Society for the Advancement of Socio-Economics
16th Annual Meeting on Socio-Economics
George Washington University, Washington DC, USA
July 8-11, 2004

DOES UNEVEN EXPECTED RISK PROMOTE POVERTY AND INSTABILITY?

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"The Washington Consensus reforms have exposed countries to greater risk, and the risks have been borne disproportionately by those least able to cope with them. …[T]he exposure to risk has outmatched the ability to create institutions for coping with risk….." (Stiglitz, page 86-87 [2002])

ABSTRACT

One of the hallmarks of a distressed economy is the spread between the nation's government bond yield and the yield of comparable U.S. Treasuries It is understood that this spread can be symptomatic of an important level of economic distress in the developing nations. Many believe that this condition will be corrected (and prosperity achieved) by the prescription of privatization, open markets, and proper fiscal/monetary discipline (Washington Consensus). But could socioeconomic dysfunction have a deeper cause that will not yield to this prescription? In particular, could persistently higher expected-risk in the planning by disadvantaged people everywhere, simply as a consequence of their disadvantage, defeat confidence and discourage investment in education and business?

In addressing this possibility, instant utility theory with its deeper foundation than standard utility theory and mathematical economics is introduced. This deeper understanding is then used to produce a parametric relationship which shows that increased expected-risks due to reduced discretionary power results in diminished rates of investment, in personal and material capital. That is, the analysis reveals an essential tendency for relatively disadvantaged individuals and nations to become more disadvantaged, due to lower or secondary discretionary-power in making decisions. This finding indicates a more definitive criterion for parity in socioeconomic interrelationships—in particular, Rawls' stipulation that "…there is no injustice in the greater benefits earned by the few provided that the situation of persons not so fortunate is thereby improved" is adjusted to "…there is no injustice in the greater benefits earned by the few provided that the *benefits and discretionary-power* of persons not so fortunate are thereby improved." In adopting this criterion it is recognized that utility theory per se, and Pareto optimality in particular (along with utilitarianism), are insufficient due to more general or higher-level considerations for advancing freedom and human welfare.

This new perspective recommends a different direction. In particular, instead of traveling the neoclassical course of unrestrained markets as the ideal or optimal, set a revised bearing by means of institutional initiatives where the global market is suitably adjusted or moderated at the borders to offset uneven expected risk. This would require (continuing) resource transfers from the advantaged to the disadvantaged—within nations and between nations—for the foreseeable future, as appropriate to their respective needs and cultures. It is understood, in this new guideline, that the disadvantaged will primarily *lift-themselves* to better social and material conditions, this being operationally necessary for both systemic and practical reasons.

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INTRODUCTION

Everyone understands that as the expected-risk of loss in an investment increases, a greater return is required to compensate. We see this quite clearly in financial entities from credit cards to government bonds. In corporate bonds, for instance, an increase in expected-risk by investors produces a corresponding decrease in the bond market-value (where the interest paid is typically fixed). The same is true in the stock market, and in real estate. This factor in investment-decisions holds true across the board, down to the level of the individual agent. In this regard, as risk attending the expected return from an investment in education, business, etc., increases, people will typically withhold or reduce their investment. [1]

Because expected-risk is so important in planning at all levels, it is imperative that we investigate its effect or impact on poverty and instability. A good place to start is in the international arena. Figure 1 compares interest-rate data for emerging economies versus developed economies. In this graph, interest rate is plotted on the horizontal axis and standard deviation of interest rates about the mean is plotted on the vertical axis. It is seen that the average (short term) inflation-adjusted interest rate of the emerging economies is 1.75% per annum while the same for developed economies is considerably lower, at 0.67%. (Note that Argentina, having defaulted on IMF loans, is not included in the emerging-markets data.) Standard deviations of the interest rates of emerging versus developed economies are 3.15% and 0.87%, respectively.

It may be concluded from Figure 1 that local and international investors assign greater expected-risk to investments in the emerging economies—by the fact that they require a greater return in compensation. In the long-term, equilibrium condition (after booms and crises have abated), it follows that more human labor must be applied to each element of material capital: The citizens of emerging economies accordingly carry a greater burden, all else equal, in their efforts to improve living conditions.

We now look deeper, and seek insight into the higher expected-risks and interest rates afflicting the emerging economies. In so doing we focus on *discretionary-power*. The word "discretionary" means "..liberty of deciding as one sees fit." That is, of "deciding" between one alternative or course of action and another. More to the point, of "deciding" how to deal with the spectrum of risk (and opportunity) one

[1] People will say this is their understanding, notwithstanding our occasional tendency to invest in bubbles. In this regard, economics must recognize "market bubbles," but devote its primary attention to the development of understanding assuming people are reasonable and rational. (My view is that accounting for uncertainty and risk in expectational plans is appropriate and absolutely necessary in mathematical economics—even though risk and uncertainty can be objectively ambiguous.)

faces over expected time. Here I make a point that appears immediately obvious—that the advantaged citizens in our world, with relatively greater economic, political, informational, etc. capabilities, enjoy necessarily greater discretionary-power than the impoverished in short-term and long-term (life-cycle) planning. The impoverished will accordingly—reasonably and rationally—recognize greater expected-risks in committing their human and material resources for welfare-improvement.

Because the relatively disadvantaged are burdened by higher expected-risks in their planning, the inevitable consequence is an inclination towards a relatively small rate of investment in capital, personal and material. And in a process that reinforces itself, diminished discretionary power of the poor serves to increase economic disparity and further diminish discretionary power. Without assistance and support, the impoverished fall further behind.

This connection between higher expected-risk (lower discretionary power) and investment should be amenable to analysis. However, the capability presently exceeds or transcends standard economics and this brings us to the second major theme of the paper.[2]

In seeking to advance economics I have found that economic (and socioeconomic) behavior at all levels is within reach of the methodology and mathematics employed in the natural sciences. Here mathematics is understood in the conventional sense—i.e., differential and integral treatment of (at least piecewise-) continuous parameters, each with a cardinal rather than ordinal character.[3] An important point in this respect is that mathematical economics at its most fundamental (behavioral) level should manifest *beauty*—that is, one should sense completeness, coherence, and simplicity. Beauty is the guiding light in mathematical physics (witness the Schrödinger equation of quantum theory and the field equations of general relativity). The great success of mathematical physics tells us of the beauty of the physical universe—and we may conclude that beauty encompasses the mental universe as well. But neoclassical mathematical economics has yet to reach this high plateau.

