AN EPISTEMIC DEFINITION OF ISLAMIC ECONOMICS

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Abstract: The epistemic explanation of the heterodox philosophico-economic field of Islamic economics and finance opens doors to a great deal of intellectual contribution in global socio-scientific learning. Islamic economics as it has been clamored for does not have an ontological, epistemological, and phenomenological content to it. These terms are explained in the text of this paper. Such an ambivalence makes the discipline of Islamic economics and finance devoid of scientific meaning. Islamic economics and finance are presently driven by the mainstream economic objective of maximization of shareholders' wealth. The field of Islamic economics and finance has thereby remained tied to old economics. It is thereby unable to make intellectual contribution. The intellectual gap between the conventional and a revolutionary paradigmatic emergence needs to be filled up. The result then will be a significant contribution of Islamic economics and finance to the world of socio-scientific knowledge.

Some pertinent issues are discussed in this paper on the inadequacy of present days' understanding of Islamic financial legal contracts in the absence of a generalized theory of integration between the prevailing exogenously set shari'ah rules and the endogenous dynamics of market system. In the epistemic definition of Islamic economics and finance, this existing mainstream methodology is replaced by the cardinal core of Islamic socio-scientific intellection. This is the episteme of monotheistic unity of knowledge as law that can configure the generality and details of the world-system being studied. A particular case of such a world-system is Islamic economics and finance taken up in this paper.

Keywords: Islamic economics, Islamic finance, epistemology and economics, shari'ah and economics.

Questioning

A budding discipline of heterodox economics with ethical outlook governing its principles, called Islamic economics and finance, has been in the literature for some time (Choudhury & Bhatti, 2016). Yet it remains questionable whether in the way it has been ushered in the literature makes this field a fad or a distinctive area of erudition. Conception beyond the notion of capital accumulation of shareholders' wealth counts in academia for acceptance of fresh ideas in the global learning venue. The answer to the query for understanding the concepts underlying Islamic economics and finance in academia rests upon whether this field is founded on logical, analytical, and applied scientific premise that takes it away from the prevailing theory of mainstream economics and finance.

Thus, is Islamic economics and finance a straightforward mainstream economic field with certain Islamic economic and social rules in it (Mahomedy, 2013)? The latter kind of individuated treatment of this field is found today to be overwhelmed by Islamic Law called the *shari'ah*. Thus no substantive abstraction and application could be conveyed by the field of Islamic economics and finance in conjunction with the *shari'ah*. Contrarily, an erudite field of intellection could otherwise establish a socio-scientific theory of integrative thought that would explain the coterminous interrelations between its methodological foundations, economic process, and market realities within an explanatory span of interdisciplinary ideas – Islamic economics and finance and the *shari'ah*.

Objective

The objective of this paper is to formalize and explain the socio-scientific foundations of the idea of Islamic economics and finance from its epistemic methodological foundations while also taking account of the relevance of the integrative study of *shari'ah* as Islamic law with economics and finance. The *shari'ah* ruling is thus shown to comprise an endogenously related analytical worldview that is coterminous with the study of Islamic economics and finance. In divulging the interactive, integrative, and evolutionary[1] socio-scientific nature of Islamic economics and finance with the *shari'ah*, the underlying methodology of this integrative field is shown to rest in philosophy of science, the resulting formal conceptions, and applications.

An illustrative numerical application is given. The explanatory terms of socio-scientific methodology of philosophy of science that underlie the methodological definition of Islamic economics and finance are given in footnotes. The principal foundation of the methodology of Islamic economics and finance as a socio-scientific discipline is argued to be the monotheistic *law* of unity of knowledge. This primal praxis over rides the constricted idea of the purpose and objective of the *shari'ah*, referred to as *maqasid as-shari'ah*. Thus the monotheistic *law* of unity of knowledge is explained in a methodological way as the foundation of abstraction and functioning of Islamic economics and finance in its totality. Yet this is the methodological worldview that has been remised in the literature and in substance of the discipline.[2]

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[1] These are properties that configure the essential foundational premise of organic unity of knowledge between diversity of selected variables and entities in the context of the methodology of the monotheistic *law* of unity that remains original and permanent in the continuously learning worldview.

[2] On the cultural and time-bound limitations of the *shari'ah* Asad (1987, p. 28) writes on the need: "To free the *shari'ah* of Islam from all the irrelevancies and burdensome accretions that have grown up around it in the course of centuries of decline; and to establish it, once again, as a practical living guidance towards an Islamic way of life."

Shari'ah in all its forms has traditionally remained an isolated study of individuated legal contracts (*'aqd*). Contrary to this approach, the primal Islamic monotheistic *law* of unity of knowledge gives a holistic methodological worldview transcending the traditional understanding of the purpose and objective of the *shari'ah* referred to as *maqasid as-shari'ah*. Paradoxically, even among the authorities of *maqasid* the clear mention and functionality of the cardinal law of monotheism is not invoked (Attia, 2010; Ashur, 2013). On such matters Auda (2008, p. 199) writes: "Islamic modernism pointed to the general deficiency of partial and individualistic approaches to Islamic law." The primal ontological law of monotheistic unity of knowledge in the world-system remains subdued.

