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ECONOPHYSICS, THERMOECONOMICS AND PHYNANCE

Selçuk BALI*

Abstract

This paper attempts to highlight various economic aspects like econophysics, thermoeconomics and phynance, their meanings, development and various ways through which they are applicable within the economics field. Econophysics signifies a research field which is interdisciplinary in form, applying methods and theories originally build up by physicists for the purpose of offering appropriate solutions to experienced problems within economics, especially those including nonlinear dynamics and stochastic processes or uncertainty. Thermoeconomics has been expressed as biophysical economics, a heterodox economics school which makes use of thermodynamics laws to economic theory. Some economists have viewed thermoeconomics as economic theory which comes up due to thermodynamics laws' application to economics particularly second law. As statistical physics regarding economic value, thermodynamics handles aspects regarding cost effectiveness. Phynance has been expressed as combination of the various aspects regarding physics and also finance for the purpose of offering appropriate explanations as well as solutions towards experienced financial problems.

Key Words: Econophysics, Thermoeconomics, Phynance, Quantitative Finance, Brownian Motion.

Introduction

The application regarding the various aspects regarding econophysics, thermoeconomics and phynance within economics is very essential. This is due to their ability to express various relationships which exist within economics especially within the financial field.

Econophysics has often been perceived as suitable within economics field due to its capacity to offer desirable solutions to experienced challenges within economics such as those associated with uncertainty (Mantegna, 2000: 72). Uncertainty has often been perceived as very disadvantageous due to the fact that it enormously affects important economic undertakings like planning which in turn negatively influences experienced outcomes. This requires appropriate solution provision hence econophysics turns out to be essential due to its capacity to offer such solutions.

Thermodynamics has also been expressed as essential due to its capacity to extensively relate various aspects like efficiency, productivity and benefits as well as cost concerning a variety of mechanisms aimed at capturing as well as making use of available energy towards working and building biomass (Aoki, 2002: 7). This is very essential as it makes it possible for individuals to come up with appropriate solutions concerning ways through which desirable outcomes may be realized through the experienced interactions

Phynance, commonly regarded as experienced relationships within physics as well as finance has expensively been discussed (Miller, 2001: 83). It is essential due to its capacity to express comprehensive

* Assistant Professor, Ordu Ünıversity, Vocational School, Department of Accounting and Tax.

relationships experienced amid finance as well as physics. Through the highlighted relationships it is evident that individuals get proper understanding concerning the various aspects regarding finance.

1. Econophysics

Econophysics is an essential field within financial economics which attempts to express the experienced relationships within physics and economics, wherein theories associated with physics are used for the purpose of enhancing understanding concerning the various aspects within economics (Dincer, 2007: 23). Econophysics in this case may be perceived as a research field which is interdisciplinary in form, applying methods and theories originally build up by physicists for the purpose of offering appropriate solutions to experienced problems within economics, especially those including nonlinear dynamics and stochastic processes or uncertainty (Beaudreau, 1998: 11). Econophysics application to financial markets study has often been perceived as statistical finance having its roots within statistical physics.

It is evident that econophysics opens up individuals towards a variety of theories' application towards explanation of actual occurrences (Cleveland, 2006: 15). For example, owing to the fact that econophysics involves utilization of both physics and economics theories as well as knowledge aspects towards explanation of experienced occurrences within economics related fields like the financial field, it is evident that individuals have the capacity to obtain better understanding regarding the experienced aspects.

1.1. History

Econophysics came up as individuals attempted to bring out desirable explanations regarding actual occurrences within the various economic fields (McCauley, 2004: 44). Owing to the fact that economic theories were not sufficient enough to offer appropriate understanding regarding experienced occurrences, economists sought to incorporate knowledge aspects as well as theories from other subjects for the purpose of propping up appropriate understanding. It is clear that varied subjects have the capacity to offer wide knowledge regarding experienced aspects due to the fact that this practice offers substantial knowledge as well as wide perceptions regarding the experienced aspects.