In matching our conception of socioeconomic reality within the context of (advanced) mathematics, it is necessary to completely and coherently formulate utility in basic or core economics. In particular, instead of directly identifying utility with commodities this must be only indirectly

[2] A discussant of this paper at its presentation during the IAES-Lisbon conference agreed that uneven expected risk promotes poverty and instability. He offered that this might also be demonstrated by standard economics. However, time did not permit his explaining how ordinal utility in standard economics can substantively accommodate uncertainty and risk in expectational planning.

[3] My belief, and that of many economists, is that human satisfaction (utility) is cardinal, in the same sense as pressure and weight. This follows from utility being time-integrated instant utility, where instant utility and time are cardinal (empirically measurable). However, standard economics often takes utility to be ordinal (essentially

accomplished (by imputation), having first identified instant-utility—"feeling-states" (See Dolan 2002 for background)—with all human mental and physical activity.

This more complete and consistent approach to socioeconomics can yield extended benefits. As a particular, by advancing socioeconomics on the basis of the (tried and true) approach of the natural sciences, the discipline could acquire its proper place in the hierarchy of investigative learning seeking to improve the human condition: Physics supports psychology > which supports socioeconomics > which supports the theories of justice and ethics.

As things stand now, mathematical economics impedes the completion of this overall methodology. Mathematical economics must progress beyond its interim or provisional nineteenth century precepts in order to adopt the empirical foundation of modern neuropsychology. And it needs to recognize that economics is not a primary branch of knowledge, like physics or psychology, but, to a significant degree, *applied psychology*—similar to the place of fluid mechanics in the natural sciences.[4] I believe that with these changes economics would acquire a closer association with the scholarly community in general, to the benefit of all.

Economics is a crucial member of this community, one that is absolutely necessary for not only completing the overall paradigm of ethical and justice theory, but also for improving socioeconomic well-being, thereby allowing justice and freedom to flourish. For economics to succeed in this respect I believe it must more closely accord with the epistemology and methodology of the investigative sciences in general (for examples—neuropsychology, social psychology, biology, anthropology, and physics). The next few paragraphs of the paper address this prospect. Then a mathematical development connecting uneven expected-risk to poverty is presented. The discussion concludes by proposing a more definitive criterion for socioeconomic justice in Rawls' "Theory of Justice."

DISCUSSION

Pareto optimality is perhaps the best place to begin. Not everyone, of course, agrees that this criterion for guiding domestic and international policy is satisfactory. In this regard, some have concluded that Pareto optimality is really "allocative efficiency (Wicksell 1934)"—that is, Pareto optimality is no

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dimensionless), an unavoidable and unfortunate consequence of the direct identification of utility with consumables, introduced in mathematical economics in the late nineteenth century. (Further discussed in the text.)

[4] At the conclusion of my presentation of this paper at the IAES Conference in Lisbon, the session moderator asked me to elaborate on the judgement that economics is (significantly) applied psychology. I observed that expectation, uncertainty, and feeling state (crucial in economic planning) are fundamental elements of economics, and are, of course, psychological.

more than "maximum efficiency" (i.e., of utility distribution), in the same sense that one naturally maximizes the efficiency of any system. Pareto optimality, and utilitarianism, are further criticized for the implicit assumption that socioeconomic justice is automatic—that it is a condition that somehow results from the maximization of "social utility," and therefore need not be explicitly addressed.

The advocates of Pareto optimality as a proper criterion for the good society make additional assumptions, without convincing qualification or justification. In particular,

(1) That the criterion is correct—i.e., properly grounded in human behavior; and
(2) That the criterion is complete—i.e., there are no natural or automatic forces overlooked by standard economics that tend to promote socioeconomic inequality.

(The reader may refer to Hausman's "*The Inexact and Separate Science of Economics*" (1992) for a substantive account of the history and state of equilibrium theory.)

All of the above concerns will be directly or indirectly addressed in this paper. It will be offered that mathematical economics requires a substantive foundation (in the understanding of human behavior), and that its methodology at all levels must refer back to this foundation.

Does Pareto Optimality Have a Correct Foundation? As will generally be the case in this paper, the question is studied from the perspective of natural science. Two levels are addressed: (a) Inspection of economics in its general characteristics; and (b) Inspection of its foundation.

Regarding the first level (a), a deficiency of mathematical economics is the absence of a systemic or interconnected classification of theoretical compartments. In fluid mechanics, for example, all physical domains—subsonic through hypersonic flow; free molecule to continuum; viscous through inviscid; etc.—can all be interrelated by way of the Maxwell-Boltzmann equations of molecular dynamics. In mathematical economics, however, this classification is yet to be developed. This, in turn, fosters or promotes inconsistency.

One inconsistency, for example, has been to identify utility (satisfaction) with human activity on the production side and to identify utility with consumables on the consumption side, as is generally true in economics. A detailed classification developed from basic considerations would highlight this inconsistency and compel its resolution.

Inconsistency can, moreover, lead to difficulties elsewhere. One such difficulty is a lack of completeness. As a particular, the disutility of labor—a real and measurable aspect of human behavior—is ignored in equilibrium theory (and is therefore also ignored in Pareto optimality). This is a serious problem for standard (equilibrium) theory: In this regard, how is the disutility of productive activity to

participate in the imputation of utility to products if consumptive utility has already been preemptively assigned to consumables (and only to consumables)?

A difficulty related to incompleteness is the inability in standard economics to model human activity as first producing things, then consuming them, in a given time-period (e.g., day)—that is, representing human activity in its typically *sequential* regimen. This shortcoming follows, again, from the direct identification of utility with consumables. The explanation is elementary: When utility is directly assigned to consumables human consumption as an essentially time-eclipsing activity (dimension [TIME]) is preempted, set aside as no longer relevant. This means that it has neither start nor end in the single day. And it means that human activity cannot be sequentially represented (unless the consumption rate is specified, which is never done when utility is preemptively identified with the consumable). Nowhere in economic journals worldwide to my knowledge has instant utility (feeling state) of the individual human being ever been directly identified with both productive and consumptive activity explicitly and sequentially modeled—a state of affairs, incidentally, that serves to perpetuate the nineteenth century neoclassical paradigm.[5]

At the second (fundamental) level (b)—why should mathematical economics adopt the more fundamental, *empirical*, starting point? The reason (in addition to eliminating the incompleteness and inconsistency noted above) is that the discipline would achieve a commonality in approach with the scientific community in general. This would accommodate physics certainly, but also psychology, particularly regarding the remarkable neuropsychological and biopsychological progress over the past decade. There would also be closer cooperation with sociology, and the greater promise of overall integration and consilience, across the scholarly communities.