Review of the literature

The review of the literature and the observed pattern of development in Islamic economics and finance bring out the nature of its inherent rich shareholders' wealth model. This picture presents a flawed and incorrect scenario of Islam and capitalism (Rodinson, 1978). Presently, similar facts are recorded: Ernst & Young financial report brings out the resulting capitalist deepening of Islamic finance in global financial markets (Ernst & Young internet version: http://www.consultancy.uk/news/3102/ey-islamic-banking-growth-on-the-increase-across-globe). The overwhelming *shari'ah* rules in Islamic finance have increased its wealth and product centered outlook. Yet on the other hand, any original and creative contribution of Islamic economics and finance to the world of learning has staggered into oblivion.

In as far as original scientific thought commences from distinctive epistemological foundations (Shackle, 1972; Bohr, 1985) comprising the methodology[3] of the discipline, so also in this paper the groundwork is on characterizing the nature of Islamic economics and finance by the foundational methodology that presents the Islamic monotheistic worldview as the organically unifying law. It is surmised that, the absence of such a methodological inquiry has been the cause of the continued failure of the field of Islamic economics and finance in contributing to global learning despite the growing material wealth of this culture of the Muslim World. Yet the potentiality for its socio-scientific creativity remains distinctive. A most important area of potential contribution of Islamic economic, financial, and social thought can be found in the field of ethics and economics by way of its episteme[4] and socio-scientific methodology.

Methodology means for us the epistemic characterization of a scientific origination, and its applications within the new discipline of thought. Therefore, it is not the possibility of the Islamic foundation of ethico-economics that is being critiqued here. Rather, it is the absence of the epistemic foundation of Islamic socio-scientific methodology that is argued to be the cause of the presently insufficient field of Islamic economics and finance as fad rather than an intellectual creativity (Choudhury, 2011).

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[3] Epistemology is a branch of philosophy of science meaning theory of knowledge. More broadly, this field of scientific reasoning encompasses the nature of consistency in reasoning premised on *a priori* and *a posteriori* domains of knowledge. The nature of analytical formalism and applications of the derived ideas thereby emanate from the *a priori* and the *a posteriori* domains. When the meaning of epistemology is taken up in its sense of creative learning, change, and formation of shapes and forms of thought, this field of socio-scientific study is called evolutionary epistemology (Campbell, 1988). Evolutionary epistemology plays a significant role in the explanation of Islamic socio-scientific methodology.

Methodology comprises the totality of the nature of reasoning premised on a certain way of combining *a priori* and *a posteriori* reasoning, as between unity and differentiation of reasoning at the epistemological origins. Methodology is holistic and applies to the formalism of analytical thought and its methods. Thus methodology shapes models of thinking as methods. Methods remain subservient to methodology.

[4] Episteme (defined by M. Foucault, translated by Sheridan,1972, p. 191) is most appropriately explained in Foucault's words: "By *episteme* we mean … the total set of relations that unite, at a given period, the discursive practices that give rise to epistemological figures, sciences, and possibly formalized systems … The episteme is not a form of knowledge (*connaissance*) or type of rationality which, crossing the boundaries of the most varied sciences, manifests the sovereign unity of a subject, a spirit, or a period; it is the totality of relations that can be discovered, for a given period, between the sciences when one analyses them at the level of discursive regularities."

The epistemic definition of Islamic economics and finance by unity of knowledge

We start by explaining the methodological orientation of Islamic economics in its distinctive way of interconnecting religion and science in the form of an organically interrelated socio-scientific system governed by the episteme of unity of knowledge (Choudhury, 2015a). Methodological embedding between religion and science is also the way of explaining the interactive, integrative, and evolutionary epistemological[5] analytics interconnecting *shari'ah* and Islamic economics and finance as embedded disciplines.

To symbolize for an analytical explanation, let Ω denote the totality of the *primordial ontological knowledge* as the foundational *law* of unity of knowledge.[6] Ω is thereby, the supercardinal topological manifold[7] (Rucker, 1982). It causes all organic relations of unity of knowledge to occur by reference to the text of the monotheistic law and to participatory discourse revolving around particulars of monotheism as law in the grand design of the unified world-system. The central dynamics in this creativity is conveyed by reference to the episteme of unity of knowledge.

Let 'S' denote the primal *functional* ontological[8] mapping of parts of the open manifold Ω as supercardinal topology into the epistemology of discoursed knowledge formation concerning the

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[5] This forms the characterizing of Islamic socio-scientific methodology in the framework of its most central analytic of divine consilience, unity of knowledge (Wilson, 1998) – that is monotheism as *law* -- by interaction, integration, and evolutionary (IIE)-learning across systems of abstractions and discursive practices. Abstraction and formalism are then followed by empirical and inferential applications. The holistic methodological worldview is brought out in expression (1) of this paper.

[6] Explanation of the term, "totality of the primordial ontological knowledge" is that, the divine law comprises the vastness and completeness of all of knowledge – of truth and falsehood -- in their detailed and explanatory planes of existence. The divine *law* as knowledge is the externalisation of belief. Belief cannot be explicit in individuals, and thereby, in ethico-economics and society and science. Only knowledge derived from the divine *law* of monotheism can be externalized in the socio-scientific order in relation to the generality and details of the world-system under study. Since monotheism is the complete law of divine oneness its functional action and form in the world-system takes up organic unity of being (the monotheistic law, meaning primal ontology) and becoming (meaning construction and explanation of the law in action). Ontology thus means theory of existence and of being. *Primal ontology* is the foundation of the monotheistic law manifest in everything. *Functional ontology* is the analytic of formation of organic unity of knowledge in the details of the world-system. Thus *functional* ontology stands for the formation of states of *becoming*, given the primal ontological state of *being*. These states are repeated over processes of learning through the IIE-learning processes characterising the functioning of the epistemic law of unity of knowledge.