The history regarding econophysics may be brought to light as follows. Econophysics came up within mid 1990s through the efforts of various physicists who worked within statistical mechanics subfield (Biddle, 2001: 27). The physicists focused upon handling complex problems which were presented by economics, most specifically the financial markets. Being dissatisfied by the explanations which were traditionally offered by economists, physicists applied methods and tools from physics for various purposes. For instance, they attempted to match various financial sets regarding data, as well as offering explanations towards wide-ranging economic phenomena (Ghosh, 2004: 33). Through this, they attempted to offer suitable solutions as the experienced practices which involved application of various theories as well as knowledge bits towards economic aspects managed to bring out improved understanding among individuals concerning occurrences within financial markets.

In accordance with the various sources, among the driving forces which were behind coming up of econophysics was huge financial data amounts availability, beginning within the 1980s (Ficardi, 2010: 15). Traditional analysis methods proved to be insufficient due to the fact that normal economic methods handled equilibrium and homogenous agents, while most of the interesting phenomena within financial markets basically depended upon situations which were far-from-equilibrium and heterogeneous agents. This there implies that traditions analysis methods turned out to be disadvantageous hence the need for other more efficient methods. Economics was found to make use of techniques which were only able to handle equilibrium and homogenous agents hence they could not adequately offer solutions towards experienced problems within financial markets which in essence depended upon situations which were far-from-equilibrium and heterogeneous agents (Board, 2002: 67). Physics therefore turned out to be essential due to the fact that its theories had the capacity to handle far-from-equilibrium as well as heterogeneous aspects. This ensured that both physics and economics knowledge bits complemented each other hence desirable outcomes were realized.

Econophysics as a term was developed by Eugene Stanley within mid 1990s, who attempted to offer appropriate description towards the large paper numbers put down by physicists within the problems regarding stock markets, first appearing within a conference upon statistical physics within Calcutta

which occurred within the year1995 together with its subsequent publications (Das, 2003: 90). It has been indicated that the initial meeting upon econophysics within the year 1998 was organized by Imre Kondor and Janos Kertesz within Budapest. In current times, the meeting series which are almost regular regarding the topic incorporate APFA, ECONOPHYS-KOLKATA, ESHIA / WEHIA and econophysics Colloquim.

Stock markets were found to involve various occurrences wherein a variety of factors steered various changes. This brought about the need for economists to understand experienced processed for the purpose of ensuring that control measures were effectively applicable (Constantinides, 2003: 81). This would make it possible for desired outcomes to be obtainable through regulation measures' application. Economists therefore sought physics theories' application which was combined with knowledge bits obtained from economics hence proper understanding was propped up.

1.2. Basic Tools

For economists within the econophysics field to accomplish their purposes, they often employ a variety of tools which make their objectives realization possible. In accordance with various sources, the basic tools regarding econophysics are statistical and probabilistical methods regularly obtained from statistical physics (Studart, 1999: 27). The sources bring to our attention that physics models whose application has been done within economics include models having self-organizing criticality, chaotic models created for the purpose of studying cardiac arrest, and percolation models and also other models which have often been developed for the purpose of making earthquake predictions.

In addition, attempts have also been experienced towards mathematical theory utilization regarding information theory and complexity, as brought out by various scientists who include Claude Shannon and Murray Gell-Mann. Statistical and probabilistical methods obtained from statistical physics offer a very essential knowledge which props up understanding regarding the various aspects experienced within financial markets (Harwood, 1999: 71). They have made it possible for economists to understand experienced behaviors as well as conditions which steer such behavior occurrences. This makes regulation measures application possible and also effective.

Owing to the fact that economic phenomena are usually outcomes regarding various heterogeneous agents' interaction, an analogy regarding statistical mechanics exists, wherein various particles interact; although it must be put into consideration that properties concerning particles and human beings differ significantly (Toporowski, 2000: 39).

The theory regarding random matrix has been expressed as a good example which may be utilized for the purpose of noise identification within matrices regarding financial correlation (Blake, 2000: 39). Prove has been expressed that the technique has the capacity to significantly improve portfolios performance, an example of which may be expressed by application within portfolio optimization. Therefore, it is evident that this practice has commonly been applied within the praxis regarding quantitative finance.

However, other tools which have been utilized from physics with success which is mixed are quantum mechanics, classical mechanics, fluid dynamics and integral path formulation regarding statistical mechanics (El-Sayed, 2003: 17). Analogies have also been found to exist amid diffusion theory and finance theory. For example, black-scholes equation towards option pricing may be regarded as diffusion-advection equation.