Since mathematical economics has not been properly founded it can be concluded that Pareto optimality, as well as other components of economics, are necessarily deficient. As has been noted, the single most important step that would place mathematical economics on the right track would be to formally adopt instant-utility of human activity as fundamental, and accept, thereby, that the only way that products (productive and consumptive) can acquire utility is by imputation.[6] With this change, the logical development of economics, in the same sense as physics, would naturally and rapidly progress.

[5] The closest any journal article has come, in my reading, is a contribution by Ramsey (1928). Ramsey explicitly modeled production and consumption, but, true to the neoclassical paradigm, he identified utility directly with consumables in his basic formulation. Furthermore, he formulated community utility—directly, for the entire economic system—rather than formulate utility for the individual and then aggregate as appropriate.

Instant Utility Theory. In this brief overview of the instant utility approach to mathematical socioeconomics it appears appropriate to define in terms of something familiar (as could generally be the case)—in the present concern, neoclassical mathematical economics. Other than the seminal contribution of Hermann Gossen (1854) and Georgescu-Roegen's substantive explanation of the approach in his introduction to Gossen's book, it could be concluded that Ramsey's important paper "A Mathematical Theory of Saving" (1928) comes closest in the literature to the pure instant-utility approach.[7] And what is the change that would render his mathematical approach self-consistent? Simply this: Instead of identifying utility directly with consumables, Ramsey could have identified consumptive (instant) utility directly with the eclipse of time by human consumptive activity—just as he identified productive (instant) disutility directly with the eclipse of time by human productive activity.[8] Symmetry and consistency—absolutely essential in the scientific method of mathematical physics, as it should also be in mathematical economics.

Had Ramsey started his analysis from this more fundamental starting point, he still could have developed the same arguments and reached the same conclusions. But important new capabilities, previously disallowed, would have been available.

At the head of the list of new capabilities is the substantive and explicit treatment of time. By identifying (instant) utility directly and exclusively with both productive and consumptive activity in the same formulation (each activity with the single dimension [TIME]), human activity as discrete or non-overlapping components over the course of a day can be sequentially represented.[9] This deeper approach

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[6] Imputing value to products—consumptive and productive alike—is of course not a new idea. The concept was, as an example, prominent in Menger's theory of marginal utility (1871).

[7] At the presentation of this paper at the WEAI Pacific Rim Conference in 2003 January in Taipei the discussant observed that my work incorporating time in economics had been accomplished in Becker's 1962 contribution. I knew that this was not true, but his comment prompted another visit to the prominent publications on the subject—i.e., that of Gossen, Georgescu-Roegen, and Becker, among others. I re-confirmed that my approach, in its essential (utility theory) form, is identical to that of Gossen, as extended in relation to the treatment of leisure by Georgescu-Roegen (see page civ of the introduction to Gossen's book). Becker on the other hand, as noted by Georgescu-Roegen, "..disregarded the duration necessary for consumption (page ci)" (See footnote 3 on page 502). …In the instant-utility methodology it is mandatory that the activity duration of all human activity, mental and physical, along with the corresponding instant utilities (feeling states), be accounted for in the essential formulation. Becker's conceptual/mathematical treatment falls short of this—not only in the absence of consumptive activity as a formal element but also in not recognizing the disutility of labor. (Should the reader want to follow Georgescu-Roegen's discussion of Figure 4 on page ciii in his introduction she should make the corrections: (1) L on the x-axis should read L_0; and (2) h in "..N be the intersection of DD with b'_1 g" h…" on page civ should read b.)

[8] As on the production side, this requires an equation relating consumption rate (with dimensions [GOOD/TIME]) to consumption activity [TIME].

[9] Unless consumptive activity as a time duration is explicitly recognized, the correct time-relationships between production and consumption in a given day cannot be mathematically expressed. One is therefore left with the implicit and questionable assumption that this relationship is not important—for example in the theory of capital and production.

allows new insights into the nature of interest, capital-function, uncertainty and the expected "connectedness" in general across intertemporal time.

> Mathematical economics based on the instant utility approach would now model sequential human activity in the single day and across intertemporal time, a capability that necessarily escapes mainstream or standard economic theory. In this capability, the substantive modeling of capital function at its most elemental single-day level becomes possible.

The basic or essential instant utility formulation may be obtained starting from Ramsey's integral expression for intertemporal utility (Page 547):

$$\int_0^\infty (B - [U(x) - V(a)])dt,$$

where "..U(x) [is the] … rate of utility of a rate of consumption x and … V(a) [is the]… rate of disutility of a rate of labour a."[10] This expression represents "..the amount by which enjoyment [U(x) − V(a)] falls short of bliss [B] integrated throughout time." In our first change, we no longer take U to be a function of the rate of consumption x (x having the dimensions [GOOD/TIME]) but rather as a function of consumptive-activity duration b (where b is dimensionless—i.e., the activity time-duration is divided by the length-of-day, following Ramsey).[11] This, of course, renders the nomenclature more concise and easier to understand, because both a and b are now basically the same thing—a is the fraction of the day that a product is produced, and b is the fraction of the day that the product is consumed. Again, "symmetry and consistency"—an important rule in any department of human endeavor, but crucially important in mathematical investigations.

Now Ramsey was ambivalent about whether it is proper to model the subjective or essential discounting of intertemporal instant-utility. However, mathematical economists generally accept such discounting (although there is some controversy as to its character—e.g., exponential or hyperbolic). We represent purely subjective discounting—exclusive of that due to uncertainty—by λ. Furthermore, we drop the bliss parameter, B, thereby yielding the individual's expected utility over his life. Accordingly,

$$\int_0^\infty \lambda\,(U(b) - V(a))dt$$

represents discounted intertemporal (or life-cycle) utility.

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[10] Ramsey used the word "total" in his definitions (two places)—i.e., ' "*total*" rate of utility'—referring to the total for the entire community. But individuals also experience rates of utility. To avoid confusion, "total" has been suppressed in the definition.

[11] There is no difficulty in taking the time unit to be a 24-hour day, following Ramsey, rather than an hour or a second, and this convention will be retained in the present paper.

Note that U and V—instant utilities (feelings) that people expect to experience—are measurable in neuropsychological tests, just as pressure, temperature, etc. are measurable in physics. That is, the parameters are cardinal. Economists always take *instant* utility to be cardinal in their analyses and modeling. However, they frequently take time-integrated instant utility—or utility (satisfaction)—to be ordinal, depending on the particular theory and its historical development. For example, in pre-eminent equilibrium theory, comprising much of mainstream mathematical economics, utility is understood to be ordinal, as though immeasurability of this crucial parameter were a basic truth of psychology. But this "truth" is simply the logical conclusion of an incorrect premise—the premise being that direct assignment of utility (time-integrated feeling state) to material (consumable) entities is the proper foundation for economics as a mathematical discipline.[12] This is clearly not the case according to the theory of knowledge (epistemology) guiding development of the natural sciences: The fact is that instant-utility is more fundamental than utility and it is directly measurable—in the initial problem- or model-definition, mathematical economics should be based not on utility directly identified with consumables but on instant utility identified with human (mental and physical) activity.