[7] The supercardinal topological manifold means the immeasurable dimension of the monotheistic law of oneness. Yet the monotheistic *law* creates and regenerates the generality and details of the world-system. Thus, the supercardinal domain represents the completeness of the monotheistic *law* as knowledge but having the property of topological unboundedness.

[8] As in the case of primal ontology of being and becoming, so also 'S' denotes a mathematical continuous mapping from Ω to the domain of epistemology. 'S' thus supports the function of epistemology in the first instance. Consequently, the tuple (Ω, S) stands for the primal functional ontology ('S') of deriving knowledge from the primal ontological law, Ω.
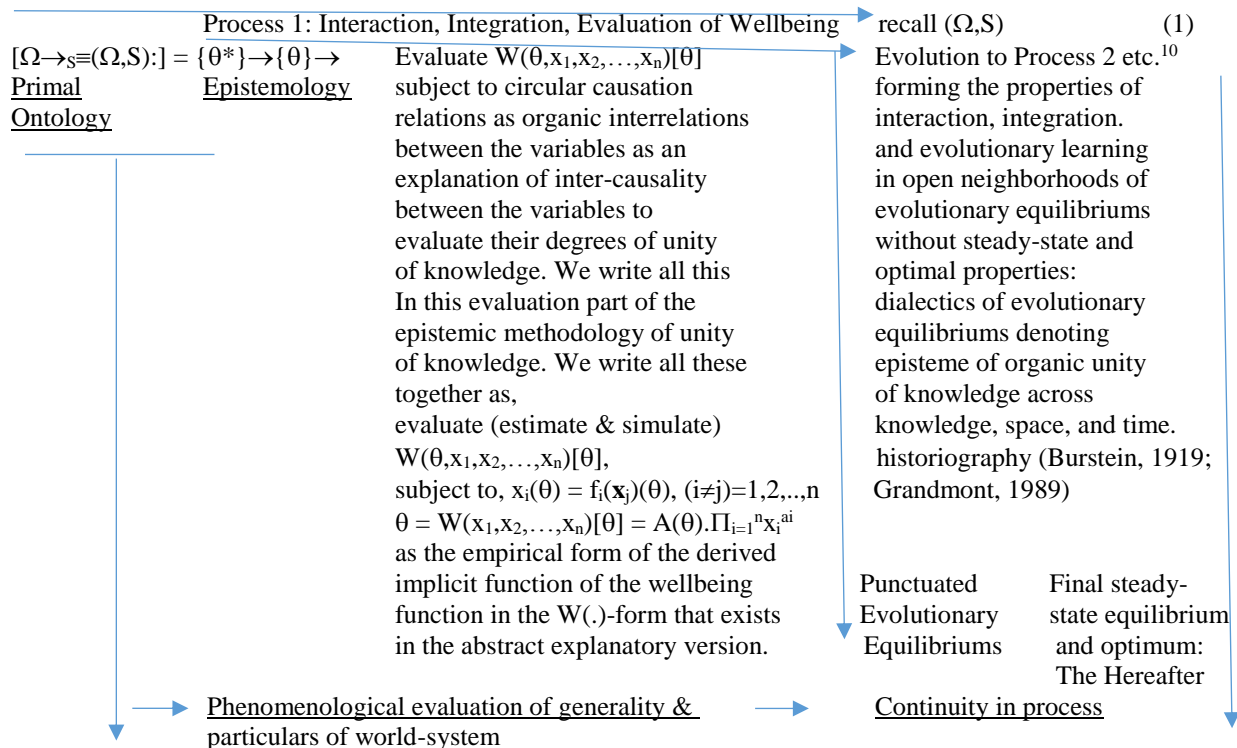
rules, and thereby, the construction of the generalized model of the world-system under study (Islamic economics and finance) that is induced by the episteme of unity of knowledge. From the generalized model emerge particular cases and applications. In terms of Islamic methodological worldview, Ω denotes the totality of the *Qur'an*. 'S' denotes the teaching of Prophet Muhammad (*sunnah*) that continuously maps the message of the *Qur'an* into the inquiry of the world-system under study.

The well-defined continuous mapping of Ω on to the generality of the unified world-system by 'S' primarily derives the explanatory and functional operational law in reference to the episteme of unity of knowledge. This stage of discovering the derived law from the monotheistic origin is denoted by $\{\theta^*\}$. We thereby write for this stage of primal ontological relations the expression, $[\Omega \rightarrow_S \equiv (\Omega,S):] = \{\theta^*\}$. Thus, any well-defined monotonic topological transformation, say G, of this functional relationship is denoted by, $G(\Omega,S) = (\Omega,S) \supset G(\{\theta^*\})$ (Maddox, 1970). The tuple together, (Ω,S), is the *primal ontological law* of unity of knowledge[9]. $\{\theta^*\}$ is knowledge-flow at the level of abstraction and rule-setting concerning their derivation from the epistemic law of unity denoted by (Ω,S).

$[\Omega \rightarrow_S \equiv (\Omega,S):] = \{\theta^*\}$, is next followed by further discourse around the primal *functional* ontological law concerning specific matters. The generality of the episteme of unity of knowledge thus assumes its worldly particulars in the transformative stages of unity of knowledge mapped on to the unified world-system. The ontological law explains the oppositely rationalist nature of the world-system premised on systemic differentiation. Examples of such states are properties of methodological individualism and conflicting modes of dialectics in economic and social theories (Buchanan, 1999; Sztompka, 1974); and trade versus financial interest as acceptable Islamic financial transaction. $\{\theta^*\}$ thus leads to the discursive nature, and thereby, interactive and integrative nature of evolutionary learning across repeated processes. The resulting knowledge-flows arising from $\{ [\Omega \rightarrow_S \equiv (\Omega,S):] = \{\theta^*\}\}$ are denoted by $\{\theta\}$.