The various basic tools have therefore been essential due to their capacity to facilitate econophysics application towards seeking of appropriate solutions when it comes to occurrences within financial markets (Gallegati, 2006: 61). This is due to the fact that they act as avenues through which accomplishment of intended purposes are accomplished.

1.3. Financial Markets, Quantitative Finance and Econophysics

The various aspects regarding financial markets, quantitative finance and econophysics may best be brought out through proper examination of each single term and what it entails. Although the three terms have differing meanings, they all attempt to explain various aspects found within financial markets (Voit, 2005: 97). Financial markets experience various occurrences, changes and challenges. Therefore, for appropriate solutions to be obtained, economists have to seek substantial information bits as well as theories which augment understanding. This makes it possible for them to come up with desirable methods through which realization of desirable outcomes within financial markets is propped up

(Roehner, 2002: 55). Explanations regarding financial markets, quantitative finance and econophysics as well as the various ways through which they relate to each other may be brought to light as follows.

1.3.1. Financial markets

Financial markets within economics may be perceived as mechanism having the capacity to allow individuals to procure and vend financial securities like bonds and stocks, commodities like agricultural goods or precious metal, and also some fungible value items at transaction costs which are low plus at prices which reveal efficient-market hypothesis (Ioanis, 1998: 107). It has been brought to light that specialized markets and general markets exist. Working of markets is usually through positioning of various interested buyers as well as sellers within a given position, hence facilitating easier interactions among them. Economies which largely rely upon seller and buyer interactions towards resources distribution may be expressed as market economies (Lavender, 2000: 98). This is due to the fact that the main operations within the market are governed by procurement and vending processes which signify the major interactions within the market.

Within finance, it is apparent that financial markets make it possible for various aspects to be fulfilled. These include international trade within currency markets, liquidity transfer within money markets, risk transfer within derivatives markets and capital rising within capital markets (Fanelli, 2002: 42). Financial markets have often been used for the purpose of joining individuals in need of capital to individuals who possess it. In general, individuals borrowing offer receipts to those lending them, wherein they promise to make suitable payments regarding the capital.

Financial markets are usually essential due to the fact that they influence experienced conditions within economies. For example, through procuring and vending of financial securities like bonds and stocks, countries have the capacity to substantially regulate money amounts entering the economy through circulation (Mantegna, 2000: 73). All nations strive towards economic development hence it turns out to be important for their governments to effectively regulate experienced conditions through procurement and vending regulation which facilitates desirable money amounts within circulation. Financial markets are therefore very essential due to their ability to influence major occurrences within nations hence they require appropriate control.

1.3.2. Quantitative Finance

Quantitative finance on the other hand may be perceived as a field which handles mathematical finance aspects. Sources have presented quantitative finance as study regarding mathematical theories which have often been used towards structuring and pricing a variety of sophisticated instruments of finance which are generally utilized by banks as well as hedge funds (Aoki, 2002: 8). In essence, quantitative finance focuses upon principles regarding linear algebra, probability distributions, stochastic calculus and also monte carlo techniques towards models imitative trades. The various aspects within quantitative finance are essential due to their capacity to prop up desirable operations when it comes to financial operations.

It is apparent that quantitative finance closely relates to financial economics as a discipline, which focuses upon underlying theories. Usually, through the various mathematical aspects involved in quantitative finance, it derives and also extends numerical or mathematical models recommended by individuals regarded as financial economists (Aoki, 2002, p.9). Quantitative finance is very essential within financial economics as it has the capacity to employ its mathematical aspects towards suitable solutions attainment regarding experienced problems.

1.3.3. Econophysics

Econophysics has often been perceived as interdisciplinary field regarding research, which applies methods and theories primarily created by physicists towards offering suitable solutions to economic problems especially those incorporating nonlinear dynamics, stochastic processes and uncertainty (Miller, 2001: 84). Application regarding econophysics to financial markets' study has often been regarded as statistical finance wherein its roots are in reference to statistical physics.

Physics knowledge utilization within economics is very essential due to its capacity to bring about wider knowledge bits attainment concerning actual occurrences within economics related fields (Dincer, 2007: 24). Sources have revealed that incorporation of obtained theories from physics to economics props up understanding of various aspects and this makes it possible for appropriate solutions to be obtained. For example, experienced challenges within financial markets have often be solved

through the use of various physics theories which attempt to broaden individuals understanding of reasons behind experienced occurrences (Beaudreau, 1998: 12). This makes it possible for them to come up with suitable ways through which appropriate regulations may be attained.