At this point we go immediately to the final or complete instant utility theory in its basic formulation:

$$\underline{P} \equiv \sum_{w=1,\infty} [f_w \int_0^\infty \lambda_w(t)\, P_w(\ldots,t)\, dt] \tag{1a}$$

where $P_w(\ldots,t)$ is expected instant utility.[13] Equation (1a) is subject to the expected constraints

$$\Phi^c_w = 0, \qquad c(w) = 1, \infty. \tag{1b}$$

The above formulation represents the expectational plan of the individual, but it will accommodate the planning of a community as in Ramsey's paper.

In (1a) the thick underline signifies the individual's present, real-time psychosomatic sensation (feeling state) in forming his or her intertemporal plan, where the plan is represented by the expression to the right of the equal sign. (Here it is understood that the individual chooses among candidate expectational plans,.and activity scenarios or worldline "branches" within operative plans, on the basis of

[12] With utility preemptively and exclusively assigned to consumables, it becomes a derivable mathematical "fact" that utility is (now) ordinal. (See, for example, Hicks (1939).)

[13] Expected instant-utility $P_w(\ldots,t)$ has a quite general functional dependence in the individual's expectation (which may or may not be realistic). As a particular, $P_w(\ldots,t)$ may depend on the consumable being consumed (or produced) at a point in (expected) time, and it may depend on the rate of consumption (or production). Its time-derivative in this regard may be written: $dP_w(Q_C,\ldots,t)/dt = \partial P/\partial t + \partial P/\partial Q_C\, dQ_C/dt + \ldots$. Note that $\underline{P}$ is additive in (expected) time, but not additive in commodity amount—this being the essential departure from mainstream *commodity-based* mathematical economics.

which imparts the most favorable or agreeable psychosomatic response. In this regard, "$\underline{P}$ =" can also designate "the expectations-operator conditional on information at age j (Skinner, 1985)" of standard or mainstream mathematical economics, or, similarly, "the mathematical expectation conditional on information available at age t (Trostel and Taylor, 2001)." In these considerations, however, the human being resembles a supercomputer, with capabilities that transcend normal cognitive function. My view is more in accord with modern neuropsychological advances, where subjective function significantly directs, and simplifies, our activities in dealing with a profoundly complex world.)

Note that it would be an oversimplification to think of instant utility P as "pleasure/pain" in the usual definition. The symbols P and $\underline{P}$ represent the individual's "feeling state" in a very general sense. That is, P and $\underline{P}$ represent not just the awareness of pleasure/pain, real-time and expected, but include "visceral awareness" in "..the contemplation of possible scenarios which constitute options for actions." (Again, real-time and expected.) (Dolan, 2002.)

Concerning this, to reiterate the earlier discussion, feeling state ($\underline{P}$) in (1a) is the basis for guidance and decisions in the "stream of activity." In this regard, the individual "chooses" or "decides," in a significantly subliminal or autonomic process, among the expected scenario-alternatives or plans, the particular alternative (plan) that yields the maximum value or magnitude of $\underline{P}$.[14] In making choices, the individual does what he or she wants to do at each moment, subject to internal constraints (e.g., habits, illness) and external constraints (social and physical). [15]

Returning now to (1a), the worldline w is a new concept in economics and behavior (but similar to the world line of physics). The worldline represents a continuous sequence or locus of world-states that the individual has formed in his expectational plan. One world-state could be expected at, say, 3:15 pm during a business presentation at work one week hence. Each of the moments leading up to that instant is another expected world-state. Connecting the moments together from the individual's present moment over his or her life cycle forms one possible worldline. Of course, the presentation may not occur for some reason, or it could be delayed. If these two contingencies are recognized in the individual's expectational plan there would be two additional worldlines, each from the present moment to the corresponding point of contingency, and thereafter throughout the life cycle. Any expected contingency

[14] This is understood to be true for the ascetic as well as the hedonist. As another reflection, I believe that feeling states are germane or relevant to all cognitive function, including mathematics and theoretical physics.

[15] This is also true for the mentally ill. The consideration here is that mental illness has its effect on expectation and planning as an internal constraint. The individual may recognize the constraints of his illness, and plan accordingly. If the individual does not recognize the illness, then the effects come as surprises. Each surprise brings unexpected new information and therefore a new expectational plan. (Here we adopt the very rigorous or substantive view that unexpected new information in cognition, however minimal, triggers or engenders a new plan, however minimally different).

or uncertainty, however small, along any given worldline, necessarily introduces another worldline: These two worldlines, to re-emphasize, are coincident from present-time up to the contingency, and permanently separate after the contingency. Since the possible contingencies and uncertainties are endless (in their details, at least), the number of worldliness in the individual's expectational plan are always infinite in number.[16]

While the above formulation is a significant departure from equilibrium theory for the reasons discussed earlier, it is closely aligned with Real Business Cycle (RBC) Theory. In RBC theory a representative agent who is both a producer and consumer maximizes the following objective function (see Hartley, et. al. (Eds.) 1998, p. 9):

$$\underline{P} = \underline{P}(\{\mathbf{C}_t\}, \{\boldsymbol{L}_t\}).$$

($\underline{P}$ represents total intertemporal utility in Hartley's work, as is standard practice in mainstream economics.) $\{\mathbf{C}_t\}$ and $\{\boldsymbol{L}_t\}$are, respectively, "..the set of current and future levels of consumption, and … the set of current and future supplies of labor (the time subscript t has the values 0, 1, 2, …, ∞)." $\{\mathbf{C}_t\}$ has the dimension [GOOD]—e.g., an element of $\{\mathbf{C}_t\}$ would be the amount of a particular kind of food consumed in the intertemporal sub-interval t.[17] $\{\boldsymbol{L}_t\}$ has the dimension [TIME]. Now if we change consumable rates $\{\mathbf{C}_t\}$ to consumptive *durations* $\{\boldsymbol{C}_t\}$ with the dimension [TIME], and also, for completeness, recognize leisure or rest $\{\boldsymbol{R}_t\}$ (with dimension [TIME]), a revised objective (utility) function is acquired, i.e.,

$$\underline{P} = \underline{P}(\{\boldsymbol{C}_t\}, \{\boldsymbol{L}_t\}, \{\boldsymbol{R}_t\}).$$

This expression may be written in the equivalent form

$$\underline{P} = \int_0^\infty P(t)\, dt$$

where, for example, P(t) would be the instant utility of activity $\boldsymbol{L}_t$ early in each day, followed by the instant utility of activity $\boldsymbol{C}_t$ in midday, and concluding with the instant utility of activity $\boldsymbol{R}_t$ at the end of

[16] What is true for forward-looking expectation is also true for memory: The uncertain past can be represented by an infinite array of retrospective worldlines. The entire configuration of worldlines is like a tree, with the root-system (uncertain retrospection) converging into the trunk at ground level (present time), and then progressively diverging from the trunk into branches (uncertain expectation). Note that for equilibrium in the present approach, Nature is postulated to override all uncertainty, directing the economy along a single rigorously periodic worldline. All agents nevertheless believe their planning is uncertain.