The combined episteme of unity of knowledge and the unified world-system, apply to the objective criterion. This is to estimate and simulate the wellbeing function, $W(x_1,x_2,\ldots,x_n)$. $W(..)$ denotes the measure of the degree of unity of organic relations existing between the selected variables, $(x_1,x_2,\ldots,x_n)$. The ordinal dynamics of interactive, integrative, and evolutionary learning as attributes of evaluation of the wellbeing function are explained by expression (1).

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[9] In Islamic language, Ω is the supercardinal domain of the primal ontological law of epistemic unity of knowledge. That is Ω denotes the totality of the *Qur'an*. Thereby, 'S' as the well-defined and continuous mapping from the domain of primal ontology of Ω to the ontological formation of rules in $\{\theta^*\}$ is referred to in Islamic terminology as *[S]unnah*, the guidance and teaching of the Prophet Muhammad concerning Ω and the generality and specifics of the detailed and the unified world-system. The same monotheistic law of (Ω,S) explains the contrary state of social differentiation. $\{\theta^*\}$ is the resulting epistemological derivation of the worldly law in terms of the episteme of unity of knowledge explaining all things, namely truth, falsehood, and the undecidable as mutual contrariness. The process towards deriving $\{\theta^*\}$ is known as *shura*, the medium of discussion and discourse. The process of deriving knowledge and its creative impact on shaping forms and reason provide the properties of interaction as discussion in diversity; integration as temporary consensus; and the evolutionary learning dynamics continuing in evolutionary learning processes (IIE-learning processes). IIE-learning processes are followed by more of the same; The extensive meaning of IIE-learning is derived from in the *Qur'an* concerning the visible (evidential) and the hidden (abstraction) world-systems.

Process 1: Interaction, Integration, Evaluation of Wellbeing → recall (Ω,S) (1)

$[\Omega\rightarrow_S\equiv(\Omega,S):] = \{\theta^*\}\rightarrow\{\theta\}\rightarrow$ Primal Ontology | Epistemology

Evaluate $W(\theta,x_1,x_2,\ldots,x_n)[\theta]$ subject to circular causation relations as organic interrelations between the variables as an explanation of inter-causality between the variables to evaluate their degrees of unity of knowledge. We write all this In this evaluation part of the epistemic methodology of unity of knowledge. We write all these together as,

evaluate (estimate & simulate) $W(\theta,x_1,x_2,\ldots,x_n)[\theta]$, subject to, $x_i(\theta) = f_i(\mathbf{x}_j)(\theta)$, $(i\neq j)=1,2,..,n$ $\theta = W(x_1,x_2,\ldots,x_n)[\theta] = A(\theta).\Pi_{i=1}^{n}x_i^{ai}$ as the empirical form of the derived implicit function of the wellbeing function in the $W(.)$-form that exists in the abstract explanatory version.

Evolution to Process 2 etc.[10] forming the properties of interaction, integration. and evolutionary learning in open neighborhoods of evolutionary equilibriums without steady-state and optimal properties: dialectics of evolutionary equilibriums denoting episteme of organic unity of knowledge across knowledge, space, and time. historiography (Burstein, 1919; Grandmont, 1989)

Punctuated Evolutionary Equilibriums | Final steady-state equilibrium and optimum: The Hereafter

→ Phenomenological evaluation of generality & particulars of world-system → Continuity in process

Episteme: Convolution in continuity of Primal Ontology, Epistemology, Phenomenology[11] concerning Events, $E(\theta,\mathbf{X}(\theta),t(\theta))$ in knowledge $\{\theta\}$, space $\mathbf{X}(\theta)$, time $t(\theta)$: $(d/d\theta)f\{\cup^{i=interaction(i)}\cap^{j=integration(j)}E^{ij}(\theta)_s= (\theta,\mathbf{X}(\theta),t(\theta))_s\} > 0$ across systems 's' by Interaction and integration (i,j) and creative evolution (IIE). These properties together define the progressive processes of knowledge-induced events (Foucault, 1972 op cit).

CHARACTERIZING ISLAMIC ECONOMICS BY ITS EPISTEMIC DEFINITION

We can now compare the definitions of Economy, $\xi(.)$ between Gerard Debreu's and the Islamic Economy according to their neoclassical and the Islamic epistemic sense of evolutionary dynamics by unity of knowledge, respectively.

Debreu's (1959) definition is given by, $\xi = \xi(\mathbf{p},\mathbf{x},\mathbf{R};\wp)$; where $\mathbf{p}$ denotes prices; $\mathbf{x}$ denotes quantities of goods and services in market exchange; $\mathbf{R}$ denotes scarce resources competed for to attain optimization objective; $\wp$ denotes pre-assigned preferences as datum.

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[10] The End of the evolutionary learning process in unity of knowledge is the Great Event referred to in the *Qur'an* as the Hereafter (*Akhira*). That is learning never ends and is pervasive.

[11] Phenomenology is a topic of the philosophy of science that studies socio-scientific consciousness (Husserl, 1965). In such socio-scientific meaning of phenomenology we take the meaning in the holistic sense of ontological and epistemological derivation of knowledge based on the episteme of unity of knowledge, and the evaluation of the formal analytics that arise, and the models that follow applied methods. Phenomenology is thus the completion of abstraction and formalism of unity of knowledge by the evidential proofs in any IIE-learning process and its continuity.