2. Thermoeconomics

Thermoeconomics may be perceived as biophysical economics, a heterodox economics school which makes use of thermodynamics laws to economic theory. Some economists have viewed thermoeconomics as economic theory which comes up due to thermodynamics laws' application to economics particularly second law (Cleveland, 2006: 26). Sources bring out thermoeconomics as double meaning term which was initially expressed as economics' science within study and improvement regarding thermodynamical processes' cost efficiencies. However, it is recently perceived as thermodynamics science use within the various study activities carried out upon economies (McCauley, 2004: 45). Sources bring to our attention that thermoeconomics may be perceived as statistical physics regarding economic value.

2.1. History

The history attached to thermoeconomics, which include origin as well as experienced development may be brought to light as follows. For instance, thermoeconomics as a term was coined within the year 1962 by Myron Tribus who was an American engineer, and its development was done by Nicholas Georgescu-Roegen who was an economist and stastician (Biddle, 2001: 28). According to sources, following its development as a term, thermoeconomics was utilized within functional sense with respect to efficiency and cost as presented within a paper which was released within the year 1962, which handled the various processes associated with seawater desalinization (Ghosh, 2004: 35). It was also applied within engineering field, wherein it was applied for the purpose of expressing energy use efficiency within industrial processes. In this case, thermoeconomics attempted to link thermodynamics with economic analysis.

Within the year 2001, Peter Corning who was a social scientist started applying thermoeconomics term within functional sense, in which case it was applied as economic systems' study through entropy and energy tools utilization (Ficardi, 2010: 17). Life, as expressed by Corning, is labor-intensive and contingent activity wherein energetic profitability has been regarded as essential to reproduction and growth. This was regarded as first law within thermoeconomics by Corning.

Within the year 2007, Libb Thims who was a chemical engineer from America, having similar views as those forwarded by Corning, perceived thermoeconomics as overarching thermodynamics discipline regarding humans, whose development was attributed to various contributions by individuals like Fredrick Soddy in the year 1922, Phillip Mirowski in the year 1989, Nicholas Georgescu-Roegen within the year 1971 and JIng Chen who brought out his ideas within the year 2005, among others, who involved themselves in thermodynamically studying various aspects regarding human societies where in they viewed them from economic view points (Claesens, 2006: 102). Through the experienced development aspects regarding thermodynamics over time, it is apparent that it attempts to offer suitable explanations regarding the various economics aspects hence props up suitable solutions attainment concerning experienced problems.

2.2. Basis

For economists within the thermoeconomics field to accomplish their purposes, they often make use of various tools which make their objectives attainment possible (Das, 2003: 91). For instance, sources bring to our attention that thermoeconomics has often been based upon the scheme that energy role within biological evolution ought to be understood and defined through thermodynamics' second law but with regard to economic criteria like efficiency, productivity and above all benefits and costs regarding a variety of mechanisms aimed at capturing as well as making use of available energy towards working and building biomass (Constantinides, 2003: 82). These tools make it possible for proper explanations to be obtained regarding the various economic aspects, ways through which they work and also suitable solutions provision during times wherein challenges are experienced.

2.3. Ecodynamics and Economic Systems

Ecodynamics may be expressed as components within applied economics. With regard to various sources, ecodynamics covers knowledge regarding monetary value, money flow and money usage (Studart, 1999: 29). It has been found to handle aspects concerning capital and labor. Ecodynamics is therefore essential within financial markets due to its ability to bring about suitable knowledge bits which may appropriately be applied to offer comprehensive understanding of experienced operations within financial markets (Board, 2002: 69). This makes it possible for individuals to obtain useful knowledge bits towards offering of solutions within experienced challenges.

Economic system on the other hand may be perceived as production structure, economic inputs allocation, economic outputs distribution and services as well as goods consumption within an economy (Harwood, 1999: 71). Economic systems may also be perceived as ways through which individuals live within a society, based upon ways through which nations handle questions and problems concerning their economy. Expressed issues within this case are issues regarding consumer needs, inflations and also other aspects which influence operations within the economy (Toporowski, 2000: 40). Sources have presented it as institutions' sets together with the social relations they hold. It signifies principles' sets through which the various challenges experienced within economics are handled, like economic problem regarding scarcity through limited productive resources allocation.