[17] It is an interesting aspect of utility theory that instant utility per unit rate of consumption is dimensionally equivalent to (total) utility per unit consumable—i.e., both have the dimensions [PLEASURExTIME/GOOD].

the day. Incorporating subjective discounting and uncertainty then produces the Gossen equation (1a).[18] (See Chamberlain 1998a for a more detailed formulation of the Gossen equation. Papers on the application of the Gossen equation are also listed.)

Uneven Expected-Risk. We all know from observation and personal experience that as expected-risk in a contemplated activity increases, all else equal, the likelihood or probability of the activity decreases, for normal people in normal circumstances.[19] This is true at all levels—from the individual to the national. At the individual level, a decision to invest time in education, or resources in business, etc., will be discouraged in accordance with the increased risk of an unsatisfactory return. Large-scale businesses regularly assess risks and uncertainties in their planning. And governments, of course, do the same.

The obvious great importance of expected-risk in planning at all levels raises the possibility that the level of expected-risk depends on one's station in the world—as individuals, businesses, and nations. For example, while all of us as individuals "..suffer the slings and arrows of outrageous Fortune," some, due to relatively greater economic and political power, can better withstand or alter or deflect risks, thereby reducing the potential harm. Some of us may more readily convert potentially injurious risk into relatively benign uncertainty, or transfer risk to others, or extinguish risk entirely. The wealthy and powerful in business and among nations are similarly advantaged.[20]

Here we make important qualifications regarding uncertainty and risk. Uncertainty is general in its meaning—it applies to all expectation, whether the outcomes are harmful or beneficial. Risk is used, however, only in connection with possible outcomes that entail harm. Risk is therefore a category or class of uncertainty.

There is, however, a problem: We can say that the "risk" is 1/100 that the roulette ball will fall in 0-0 (and the bet definitely lost). However, it is semantically contrary to say that the "uncertainty" is 1/100

[18] In recognition of Hermann Gossen's essential contributions to the instant-utility approach, the emotive equation has been renamed the *Gossen equation* in my work.

[19] Of course, suicidal individuals may choose exposure to extraordinary risk, such as high-speed driving. And some risks are chosen for expected enjoyment (as part of the "reward"). But these aspects of risk-taking behavior may be judged beyond the normal. (Nevertheless, all risk-taking, rational and irrational, is a legitimate aspect of intertemporal planning—and can accordingly be represented or modeled in the present [instant utility] approach to mathematical behavior.)

[20] A major source of expected-risk is comprised of the push-pull forces driving capital into emerging economies. As noted by Loungani (2002), Mody and Murshid suggest that the "flush of capital inflows in the 1990s was more a push into developing countries [due to low interest rates and asset returns in the industrialized economies] than a pull based on unmet demand for investment financing". In this regard, "pull" investment is already a significant

that the same thing will occur. In this regard, "uncertainty" refers to the degree to which the possibility of 0-0 is less than 100%, while "risk" refers to the degree to which the possibility of 0-0 is greater than zero.

This difficulty may be resolved by employing the term certainty in mathematical economics (and mathematical behavior general in general). We can accordingly say that the level of certainty—or, simply, "certainty"—is 1/100 that the ball will fall in 0-0. This, of course, gives a new dictionary meaning to "certainty," but the extension of word-meanings is not uncommon in (evolving) knowledge.

We will continue, however, to employ "uncertainty" in our discussions, when not specifically referring to mathematical formulation.

In the following analysis, we produce a mathematical model that shows how relatively high expected-risk can reduce the rate of investment, and, ultimately, reduce capital intensity in the affected departments—human and material. An important feature of these cause and effect relationships between risk and investment is that they apply to human society at all levels, from the micro-economy (and individual agent) to the macro-economy.

Immediately after the mathematical treatment, the discussion turns to the methodology for defining the guidelines for improving human society.

Mathematical Formulation. Equilibrium is a simplifying assumption that has been used to advantage for many years in economics, as it has in physics (e.g., engineering). There is an important difference, however, between the approach to equilibrium analysis in standard mathematical economics and the approach to equilibrium analysis in instant-utility economics: In the present approach we start with the fundamentals and then introduce appropriate assumptions, whereas in the standard (economic) approach the economic system is *directly* formulated using plausible assumptions.

In the present *instant-utility* approach to mathematical economics it is first recognized that no economy is ever in true equilibrium or steady state. But we can postulate that the characteristic time or time-scale of macroeconomic transients (actual and expected) is much greater than the time-scale of expectational discounting (by pure *virtual*-discounting and/or risk-discounting), which is, in turn, much greater than the length of day (24-hours). Because each individual plans on the basis of unchanging macro-conditions within his or her discount horizon, day-to-day microeconomic repeatability, or periodicity, prevails. As a particular, the (life-cycle) plan of each individual is postulated to follow the

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expected-risk in the home-grown entrepreneur's planning, with possible "push" investment arising from economic conditions and central-bank decisions thousands of miles away further increasing expected-risk.

same activity-regimen day after day (periodicity). Managers of every kind (e.g., business, governmental) and at every level (e.g., local, national) do the same.

To reiterate, all individuals plan on the basis of near-term expectation, where macroeconomic conditions have not changed. They effectively ignore economic behavior, at all levels, beyond the discount-horizon. Here everyone may see changes far ahead, and may even see tragic disruptions at some future time, but all discount expected intertemporal utility at a sufficiently steep rate that, in a sense, they do not care. All plan and perform as though the economy will not change.

In addition to taking advantage of the steady-state, or equilibrium, assumption, we recognize and adopt diminishing returns of capital and labor. It will also be assumed that the expected rate of production equals the actual rate of production, and that these rates do not change. The same assumptions are made regarding consumptive activity. These assumptions are particularly instrumental in the forthcoming expression for the effect of risk on capital.