According to the epistemic Islamic definition of Economy,
$\xi(\theta) = \xi\{(\theta,\mathbf{p},\mathbf{x},\mathbf{R},\wp,\mathbf{t})[\theta]\} \equiv \xi\{E(\theta,Space,Time)[\theta]\}$.

Because of continuous evolutionary learning by $\{\theta\}$, dynamic preferences are formed discursively as a decision-making behavior. Therefore, if a society has m-number of individuals, then social preference ($\wp_{soc}$) is formed by the IIE-aggregation of organic unity of knowledge:

$\wp_{soc}(E(\theta)) = \cup_k^{i=interaction}\cap_k^{j=integration}\{\wp_k\}[E(\theta)]$; k = 1,2,..,m; i,j denote as many interactions (i) leading to integration (j) (temporary consensus) with evolutionary learning denoted by,
$(d/d\theta)[\wp_{soc} = \cup_k^{i=interaction}\cap_k^{j=integration}\{\wp_k\}[E(\theta)]] > 0$, across specified set of events, $\{E(\theta)\}$.

The same kind of organic interrelationships to form aggregate preferences can be specified for various kinds of knowledge-driven preferences. In neoclassical economic theory such aggregations take up utilitarian forms despite its exogenously introduced ethical ruling (Hammond, 1989).

Note also that, all the variables in the vector, $\mathbf{X}(\theta) = (\theta,\mathbf{p},\mathbf{x},\mathbf{R},\wp,\mathbf{t})[\theta]$ are endogenous by virtue of their inter-causal relations of organic complementarities. This is a property conveyed by the episteme of unity of knowledge as in expression (1). The idea of 't(θ)' is conveyed by learning 'processes'. Hence, $\theta \leftrightarrow t(\theta)$. Because 'θ' is endogenous, 't(θ)' is endogenous as well. But this is not so regarding the idea conveyed by 't' alone, as in all of economic theory respecting the meaning of time-dynamics.

Endogenous and exogenous relations in comparative Islamic economics and finance perspectives

Example 1:

An example of endogenous and exogenous variable is of government expenditure as a resource. In the epistemic definition of Islamic economics and finance, government expenditure is changed to endogenously determined spending by way of participatory discourse between public and private sector decision-makers. Thereby, 'θ' is induced in the spending variable (Choudhury, 2015b).

Yet in Keynesian macroeconomics, government expenditure is treated as exogenous variable. Thereby, all macroeconomic policies are treated exogenously. On the other hand, all policies are endogenous in Islamic economics and finance by virtue of deriving policies as decisions out of participatory discourse in reference to knowledge derived from (Ω,S). Because participatory decisions arise from aggregate preferences formed by the IIE-processes, say between households, private sector, and public sector in the Islamic economy as explained above, therefore, as shown above, we can write by compounding the preference and policy vector $\mathbf{P}(\theta)$ as,

$\mathbf{P}(\wp_{soc}(E(\theta))) = \cup_k^{i=interaction}\cap_k^{j=integration}\{\mathbf{P}\{\wp_k\}[E(\theta)]$; k = 1,2,..,m; i,j denote as many interactions (i) leading to integration (j) (temporary consensus) with evolutionary learning denoted by,
$(d/d\theta)[\mathbf{P}\{\wp_{soc}\} = \cup_k^{i=interaction}\cap_k^{j=integration}\mathbf{P}[\{\wp_k\}[E(\theta)]] > 0$.

In this expression we can consider the participatory dynamics between monetary and fiscal policies in terms of the wellbeing goal. Households, the private sector, and philanthropic governments, altogether benefit from the policy effects on prices stabilization, spending by resource mobilization between the financial sector and the real productivity sector. Social preferences are formed by collective consciousness to support the participatory policy consequences. In his lecture to the Institute of New Economic Thought, Sen (2012, https://www.youtube.com/watch?v=OBw5fJkjXiM; visited Aug. 2016) referred to such endogenously interactive decision-making by the term 'Government by discussion'.

Example 2:

Another example of the endogenous relationship between spending and the real economy contrary to exogenously set bank interest rates and the financial economy in conventional economic theory is that of the irrelevance of bank-savings in Islamic economic and finance system. In Islamic financial economy capital formation proceeds in the real economy in the presence of tradable transactions overriding interest-based transactions.

The argument made here is that resource allocation is treated under the assumption of scarcity in a neoclassical economy; and is therefore competed for between the real economy and the financial economy. The price rewards in the neoclassical economy for such a competed for allocation of resources between the real economy and the financial economy are real rate of return (say 'r') in the real economy and interest rate (say 'i') in the financial economy. The marginal rate of substitution between the real economy output (say 'x_R') and the financial economy services (say 'x_F') is given by, $- dx_x/dx_R = (r/i)$.

Now besides, if an exogenous effect of '$\theta\sim$' (sectoral differentiation as shown by Holton (1992)) works out contrary to the Islamic endogenous 'θ'-values, then like the exogenous technological and preference of choices, $\{\theta\sim\}$ will cause exogenous shocks on $- (dx_F/dx_R)[\theta\sim] = (r/i)[\theta\sim]$ at higher values of the marginal rate of substitution between $(x_F, x_R)[\theta\sim]$. That is there will be greater opportunity cost of resources.