It is evident that economic system consists of individuals together with institutions as well as their relationships towards productive resources like through property convention (Blake, 2000: 54). Modern economic system examples comprise of mixed economies, socialist systems and capitalist systems. Some sources express economic systems as economics category which comprises of respective systems' study. It signifies organizational arrangements as well as processes which societies take up for the purpose of making consumption and production decisions (El-Sayed, 2003: 18). Towards development as well as modification regarding economic system, societies make choices amid unconventional decision modes and alternative objectives. The various objectives which may be perceived as desirable include equality, liberty, growth, and efficiency.

The experienced interactions between ecodynamics and economic systems is usually very essential due to the fact that it influences overall economic conditions. This is due to the fact that ecodymanics which focuses upon monetary value, money flow and money usage has the capacity to influence operations within economic systems which highly depend on experienced money levels (Gallegati, 2006: 63). For example, moderate money supply brings about desirable operations whereas too low or even too high brings about problems within economic systems which call for immediate handling otherwise they bring about undesirable outcomes. For economic conditions to be desirable, nations ought to ensure that ecodynamics and economic systems experience desirable interactions.

Through economic systems, countries are usually in position to make substantial decisions regarding the various commodity types which they will produce through their resources, the ways through which the commodities will be produced and markets wherein produced commodities would be absorbed (Voit, 2005: 98). These are essential aspects due to the fact that they make it possible for major decisions to be taken up within society. They also open up individuals towards offering appropriate solutions to problems which come up within the various operations.

3. Phynance (Physics Together with Finance)

Phynance has often been perceived as a field which incorporates both finance and physics aspects for the purpose of facilitating proper understanding promotion concerning various economic aspects (Roehner, 2002: 56). In this case, physics knowledge is usually applied towards explanation of experienced economic conditions. Economists realize that economic theories which were traditionally formulated have no capacity to offer substantial explanations regarding experienced conditions hence the need to turn to some theories found within physics which have the capacity to bring about suitable explanations regarding experienced economic situations. This is usually essential as it makes it possible for substantial solutions to be sought regarding experienced challenges.

Skills application from the science branch regarded as mathematical physics to economics and finance has turned out to be firmly established (Ioanis, 1998: 109). Physics graduates during the later periods of 1990s were vigorously being recruited through finance houses. Insights obtained from physics

have often fed models' development which offer appropriate understanding towards poverty and wealth distributions. For the individuals working within these areas, a variety of differing study fields exists. For instance, upon a given scale originating from daily applications towards underpinning research, individuals would realize various aspects like quantitative finance within one end, existence regarding econophysics within another and financial engineering as well as other numerous place labels amid them (Lavender, 2000: 99). With reference to present purposes, the various differences may be regarded as a distraction. The essential aspect within this case is overarching view regarding space in which occurrence regarding monetary transactions is experienced in form of statistical universe having characteristics which authorize models' utilization obtained from the objective.

Although individuals may be surprised at the relationships which exist amid money and physics, it is evident that a strong relationship exists between them. Management regarding money, just as in the case of physics experiment, implies handling numbers as well as varying quantities (Fanelli, 2002: 43). It has been found out that physics in actual sense focuses on general descriptions development like mathematical models which have often been experienced within the surrounding world. In accordance with the various sources, the models have the capacity to describe various complexity types like molecules movement within a gas or else stars dynamics within a galaxy. Similar models however may be applied towards related complex behavior within financial markets.

In reality, banks experience actual practical use of physics knowledge bits towards accomplishment of the various banking objectives (Mantegna, 2000: 74). For example, banks have utilized physics knowledge within financial deals pricing through modeling of the various markets as processes which are almost random and undertaking probability calculations regarding movements within future markets. It has also been applied towards trends or patterns identification within the market, having the capacity to facilitate development of trading strategies which are profitable. Through physics theories' application towards the explanation of experienced financial situations, it is apparent that proper understanding is enhanced regarding experienced variations within the financial market.