Another assumption, closely aligned with equilibrium, stipulates that departures or perturbations from equilibrium disappear over time. This, of course, is an essential characteristic of the stable system, in economics as in physics. In this regard, it is standard to postulate an *exponential* decay—i.e., the rate of decay at each (expected) instant is always equal to the residual of the perturbation in product with a constant factor. This assumption—decaying perturbation—is crucially germane to the formulation, later in the paper, of the concept of "interbalance." As a preview of this concept, interbalance is simply the requirement that cancellation or nullification or balancing must exist in the residual marginal utilities resulting from some small shift or change in the individual's expected activity—in the present case, the "small shift" is a marginal labor-duration increase in the production of capital, in the initial intertemporal day. In this *intertemporal* canceling-out of all expected (and discounted) marginal utilities resulting from the perturbation, interbalance ties or relates expected risk to the three modes of production (at the margin): (a) indirect labor (which produces capital); (b) direct labor (which produces consumable); and (c) material capital (which produces both itself and consumable).[21]

The final subset of simplifying assumptions addresses three aspects of essential subjectivity—in particular:

- <u>Expected instant-utility functions</u>:
    - Mathematical complexity is greatly reduced by each individual expecting all labor instant utility to be constant—independent of type or kind (direct or

[21] "Interbalance" is a suggested more concise terminology in place of "intertemporal efficiency." (See Hartley, et. al. (Eds.) 1998, p. 45). Note that interbalance in the present approach recognizes that capital persists for some time

indirect) and duration (whether for one hour, or two, etc.) throughout expected time.

- Stipulating consumptive instant utility to be near vertical ($dU/dt <\sim -\infty$) simplifies by holding the consumptive activity nearly constant during a shift in expected-risk.
- We give rest instant-utility a constant magnitude, thereby simplifying its relationship to production and consumption.

- Expected virtual (autonomic) discounting:
  - Autonomic discounting is nullified—i.e., given a constant 1.0 value.
- Expected risk:
  - Expected investment-risk is postulated to be uniform or constant over all expected time (intertemporal period).

Here it may be emphasized that expected investment-risk distributed over expected time has the same effect as autonomic discounting, and, furthermore, could be judged to predominate, for healthy individuals in normal situations.

In seeking the expression relating capital intensity and investment to expected-risk, we employ the Gossen equation (1a) in its summation rather than integral form:

$$\underline{P =} \sum_{w=1,\infty} \{ \sum_{t=0,\infty} <f_w \lambda_t [\boldsymbol{V1}_t + \boldsymbol{V2}_t + \boldsymbol{U}_t + \boldsymbol{R}_t]>_w \tau \}. \tag{2}$$

Here the kernal within $<\ldots>_W$ for worldline w of the representative individual consists of the worldline occurrence probability f_w; the virtual discount function λ_t (given the value 1.0); along with the labor instant utilities ($\boldsymbol{V1}_t + \boldsymbol{V2}_t$), consumption instant utility ($\boldsymbol{U}_t$), and rest instant utility ($\boldsymbol{R}_t$)—all for a one-day time unit (τ). (Note that taking the full day as the basic time unit naturally follows from segmenting intertemporal time into an infinite number of discrete days. It is seen that $\boldsymbol{V1}_t$, etc., now have uniform, averaged values over the day, thereby giving up their separate, sequential identities—a significant mathematical simplification (first introduced by Ramsey) that still allows mathematical accounting of separate and distinct activities.)

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following its production. In Hartley's expression (p. 45), marginally produced capital (i.e., its perturbation) is assumed to disappear after the first period (e.g., day).

As noted, τ is the length of the (24-hour) day, taken to be unity. Since λ_t has the dimension $[\text{TIME}]^{-1}$ in the present instant utility methodology, it cancels the dimension of τ leaving $\underline{P}$ with dimension [PLEASURE (feeling state)]—i.e., the individual experiences a psychosomatic response, however slight if not moderately felt or profound, to his prospective plan of action. It is important to note however, as previously discussed, that one could take λ_t to be dimensionless as is standard in mainstream economics. In this alternative, $\underline{P}$ is total (discounted) intertemporal utility U, obtained as a purely intellectual exercise by the planner.

The next step is to revise certainty f to represent expected-risk. Here it is assumed, following Ramsey, that each individual recognizes and expects the finite possibility in each future moment that his economic viability could suffer a great reversal, one tantamount to the effective extinction or demise of significant production/consumption. If we postulate—as one of the primary assumptions of the analysis—that this expected-risk has an unchanging occurrence-probability in each day over expected time and that all other uncertainties and risks are suppressed leaving just a single life-cycle path, then $\sum f$ may be written

$$[\sum f_w]_t = [\sum f_w]_0 \exp(-[\beta - \gamma]\, t)$$

with

β = rational discount coefficient;
γ = irrational deviation.

(See 2000.) We are not interested in the irrational deviation γ in the present study. Substituting the resulting expression into (2) gives:

$$\underline{P} = \sum_{t=0,\infty} \{\exp(-\beta\, t)\, \lambda_t\, [\boldsymbol{V1}, + \boldsymbol{V2}_t + \boldsymbol{U}_t + \boldsymbol{R}_t]\, \tau\} \tag{3a}$$

where it is recognized that $[\sum f_w]_0 = 1.0$.

The above expression represents the psychosomatic feeling-state (or, alternatively, total *discounted* intertemporal utility) that the given individual experiences in his or her reflection on the plan of action, accounting for the expected-risk over intertemporal time. To this we append the interbalance constraint:[22]

[22] In the summation of the present expression (3b), discounting is uniform in each day with zero absolute discounting in Day 0. As a result, a small discount factor in the original expression (see 2000) is omitted.

$$(3b) \qquad \left\{ [\, mp^{L1} \,]\, [mp^{cap\text{-}L2}]/[mp^{L2}] \right\} \left\{ \sum_{t=0,\infty} \exp(-\beta^{i}\, t)\, \exp(-\Lambda\, t) \right\} = 1,$$

where

mp^{L1}	Marginal productivity of indirect labor in producing capital (dimensions [GOOD/TIME]),
$mp^{cap\text{-}L2}$	Marginal productivity of capital in producing consumable (dimensionless), given the operative direct labor,
mp^{L2}	Marginal productivity of direct labor in producing consumable (dimensions [GOOD/TIME]),
$\exp(-\Lambda t)$	Exponential decay of the capital-perturbation.

Note that capital in this model produces both itself and consumable.