In the Islamic economy with its epistemic effect of unity of knowledge between the real sector and the financial sector, there will exist pervasive complementarities between these sectors. Now the circular inter-causal complementary flows of resources between the two sectors establish cooperation by integration between the two sectors. Hence the ontological function of the financial sector is to receive financial savings; and continuously and simultaneously direct such savings as resource mobilization into the real sector. The productive output of the real sector reverts the value of resource mobilization into the financial sector, and so on, by circular inter-flow of resources.

Now bank-savings defined as finances withheld in the financial sector in the presence of interest rate as reward are converted into continuous resource mobilization for use in spending in the productive real economy.

The result of such continuous circular causal flows of resources between the now unified two sectors is similar to the Keynesian equilibrating condition of savings equalling spending in productive outlets. The difference though is that, unlike the prevalence of business cycles in the Keynesian economy, the continuous circular flow of resource mobilization between the Islamic financial and real productive sectors would cause business-cycles to be dampened.

The adverse effect of bank-saving on potential output**,** productive spending as resource mobilization, and growth of the coterminous relations between these integrated sectors can be explained further as follows:

Time: $t = 0$ $t = 1$ $t = 2$ $t = n$

Output Q_0 $Q_1 = Q_0(1-s)(1+i)$ $Q_2 = Q_0(1-s)^2(1+i)^2$ $Q_n = Q_0(1-s)^n(1+i)^n$

Return on savings is denoted by the constant savings rate, s.

Resources $Q_0(1-s)$ $Q_1(1-s) = Q_0(1-s)^2(1+i)$ $Q_n = Q_0(1-s)^n(1+i)^{n-}$

accumulated post saving by

The rate of interest

Output Q_0 $Q_1' = Q_0(1+r)$ $Q_2' = Q_0(1+r)^2$ $Q_n' = Q_0(1+r)^n$

returns on spending

without bank-savings and interest rate

'r' denotes growth rate identical with (g(.)) of real output replacing 'i'. 'r' is positively related with the rate of increase in real money and real spending simultaneously, as explained in Example 1. That is, $g(M/P) = g(Q/P) = g(S_p/P)$. Thereby, $g(M/Q) = g(S_p/M) = g(S_p/Q)$ to a scalar relationship.

Thus bank-savings cause continuous withdrawal from potential output. The adverse consequences are followed by deceleration in resource mobilization, lack of goodly spending, under-employment, and inflationary trends. Wherewithal, there comes about the coterminous degradation of trade, prosperity, economic and social stability, sustainability, fairness, and social wellbeing.

Just as trade and its productivity actualizing wellbeing with stability have intertemporal consequences, so also the *qurʾānic* premise of avoidance of interest explains the replacement of interest by productive rates of return in the inter-generational context. In this regard, the *Qurʾān* (2:289) declares: "O you who believe! When you deal with each other, in transactions involving *future obligations in a fixed period of time*, reduce them to writing….Let him who incurs the liability dictate, but let him fear his Lord *Allāh*, and not diminish aught of what he owes…" Thus every point of valuation of obligations in intertemporal spending and accrual of returns over time-duration marks the conjoint organic interrelationship between the elements, namely of trade, wellbeing, sustainability, stability, fairness, and avoidance of interest over time. Here the meaning of sustainability is premised on the balancing of coterminous interrelations according to the *qurʾānic* injunctions and attributes that play their specified complementary roles between the good things of life.

The effect of 'θ' on Islamic productive change in the perspective of inter-sectoral organic unification by inter-causality causing linkages has an evolutionary learning implication. Hence no optimal state of endogenous change is possible. All transformations in the Islamic financial economy occur along the IIE-learning path. Consequently, business-cycles although not perfectly avoided, they are dampened along the intertemporal evolutionary path.

An argument concerning *shari'ah* implications of financial rules and market process

The definition of Islamic economics and finance implies that, the pervasively endogenous nature of inter-variable relations according to the episteme of unity of knowledge makes government, institutional, private sector, and market functions to be embedded interactive entities. Preferences and social rules; ethics and behaviour; and social contracts are all of the endogenous nature in respect of the pervasively interactive, integrative, and evolutionary learning dynamics. The knowledge-induced learning premise defines the extensively dynamic nature of all inter-causal relations. Market process in respect of such dynamic evolutionary learning is upheld contrary to an exogenously set regulatory rule enforcement by the Central Bank for adoption by commercial Islamic banks (Central Bank of Malaysia Shari'ah Advisory Council Report, internet version visited Aug. 2016).

Contrary to the properties of all relations in terms of endogenous interrelationship, the present days' imposition by standardisation of Islamic financial rules enacted by the Central Bank of certain Muslim countries fail to explain certain critical Islamic financing elements. The gaps need to be repaired in order to make up for an endogenous *shari'ah* and economic interrelationship to be valid. The emergent endogenous inter-causal relations between *shari'ah* and the market process would then abide intertemporally.

By such a totality of intertemporal relationships, the valuation of the *objective wellbeing function* would be performed (expression 1). Instead of developing such intertemporal evolutionary relationships between interacting and integrating markets, institutions, and *shari'ah* rules, the Central Bank and other Islamic enforcing institutions (e.g. Islamic commercial banks; AAOIFI, 2004) emphasize mechanisms in enforcing certain legal contracts based on the Islamic financial legal contracts. In approaching such Islamic financial rule enactment and standardization, the wider perspective of developing the general theory of a systemic nature is dispelled. Islamic financial and economic activities have thus devolved into individuated legal contracts. The result has been contrary to explaining a generalized system of interrelationship according to the epistemic context of unity of knowledge. Furthermore, added to this failure there remains absent the analytical intertemporal implications of a generalized system theory of *shari'ah* and the Islamic financial economy.