3.1. History

Historical development regarding phynance, as indicated within the various sources may be attributed to need for appropriate explanations towards experienced conditions within the field regarded as finance (Aoki, 2002: 10). Owing to the fact that individuals were unable to appropriately understand the various finance aspect based upon economic theories, it is apparent that attainment of more comprehensive theories turned out to be essential. This therefore brought about incorporation of various knowledge bits attained from physics, which were utilized together with knowledge aspects concerning finance for the purpose of ensuring that appropriate solutions towards experienced difficulties were sought.

Through its development, phynance has been very essential as it has made it possible for useful knowledge bits to be attained which facilitate substantial understanding regarding various aspects affecting financial markets (Miller, 2001: 85). It is evident that the field has facilitated realization of desirable operations due to the available knowledge bits which steer appropriate solutions attainment regarding experienced problems.

3.2. Brownian Motion Upon Capital Market

Brownian motion may be perceived as stuff bits which are usually kicked around through some atoms' forces. In correspondence, price movement within a market may be expressed as sum result regarding distinct financial items like derivatives or even other instruments which are kicked around through the various forces experienced through interactions between purchasers and sellers (Dincer, 2007: 25). Within both financial and physical contexts, the experienced kicking around of the various aspects may be described through the utilization of the various stochastic processes which are stationary and strict, wherein the particles take up random walk.

Brownian motion may as well be expressed as presupposed random movement regarding particles which are suspended within a fluid like gas or liquid, or mathematical model utilized for the purpose of offering suitable descriptions regarding similar random movements, often regarded as particle theory (Beaudreau, 1998: 14). Sources have brought to our attention that mathematical model regarding Brownian motion hold various applications within the real world. Fluctuations within stock markets have often been utilized as suitable examples, although movements within share prices might experience a rise as a result of unanticipated events wherein repetitions are not experienced.

It has been put to light that Brownian motion is usually among continuous-time probabilistic or stochastic processes, and also a limit regarding more complicated and simpler stochastic processes (Cleveland, 2006: 27). The experienced universality in this case may closely be related to normal distribution universality. Within the various cases, Brownian motion has been perceived in terms of mathematical convenience but not model's accuracy which motivates their utility. This is due to the fact that Brownian motion, having time derivative which is infinite everywhere, has been expressed as idealized approximation towards real physical processes which are random, always having a time scale which is finite in nature.

The various Brownian motion models regarding financial markets have often been based upon Paul Samuelson's and Robert Merton's work, regarded as extensions towards William Sharpe's and Harold Markowitz' market models regarded as one-period in form, and have in general terms been concerned with offering suitable definitions to various concepts regarding financial markets and assets, wealth and gains with regard to stochastic processes perceived as continuous-time in from (McCauley, 2004). Through the knowledge bits obtained from the model, involved assets have progressive prices which evolve constantly in time, driven by the processes involved in Brownian motion. In accordance with the various sources, it is evident that the model needs an assumption regarding assets which are perfectly divisible and wherein transaction costs are not experienced either for selling or buying (Biddle, 2001: 30). The other supposition is that prices attached to assets do not have jumps, which implies that surprises are not experienced within the market.

4. Comparison and Relation Regarding Econophysics, Thermoeconomics and Phynance

Comparisons as well as relations regarding econophysics, thermoeconomics and phynance, may be expressed as follows. Comparisons and relations in this case attempt to bring out experienced similarities and also differences which have often been experienced in the case of phynance, thermoeconomics and econophysics. These may be brought to light as follows.

The various similarities regarding the various aspects covered within phynance, thermoeconomics and econophynance may be brought to light as follows. For instance, from the various aspects which have been brought to light above regarding these aspects, it is apparent that they all attempt to bring out useful information bits which have the capacity to prop up desirable operations within financial markets (Das, 2003: 94). This may be substantiated as follows.

For instance, phynance as a field incorporates both finance and physics aspects for the purpose of facilitating proper understanding promotion concerning various economic aspects. This has an implication that knowledge aspects obtained from physics are utilized together with economics aspects for the purpose of ensuring that proper understanding is enhanced (Constantinides, 2003: 84). Economists realized that economic theories which were traditionally formulated had no capacity to offer substantial explanations regarding experienced conditions hence the need to turn to some theories found within physics which brought out suitable explanations regarding experienced economic situations. This is usually essential as it makes it possible for substantial solutions to be sought regarding experienced challenges.