In formulating (3b), the expression for the decay of the original or initial capital perturbation is $[mp^{L1}\ \delta L1]\ \exp(-\Lambda t)$. In day 1 this yields a marginal increase or perturbation $[mp^{L1}\ \delta L1][\ mp^{cap\text{-}L2}]$ in the produced consumable. Dividing this by mp^{L2} then gives the corresponding marginal reduction of direct labor $\delta L2$. As the original expected capital perturbation (expectedly) decays day-by-day it continues (in the individual's expectation) to induce benefits in each day in terms of reduced direct labor and the corresponding reduced labor-disutility. Balancing the original L1 disutility increase against the beneficial L2 disutility reductions over expected time, summed and risk-discounted, results in (3b).

Note that Λ—the inverse of the characteristic time for macroeconomic change, and also for the perturbation—has been assumed to be much smaller (an order or more) than β [that is, the characteristic time of the economy is much greater than the characteristic time of expectational discounting] in order to permit the expected-equilibrium assumption. The exponential term could accordingly be dropped, but it is retained as an explanatory aid in the following discussion.

Effect of Expected-Risk On Capital Intensity. From (3b) we may see the effect of a sudden shift in expected-risk on the individual's investment in capital—personal (education, etc.) and material (business enterprise, etc.). We recognize, first, that only the marginal productivity of indirect labor mp^{L1} immediately or instantaneously changes with a sudden shift in expected-risk (capital intensity is of course unchanged during this instantaneous shift). The reason why only mp^{L1} changes is that the marginal productivities of capital $mp^{cap\text{-}L2}$ and direct labor mp^{L2} are "frozen" or fixed—because the amount consumed each day is fixed (by assumption). (When the total amount consumed in the day does not change, the duration of direct labor that produced it must also be constant. And because the duration of direct labor does not change, capital marginal-productivity (of consumable) also does not change.)

Now if the expected-risk of investment β^i increases, it is seen from (3b) that mp^{L1} must increase to compensate. This is necessary, to reiterate, because the individual expects that the negative marginal utility experienced at t=0 in producing the marginal investment will no longer be fully compensated by the sum-total of the discounted positive marginal utilities over each of the intertemporal days. Recalling the "diminishing returns" assumption—i.e., marginal productivity decreases as labor or capital increases, all else equal—the increased mp^{L1} is caused by a decrease in the amount of labor the individual expects to apply each day in producing capital (e.g., harvestable land; manufacturing equipment; education; etc.). And what is the overall result? …An increase in expected investment-risk causes a decrease in labor and effort to produce or maintain (human and material) capital.

What happens in the long run? In the long run, depletion of capital (loss of knowledge and skills; loss of arable farmland; wear and tear of machines, etc.) due to lack of maintenance results in an absolute reduction of capital intensity (of all kinds). As capital diminishes, increasing direct labor due to reduced capital on-line is required to satisfy consumption. Consumption eventually must fall. In the end, the individual must work longer hours with reduced capital to meet his or her needs. The individual has been pushed closer to impoverishment as the result of a change in circumstances that increases expected investment-risk.

What is true for the individual at the microeconomic level is also true at the macroeconomic level. (Here I am aware of the criticisms of "methodological individualism [Arrow, 1994]." In this regard, social identity is a prominent force in socioeconomics, one that economists need to address.) For our assumed equilibrium economy, all agents perform in unison, cooperating and compensating as required. The interbalance constraint (3b) is accordingly representative of the entire macro-economy, national or global.

Welfare Implications of Uneven Expected-Risk. In the present work we have offered a substantive mathematical formulation that reflects the importance of expected investment-risk in human planning—that is, on whether to increase capital or allow it to diminish. We have seen that a sudden increase in expected investment-risk can bring about a rapid decrease of capital-producing labor, followed by a slower decline in capital intensity due to wear and tear.[23]

It appears but a small step to conclude that if expected-risk is naturally greater for individuals and nations with reduced discretionary power, that an uneven burden would exist—that is, the relatively

[23] This is not intended to oversimplify. Of course, workers will continue to earn a living when fearing an economic slowdown. And individual managers will study alternatives. But it is understood that entrepreneurs and venture-

disadvantaged would experience generally higher (long term) natural interest rates (i.e., due to excessive risk-discounting) and a reduced tendency to maintain and expand capital intensity.

Is expected investment-risk unevenly distributed between the rich and poor? This question may be resolved into a more basic consideration: Given, heuristically or hypothetically, that risks burden everyone, rich and poor alike, could the greater discretionary power of those of us with greater advantages more effectively succeed in nullifying or counteracting risk? The answer would appear to be yes, on its face.

But we need to go beyond this cursory assessment. The issue or question is amenable to investigation: We should establish the distribution of discretionary power and expected investment-risk across the global economy as a function of wealth, income, and political/military power. The reasons for doing this are: (1) The argument of the present paper cannot be compelling without this data-base; and (2) The creation/evolution of domestic and international institutions to reduce uneven discretionary power over time is not feasible without this data base.

One of the more recent works in the quest for the good society is Sen's "Development as Freedom (2000)." In this work, Sen recognizes that material well-being is a necessary adjunct or companion to the ultimate quest of expanding personal freedom. Here "material well-being" is of course not the same as "material excess"—of the genre currently in vogue in America, Europe, and elsewhere. And material well-being is not the primary goal—rather it is freedom itself.

Sen is in agreement with the judgement of many scholars that Pareto optimality and utilitarianism are inappropriate guidelines for advancing human welfare. The present writer agrees with this view, on two levels: (1) As discussed earlier, these criteria or guidelines lack the substantive foundation to adequately validate our deliberations and decisions; and (2) Even if the neoclassical methodology were substantive, Pareto optimality—normative economics "guideline" for maximizing human welfare—is really "allocative efficiency," in much the same sense as businessmen strive to allocate resources to maximize profit. In this regard, efficiency in business and socioeconomic betterment is certainly important in the objective of improving human welfare. But it is necessary and appropriate to look deeper than mere efficiency—to issues and judgements concerning how best for people to gain the joy and harmony that may be possible in this world.

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capitalists—and economic agents generally—typically become more conservative in their decision-streams when experiencing increased expected-risk (all else equal).

While I recognize that the subject of the good society has been addressed by a number of contemporary scholars, I would like, in this preliminary and brief treatment, to address the matter from the perspective of Rawls' "Theory of Justice (1971)." Most relevant to the present study is his axiom that "…there is no injustice in the greater benefits earned by the few provided that the situation of persons not so fortunate is thereby improved (pg 15)." In other words, by way of metaphor, justice is preserved for the human race moving along our difficult road if the poorest among us are at least moving ahead, however slowly.