Problem of rate-determination to replace financial interest rate in Islamic financing

With the above-mentioned inability in formalizing an intertemporal evolutionary general equilibrium endogenous model of embedding between *shari'ah* and the Islamic financial economy, it has become equally impossible to determine the various financial rate for Islamic banks in asset pricing and asset valuation. On the other hand, rate-determination plays a central role in the principal Islamic concern to phase out financial interest by legitimate trade related activities. Such a generalized system perspective of rate-determination in the light of the episteme of unity of knowledge across systems and intertemporally, would establish a standardised theory of various pricing and profit rates and yield rates that arise from the extensive participatory forms of financial instruments playing their due roles in Islamic financial economic system.

In recent times, a good deal of mechanism is being tried out for the measurement of rents on leased assets by the Islamic interest-free method. The '*shari'ah* compliance' approach as suggested by Bank Negara Malaysia is yet unable to provide an endogenous generalized theory of rate-determination with integrative view between *shari'ah* and economics, by taking account of the intertemporal effects of contingencies at event-points along the IIE-learning path.

By noting the inability of *shari'ah* and Islamic economics and finance to derive a generalized theory of inter-causal relations, we present the following approach to formulate the algorithmic approximation approach, contrary to the legalistic approach of setting the rates not having dynamic effects along the trajectory of Figure 1. In our axiomatic approach only the methodological implication of the episteme of unity of knowledge is effective. Exogenous legalistic rule-setting by *shari'ah* injunctions on financial and economic matters is avoided.

H $\bullet$ H

H $\quad \bullet E_0(\theta_0,\mathbf{X}_0(\theta_0),t(\theta_0)) \qquad\qquad E_N(\theta_N,\mathbf{X}_N(\theta_0),t(\theta_N))$ Continuity to Hereafter

(Ω,S) $\qquad\qquad$ Evolutionary world-system: asset valuation $\qquad (\Omega,S)$
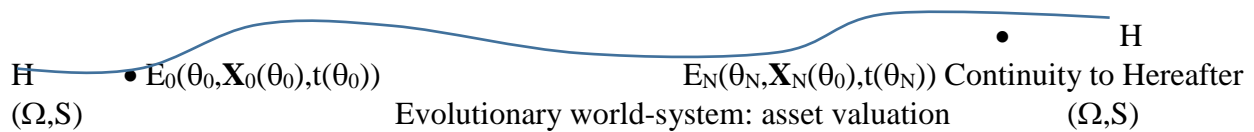
Figure 1: The historiography HH of asset valuation in the light of wellbeing effects of the episteme of unity of knowledge in Events E(..)

Every point along the historiographic trajectory HH denoted by ($\bullet$) is an evaluation point, such as of assets. Evaluation in the context of the epistemic application at these points involves a sequence of activities. These include the coterminous ethico-economic implications involving an integrated approach of economics, finance, and the *shari'ah;* economic and financial evaluation as of rate-determination; social appropriateness as of ethical choices of goods and services; and discursive participation between decision-makers concerning the choices at the E(..)-points. This is a continuous experience along the historistic trajectory of epistemic unity of knowledge across knowledge, space, and time dimensions of the events.

We draw attention here to the forward overlapping generation model of asset valuation with the wellbeing implication of the trajectory HH as the locus of many Event evaluation points. Such an intertemporal asset valuation model shows the continuity of Events encompassing all the stages shown in Expression 1 and Figure 1. Thereby, at the specific valuation point say at time T, $0 < T < n$, the determination of the rate of return (say 'r') corresponding to the financial sector and the growth rate ('g') corresponding to the real sector (i.e. proxy for real investments), the capitalized valuation without any intermediate leakages, but with new injections A_t at every new Event point of valuation, is denoted by expression (2).

An Islamic economics and finance method of rate-determination compliant with mainstream model

Example 1:

The following is an Islamic safe and possible model from mainstream economic and finance theory that can be used for rate-determination. We use the terminal valuation (TV) expression of intertemporal overlapping generation model,

$$TV = A_0[(1+r)(1+g)]^T + A_1[(1+r)(1+g)]^{T-1} + \ldots + A_{T-1}[(1+r)(1+g)] + A_T. \qquad (2)$$

Now in the differential value form, expression (2) is written as,

$$\Delta A_0[(1+r)(1+g)]^T + \Delta A_1[(1+r)(1+g)]^{T-1} + \ldots + \Delta A_{T-1}[(1+r)(1+g)] + \Delta A_T; \qquad (3)$$

With progressive trend, negative values of ΔA_T will arise caused by asset value depreciation. Such depreciation will continue until the end of economic life of the asset when the net asset value would become zero. At this very end point, a series of positive net flows will equate the series of negative net cash-flows. Thus, expression (3) has a series of positive terms matched by a series of negative terms to yield a solvable equation in a polynomial form of 'r', 'g', (r+g) upon carrying the asset valuation trajectory over the lifetime of the asset.

Consequently, some real roots for 'r' and 'g' can be determined from the polynomial form of expression (3) in the rates. The terms in expressions (2) and (3) along with the determination of the real roots of the polynomial evaluated near to their event points of occurrence are evaluated 'nearest' to such points over the lifetime of the asset. We call such points as 'nearest points' of occurrence of events, in respect of their best possible evaluation nearest to given readable contingencies (Hirshleifer, 1970). Now the valuation of 'r' and 'g', and hence of assets by their rate-determination, are approximated in two ways. Firstly, the 'nearest' points can yield their best probability limit values. Secondly, algorithmically in analytical projection over the intertemporal life of the long-term asset, the rates can be approximated by the real roots of the polynomial in 'r' and 'g' (or r+g).

