The Boland (2002), Patruti and Tatulescu (2015) and Goulielmos (2018) approach to time in economics is based on the submission by Carter (1958). This is conveniently the building block from which all other postulations are made involving time in economics.

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The advantage of Time in Economics is the contextual relevance that in the economic evolutionary process, the state of equilibrium is separated from the market fluctuations for system clarity. Interactions by economic actors is time bound in any economic system – market, welfare and state planned – and assumed to only occur solely, freely, in different markets - virtual or actual – within 'timebound' so they obey the frameworks of the production, or service contracts (Meyer, 2002; Eke & Osi, 2022; Schwab, 2016). To take into consideration other dimensions of time in the economic process other than being a mere serial constant record of the sequence of events is, therefore, equivalent to saying that the classical school of thought's emphasis on the state of equilibrium is essentially a time-bound analysis in economics. Their restrictions to economic actors self-regulating and the macro system seeking a pathway to equilibrium may seem unnatural, outdated, and unconventional, but it is convenient and expected to be computationally universal as the virtual socio-economic space does not respect cultural, historical, geographical, geophysical, and country-specific realities (World Trade Report, 2021).

An economist may simply manipulate an algorithm to influence the economic process. Targeting X units of output, he or she can alter the algorithm such that (x = 2X). This enables the economist to encode an altered algorithm.

With these definitions outlined above, information asymmetry may arise if and only if this hypothesis contains an *economic vagueness*: This hypothesis specifies more than one scenario as is enshrined in the basic concepts of economics given the state evolutionary trends in the telecommunication and digital space but fails to give probabilities for each scenario. It is simply because there are no consistencies in this evolution process in terms of inventions or improvements. These are a result of information and computational advantages held by economic agents and their firms (Boland, 2002). For example, in the classical economic analysis, there is ample reference to free entry and existence in a particular industry, assuming that there are many active participants competing π. Assuming that there is consistency or predictability in innovation, each firm producing within β_h; therefore, one π produces a product solving society's problem, P, such that P = HP, as a result of the innovation solving or accelerating productivity in the internet world P = IP and many other products assumed to be of equal utility. It should be noted that this conclusion, accompanied by economic vagueness and information asymmetry, may not be directly proportional.

Some authors, such as Yoshida (2001), assume time as given in their analysis or largely ignore taking it into consideration, in which models are constructed such that life's realities are oversimplified, thereby denying researchers the only consistent evolutionary trend that impacts economic process where functions are designed ignoring time and information as variables. In the submissions made by Rohatinski (2017) and Boland (1978), they argued that time is a flow concept in a typical production process. In an ecosystem or economy in which the virtual world is fully operational and integrated into the human world as a viable alternate socio-economic realm, it would be very difficult not to produce goods and services that satisfy wants and matched with very high productivity very rapidly since P = HP and P = IP. It is assumed, as given at this juncture that the algorithmic pathways that are economically relevant for very powerful super micro-computers chips, etc., would be clearly embedded into the economic analysis of the future (Barrdear & Kumhof, 2016; Eke et al., 2020). This is not to claim that such processes are necessarily reasonable but rather to reflect that they are quantitatively and qualitatively relevant to the scheme of things as outlined in this paper. Nonetheless, it is worth noting that both Newtonian and Austrian models of time in economics are also capable of providing insights into further

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exploration of the economics of the virtual world and its impact on the real world.

Bailey (2007) and Deprez (1985) impressed that, by contrast, economic vagueness is required to cause information asymmetry, such as the unproven hypothesis of the direct link between the economies of the virtual and real worlds. If there were no economic vagueness then any information asymmetry is because of time-bound productivity gains, which are uniquely specified by the structure of and resource input into the system design and algorithms. It is therefore, reasonable to say that this system is algorithmically influencing the real or human world's economic process.

Economics in Time

In order to assess the possible difficulties in time that may arise in analysing economics in time, it is rather useful to brush aside for a moment the normal conventional notions of time and economics and concentrate on time as an input resource in a typical production process, (Eke, 2016 and Eke, 2020). Consider a standard production process with inputs $\beta_{i\ f}$ and $\pi_{i,\ f}$ and some constraints U. All things being equal, this system delivers optimum output in the real world, while in a pure virtual or digital world is simply a probability distribution over a period within the constraints the algorithmic design reflecting some economic observer's uncertainty.

To introduce economics in time into classical economic theories is to impose a constant condition on the production process through time; that is $\pi_i = \pi_f = \pi_{i,}$ where π is an equilibrium condition (Eke & Osi, 2022). In other words, this equilibrium condition that emerged in the past is required to be the same one in both states – digital and human worlds – and over time itself. With knowledge of an equilibrium condition β_h and U, a consistent π can be deduced, from which β_h can be calculated. In studying Batabyal et al. (2001), we concluded that there are two distinct ambiguities that may arise when considering economics in time-based on classical economic theory: ambiguities derived from fluctuations and those arising from information asymmetry. In this paper, a totally unconventional view on the subject matter is taken whereby a computation, which algorithmically produces an output from an input, is never ambiguous. So, a theory that predicts a "crazy" powerful possible transition to and from in terms of the communication between the human/physical world and virtual world will not be called ambiguous because of them, even if those abilities make the theory appear unreasonable or hard to accept. The "crazy" ability to make this interface has been assumed, so one should expect some "crazy" conclusions as regards the essence of economics these "times".