A primary conclusion of the present work is that this criterion of the just society is insufficient—if it is believed or concluded (as Rawls concludes—pg 32) that it is unjust to conduct our affairs as to promote or allow long-term instability and decline. The reason is that the criterion does not prohibit an increasingly nonuniform or uneven distribution of wealth and income, with a corresponding divergence of discretionary power. And this, among the poorest of us, increases expected investment-risk in planning, and decreases rates of investment in human and material capital. Capital intensity must eventually fall. Inevitably, major sectors of the world community will no longer move ahead "however slowly," and must receive support or collapse. An increasingly burdened global society is itself endangered.

It is necessary, therefore, that a more rigorous or disciplined principle be adopted—i.e., to follow Rawls,

> There is no injustice in the greater benefits earned by the few provided that the *benefits and discretionary power* of persons not so fortunate are thereby improved.

This does not mean that wealth and income must be uniform everywhere. But it does mean that domestic and international institutions need to be introduced, revised, and/or supported as necessary, to suppress the uneven discretionary-power and resulting uneven expected investment-risks that naturally follow from uneven wealth and power. With this change I believe that the well-being of the disadvantaged and poor could, over time, be steadily improved.

Besides the foregoing revised criteria within the context of Rawls' "Theory of Justice," there are two additional concerns:

(1) While material well-being is necessary, it is in itself an insufficient criterion for the good society; and
(2) Utility theory (which includes utilitarianism and Pareto optimality) does, after all, play an important (and indispensable) role in the overall methodology of ethics and justice.

Regarding (2), focussing on the second criterion, Pareto optimality is properly viewed as "allocative efficiency." That is, in the absence of market failure optimal allocation should naturally result (for [bounded] rationality)—subject to the institutional constraints of diverse kinds imposed by society. These

constraints are of course determined on a higher plane than the market. Nevertheless, (instant) utility theory, and mathematical socioeconomics based thereon, is indispensable to the methodology of justice and ethics. The utility approach cannot by itself rightfully guide society to a better world, but, properly formulated, it would provide vital support.

Concerning materialism as the measure of a satisfactory life (1), Sen, as noted above, offers "Freedom as Development (2000)" as the proper alternative. In his assessment of Sen's recommendations, Duhs (2002) observes that "Freedom as Development" can't be the "last word" in our centuries-long deliberations. Both Sen and Duhs are critical of utility theory. But, to again revisit the issue, can we truly settle on a satisfactory plan for elevating human society without the support of mathematical economics, properly formulated? Referring again to the natural sciences, applied-mathematics (engineering, in general) has greatly improved the material well-being of the global population over the past century. We would, it seems, be mistaken to conclude that mathematical economics cannot be similarly beneficial.

CONCLUSIONS

Theory of Justice

In his "Theory of Justice," Rawls offers an alternative to utilitarianism and Pareto optimality in our quest for the "right and good" in human society—a set of principles that is meant to ensure, as a criterion of justice, that the material well-being of the relatively disadvantaged in this world is improved (i.e., however minimally) as the advantaged few earn greater benefits. This criteria for the just and ethical society is argued in the present work to be insufficient—and not simply because it allows the poor to fall further behind in relative terms as we move down the road. The criteria is insufficient because the relatively disadvantaged are more susceptible to investment risk than are the advantaged in our inevitably interactive enterprises, thereby tending to fall further behind in (normalized or percentage) rates-of-investment in all affected departments, personal and material. Without appropriate institutional countermeasures this must inevitably lead to increased poverty and instability—not only within the most impoverished nations but possibly for the global society in general, due to its increasingly interconnected and interactive nature.

It is not only the afore-mentioned criterion for the just society in Rawls' important contribution that an exception seems appropriate. As a further consideration, I am in agreement with Sen in his recent study "Development as Freedom" that we focus more on human freedom than (unlimited) material improvement in advancing the human condition. This is not only appropriate in and of itself, but, as a practical matter, our planet cannot support much more "prosperity."

However, it is not agreed with Rawls and Sen that utilitarianism and Pareto optimality may not be useful. These derived criteria—or, more generally, utility theory—can be germane in our quest for the right and good in society, along with other departments—for examples, physics, psychology, and sociology. An integrated methodology of contributing disciplines is required, with utility theory—and mathematical socioeconomics built thereon—as vital components.

Utility Theory

But utility theory in standard mathematical economics is inconsistent with our approach to investigative learning in general—in its philosophical underpinnings (theory of knowledge) and its methodology. This is a serious matter—inasmuch as the dichotomy or departure undermines interdisciplinary cooperation. The problem originates with the direct identification of utility with consumables in neoclassical economics instead of accomplishing this by imputation, having first exclusively identified (instant) utility with all (mental and physical) human activity. Were mathematical economists to accept this change, economics would be adjusted at the fundamental level, with new light cast across much of the methodology, to the greater benefit of science and society in general. With this adjustment standard economics would not be overthrown but provided a deeper foundation, thereby improving our understanding in this crucial department.

Institutional Change

Institutional change to counteract higher investment-risks of the disadvantaged due to their diminished discretionary power is the remaining concern. Changes in this regard would have the near-term objective of ensuring that the benefits and discretionary power of the disadvantaged are improved as the advantaged earn greater benefits (an essential criterion for the just society). The long-term objective is an institutional order that achieves and maintains uniform discretionary-power/expected-investment-risk—recognizing, of course, that this is more of a unending process than an exactly achievable goal, due to imperfect information and institutions in a technologically, politically, environmentally, etc., evolving world.

It does appear that resource-transfer of appropriate forms from the advantaged to the disadvantaged, as required to reduce uneven discretionary power, will be necessary. Here I believe that attention must be given to balancing discretionary power within nations, as it must be given to balancing discretionary power between nations. Indeed, unless we can defeat the natural tendency toward poverty and instability within national boundaries, due to uneven expected investment-risk, our efforts to defeat this tendency in the international community will continue to languish.

As to the form of institutional change, I have no present recommendations. It seems clear, however, that there would be general criteria, rules, and guidelines at the international level. But how these would be implemented would depend on the particulars of each nation (history, culture, form of government, economic system, etc.). Significant influence would certainly be established on the transfer of capital and consumables across international boundaries, as necessary to protect local entrepreneurship and promote economic/financial stability that nations will need to primarily lift themselves to higher levels of achievement and freedom.

As always, change would come slowly. But the resolve and commitment to bring institutional change to promote a better life for all would, concomitantly, change expectations in all quarters, and advance the prospect of peace and harmony in our time.

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FIGURE 1. INTEREST RATES and STANDARD DEVIATIONS:

EMERGING versus DEVELOPED ECONOMIES