Expressions (2) and (3) tie up with Figure 1 point-by-point at all the Events with the sequences of valuation activities underlying such events, as shown in Figure 1. Expression (3) can be used as the ex-post (actual) rates, differently from ex-ante (expected) rates, r, g, (r+g). These rates can be approximated by the Newton-Rhapson formula of approximating the real roots of polynomials in the rates (Jean, 1970) applied to polynomial root approximation of expression (3).

Example 2:

A matrix explanation by an illustrative cooperative game between shari'ah and Islamic financial economics

In the light of the above-mentioned problems of integration between Islamic Economics, Finance, and *Shari'ah* and the consequences of evolutionary learning game theoretic perspective, the following example is provided. This simple formulation of a game-theoretic matrix shows that, integration (complementarity) between Islamic Economics, Finance and *Shari'ah* proves to be the ideal state of a cooperative game in the generalized framework of IIE-learning system with respect to probabilistic payoffs.

We pose the following problem: In the case that both Islamic Financial Economics and *Shari'ah* remain differentiated disciplines the payoff is shown by Payoff (Economics, *Shari'ah*) = (0,0). When *Shari'ah* maintains its own as a discipline but Financial Economics is differentiated then the Payoff = (0,1). Likewise, there is the Payoff (1,0). The cooperative case of Payoff with mutual interaction and integration between Economics and *Shari'ah* is given by, Payoff = (1,1).

Shari'ah ⟶ Max. expected payoff (*Shari'ah*)
For given states of Economics

Economics	(0,0)	(0,1)	
Expected. Payoffs (column)	0	1	1
	(1,0)	(1,1)	
Expected Payoffs (column)	1	1	1 .
			Min Max = 1

Max. expected payoff (Economics)
For given states of *Shari'ah*

1   1   Max.Min = 1

A cooperative game exists between Economics and *Shari'ah* with MinMax = MaxMin = 1 as ought to be the case by interactive and integrative relationship in their general equilibrium system at the payoff equal to (1,1) (Prisoner's Dilemma).

Next we consider variable payoffs over stages of interactive and integrative dynamics caused by variable probabilities of the payoffs. Say the variable probability measures are $\{p\}(\theta)$ for occurrence of an event; and thus $\{1\text{-}p\}(\theta)$ for non-occurrence of an event. Both of these sequences of variable probabilities are caused by continuous evolutionary learning denoted by 'θ'. The continuous system of events influenced by variable probabilities under the influence of 'θ'-values is denoted by $F = F(\{p(\theta)\})$. Thereby, $(dF/d\theta) = \{\partial F/\partial p(\theta)\}.(dp(\theta)/d\theta) \neq 0$. The implication is that evolutionary knowledge-induced game theoretic framework prevails along the IIE-evolutionary learning processes along the historiography of HH (Osborne & Rubinstein, 1994; Burstein, 1991).

Conclusion

Islamic economics as traditionally understood is overwhelmed today with the injunctions of Islamic law. The problem with such rule-setting in the case of Bank Negara Malaysia, for example, was mentioned above. Yet there has not been any scientific attempt to derive a generalized evolutionary learning equilibrium system oriented model that would follow an IIE-system methodology between Islamic Economics, Finance, and the *Shari'ah*. The construction of such a generalized system model arising from its epistemic methodology of unity of knowledge is important for addressing many of the rate-determination and policy-theoretic implications of asset valuation as an example of activity wherein the IIE-learning methodology of Economics, Finance, and *Shari'ah* would interact, integrate, and evolve over knowledge, space and time.

The revival of Islamic economics and finance has great global learning and contributory potential. Yet this discipline ought to be deeply induced by its epistemic praxis of unity of knowledge as the primal ontology as law. The episteme of unity of knowledge forms the essential monotheistic foundation of Islamic intellection as law in action. According to this premise of

intellection all abstracto-empirical discourse of Islamic economics, finance, and the relevance of the embedded *shari'ah* can be carried out. The emergence of the discipline of Islamic economics and finance would then be a distinctive one with endogenously embedded *shari'ah* rules. In the absence of realizing and actualizing the epistemic foundation, Islamic economics and finance will continue to be a branch of mainstream economics spanned by the axiom of economic rationality and its decadent reasoning perspective.

In mainstream economics, to which conventional Islamic economics and finance is subservient, the postulate of economic rationality is deduced from the quite different epistemology of Rationalism. Rationalism as a branch of the philosophy of science means the divide between the *a priori* realm of morality and *a posteriori* realm of materiality. This divide between *a priori* and *a posteriori* reasoning is known as Kantian heteronomy (Bhaskar, 2002). For such a state of its reasoning denying logicalness, the nature of Islamic economics and finance ought to be seriously studied in relationship to economic fields like heterodox economic theory, ethico-economics, evolutionary learning economics, and deontological economics (Lawson & Pesaran, 1989; Sen, 1992; Boulding, 1971). By its epistemic induction of monotheistic law of unity of knowledge as the primal ontology, the generalized theory of Islamic economics and finance explained in expression (1) extends to the much wider field of socio-scientific inquiry of organic inter-causal behavior as systems and cybernetic patterns.

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