Consistency in the ecosystem is a situation in which a consistent history of innovations is not possible (Carter, 1958; Boland, 1978; Klein, 2007; and Tony Yu, 2020). The "system ambiguity", in which a system algorithm can be manipulated to correct a market disequilibrium, is the usual example of such ambiguity. Classical constraints arise when this hypothesis fails to specify any valid condition or evolutionary trend. Classically, this occurs because the consistency condition is rendered unsatisfiable either for a particular set of possible β_i or for all β_i (Tony Yu, 2020). There are three options to avoid these ambiguities when they arise in theory: disallow system algorithm manipulation, only allow algorithm review with certain interactions that avoid these ambiguities, or enforce some retrospective operational constraints on initial conditions. The first option is contrary to the subject of study and is not considered. Aguari et al. (2012) made us understand that retrospective constraints are insufficient to prevent ambiguities when dialogue or interactions can be arranged, which in itself precludes any input; therefore, such a scenario must be disallowed.

De Vroemy (2008) asserts that information ambiguities are situations with consistent dynamism in which information asymmetry plays a critical role; *viz*., the information trend has not been fit into

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an algorithm flow and therefore has not been computed. An example would be the untested scenario where an economist observes an economic trend if found unsuitable, simply rewrites the system algorithm; this economist has simply corrected an 'anomaly' bypassing the normal convention of moral suasion, government intervention, market crises, etc. Another example here is that money in this realm is not physical nor digital, as the case may be over cryptocurrencies and digitalised currencies. Money is simply an algorithmic creation in the system which has purchasing value. This form of money may seem to have appeared from nowhere. Some arguments that give insight into this scenario are; Auer & Bohme (2020); Schneider (2020); Frost et al. (2020); World Government Summit (2015); OECD (2002); and Lietaer (1999). In dealing with time in economics or economics in time, the only consistent evolution is systems innovation and human approach, which for simplicity's sake to model a pattern for our analysis in this paper, reveals a fixed path or trend of some given function (Boland, 1978; and Klein, 2007). With such an assumption, it is believed that this system can produce the solution that $\beta_i = \beta_h$ (Boland, 1978; Klein, 2007) very rapidly and, as such, provides a very powerful algorithm computation rather than arguing over ambiguities found here. This is not a claim that such a hypothesis is reasonable. Definitely not. However, it's an attempt to reflect on different possibilities from the scenarios equivalent to the information available. It is not that theories and hypotheses in both economics in time and time in economics can solve fixed points in this way.

By contrast, the uniqueness of the system is a required condition for any information to have an impact as a result of the dynamism in time, which is also subject to the structure of, and input to, the economy (Eke & Osi, 2022). It is therefore, reasonable to say that this circuit is algorithmically fail-proof.

NEWTONIAN AND AUSTRIAN MODELS OF TIME IN ECONOMIC ANALYSIS

One may construct time based on the Newtonian model submitted by Tony Yu (2020) and assume that it is characterised by movements along a line, where different dates are then depicted as a succession of line segments or discrete time or points or continuous time as argued by O' Driscoll and Rizzo (as cited in Tony Yu, 2020). Just as in the classical school, where time is implied as being homogenous, let us assume, therefore, that $\boldsymbol{\pi_i = \pi_h = \pi}$ and imposed strictly on economic actors.

$$\pi = L(\pi) = W_i \{U (\beta_i \infty \pi) U^* \qquad (1)$$

Since the worlds are separated in analysis by W_i and W_h, however, both institutional realities are also assumed to be controlled by

$$\boldsymbol{\beta_h =} W_h \{U (\beta_i \infty \pi) U^* \qquad (2)$$

Essentially, the distinguishing factor for the Austrian model is that it provides a crystal-clear path on how time allocation as a crucial resource in the economic process impacts future outcomes.

$$U (\beta_i \infty \pi) U^* \rightarrow \boldsymbol{\beta_h} \infty \pi \qquad (3)$$

Which replaces the lower level of productivity associated with the analogy systems in the human real-world realities after U with the spiked level of productivity associated with the internet-aided process. By extension, comparing today's real to tomorrow's internet world throws up an exciting possibility of further exploiting scenarios in which less time is consumed to produce more described as aptly described in Eq. (3) requires more research to clearly define more theories, theorems, and economic concepts so as further enlighten us on this *economic vagueness* in the process. However, this vagueness is entirely without observable consequence since all local observations on the separate systems though it is becoming increasingly compatible, are entirely dictated by the productivity trends, and Eq. (3) simply describes a macro system pointed out by Rohatinski (2017).

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CONCLUSION

Equations (1) and (2) define the Newtonian model in its barest form: To find β_h given β_i and U, one solves Eq. (1) to obtain π and then evaluates Eq. (2). Note that the equation of transmission (2) is both non-linear and non-unitary for general β_i and U.

The Link L is what we would like to term the Rohatinski quotient of an ordinary inter-world channel. The Caragea factor in Caragea (2019) guarantees that any time-bound productivity trace from the internet or virtual world to the human world has at least one fixed point π. Therefore, using the Newtonian approach with any unitary and positive resource input, that time-bound productivity question can be solved for output in the human world. The Newtonian model is not vulnerable to paradoxes that may arise due to the certain economic vagueness that is present within the assumptions of the classical school.

While a solution of Eq. (1) for π always exists, this solution is not guaranteeing an equilibrium; therefore, the Newtonian model contains the same economic vagueness present in the classical school of economics. As such, they are vulnerable to certain uncertainties and instability. Most theories involving the Newtonian model in their literature use these analogies that permit only a single simple solution for π and thereby avoid this economic vagueness.

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