Thermoeconomics, which is perceived as statistical physics regarding economic value has also been useful towards financial economics due to its capacity to offer considerable information bits concerning statistical physics (Studart, 1999: 29). This has highly benefited financial markets due to the fact that it has often brought out suitable information bits which are useful towards solutions provision regarding experienced difficulties within financial markets.

Finally, econophysics involves use of knowledge bits concerning physics as well as economics for the purpose of creating substantial explanations regarding various occurrences (Claesens, 2006: 104). Econophysics involves utilization of both physics and economics theories as well as knowledge aspects towards explanation of experienced occurrences within economics related fields like the financial field, it is evident that individuals have the capacity to obtain better understanding regarding the experienced aspects. This ensures that proper operations are promoted within financial markets.

However, although econophysics, thermoeconomics and phynance,make considerable contributions towards desirable outcomes attainment within financial field, it is apparent that the three fields operate differently (Harwood, 1999: 75). For example, phynance makes use of physics and also

finance knowledge wherein the two are utilized together for the purpose of ensuring that considerable knowledge bits are obtained which facilitate suitable operations attainment. Owing to the fact that finance field has no capacity to substantially offer suitable explanations towards actual occurrences, it is apparent that aspects from physics are incorporated for the purpose of propping up better understanding regarding various occurrences within the actual world.

Econophysics on the other hand makes use of knowledge bits obtained from physics and economics to offer desirable explanations regarding actual occurrences within economics field (Toporowski, 2000: 43). This mainly attempts to offer suitable solutions to experienced problems within financial markets. This is usually through incorporation of knowledge bits from physics which offer wider view regarding experienced economic aspects. Economics alone has no capacity to offer substantial information capable of propping up appropriate understanding realization, but incorporation of knowledge aspects from physics brings about appropriate understanding of the various aspects.

Thermoeconomics which focuses upon statistical physics regarding economic value employs knowledge obtained from statistical physics concerning economic value to offer appropriate solutions towards economic problems especially when it comes to the financial markets (Blake, 2000: 55). This is through comprehensive knowledge realization which makes it possible for desirable situations to be arrived at through appropriate solutions provision to experienced difficulties.

This implies that the various fields which include phynance, thermoeconomics and econophysics differ in the ways through which they employ their knowledge bits towards economics field (El-Sayed, 2003: 19). Although they have the capacity to offer suitable solutions towards financial markets, it is evident that they make use of varying techniques based on the applied knowledge bits.

The paper has comprehensively brought out substantial explanations regarding ways through which phynance, thermoeconomics and econophysics relate with each other as well as comparisons. The entire fields are relevant to each other due to their capacity to seek explanation regarding various financial aspects as well as solutions provision towards the experienced economic problems (Board, 2002: 69). To accomplish the intended purposes, economists have utilized mathematical as well as physics theories which assist in offering comprehensive explanations regarding experienced conditions within financial markets.

Conclusions

The results obtained in this study may be brought to light as follows. For instance, knowledge aspects obtained from the various fields like econophysics, thermoeconomics and phynance are essential due to the fact that they offer comprehensive information which has the capacity to offer solutions to experienced challenges within the various economic fields (Gallegati, 2006: 64). It is apparent that each of the fields combines varied knowledge bits obtained from different disciplines hence they comprise of comprehensive information capable of bringing about better understanding. Economists should therefore be encouraged to utilize knowledge from various fields for the purpose of expanding their knowledge ability within the various fields (Voit, 2005: 99). This makes it possible for them to apply the various knowledge bits towards solution provision regarding the experienced difficulties.

From the various aspects brought to light above, it is apparent that econophysics, thermoeconomics and phynance offer comprehensive knowledge bits which have often been useful within the various economic fields like financial markets for the purpose of offering suitable solutions to experienced difficulties as well as propping up desirable operations (Dincer, 2007: 26). Plain theories which were initially available regarding economics were found out to be inefficient towards appropriate explanations provision hence the need for combination with knowledge bits from other subjects hence this has brought about considerable improvements. Answers to various questions which could not adequately be answered through the utilization of the various theories regarded as traditional in form may now be answered through application regarding econophysics, thermoeconomics and phynance. Economists should therefore be encouraged to utilize comprehensive information bits from varied subject areas for the purpose of propping up better understanding regarding actual occurrences. Single subjects may not substantial explanations but combination of knowledge aspects from various subjects brings about better understanding.

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