

## PARETO UPDATE II

(A) In our previous Pareto Update (I) we gave the new and genuine formula for Pareto density distributions. (As opposed to the numerous, merely mimicking ones, which may be acceptable for the simple outlining of Pareto-type distributions.) Viz.

$$(B) \quad f(x) = k_* e^{-\left[ \frac{(\int \ln(\ln(x)) - \int \ln(\ln(\mu)))^2}{2 * (\int \ln(\ln(\sigma)))^2} \right]}$$

(C) We also offered tested computer- spreadsheet programs to more than fleetingly interested readers, as freeware..

(D) We also sketched out our newly discovered principle which is underlying the generation of all gaussian type frequency distributions. viz.:

(E) Single factors disperse in the shape of a normal density distribution. ("gaussian bell"). Two factors interacting multiplicatively and simultaneously result in a log-normal density distribution still with an inner, essentially gaussian, structure. A host of factors interacting simultaneously with each other in a sort of networked turbo-chain-reaction result in a integration involving normal-distribution. (As first seen by Pareto).

(F) We also ventured to point out that the true Pareto-Formula is not just another Pareto-simulation tool, but represents significant progress as it will lead to further, deeper insights. (Rather than putting a dead stop to any further speculation and exploration.)

(G) "So what?!"

After publishing the first two papers\* we sensed as response a thundering silence -- no apparent effect on the status-quo-thinking whatsoever. From a few e-messages we surmised there was only a languid "so what?"-reaction at best. Over the past century many purely graphical simulations of the Pareto-curve had been conceived and published. There were already a dozen or two imitative formulas on display in books. These a dime a dozen - purely optical - samples amply sufficed to fill any occasional need for a good mimicry of an assumed genuine Pareto-frequency distribution. Seen from this perspective all we were offering was only one more formula, with a marginal innovation value close to zero. The fact that the new insight that Pareto distributions a generated by myriads of gauss-normal probability factors interacting on each other in a multiplicative random turbo-mix of probabilities in an integrative fashion did not make any waves.

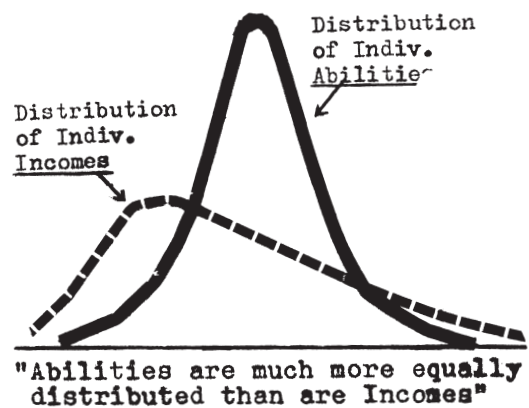
(H) Because of the above and just to show how this new insight can be a significant tool for gaining deeper knowledge and better understanding of other economic phenomena we applied it to a real life example. We took the liberty of looking with this magnifying glass at a "paradoxon" which featured prominently for many decades in the leading US introductory textbook of economics.

(I) We are referring of course to the evergreen series of editions of "ECONOMICS", published by MacGraw Hill and authored by the Nobel Prize laureate (1970) Prof. Paul.A.Samuelson; later-editions were co-authored by his heir-apparent Sterling Prof. (Yale) William D.Nordhaus. That series started in 1948 and every new edition has been continuously and carefully reviewed, edited, and updated before re-publication; over 18 editions right up to the end of the last century. It is a veritable backbone of U.S. economics- basics teaching. We can accept that its contents reflect with high accuracy and within the three sigmas, the state of current economic thinking at each stage and an "authoritative statement" of modern economic science.

(J) In chapter 26: Introduction to Incomes and Inequality it featured for about half a century the same two-colour graph which summed up neatly and strikingly a perennial conundrum:

(K)

### SPREAD OF INCOMES AND ABILITIES

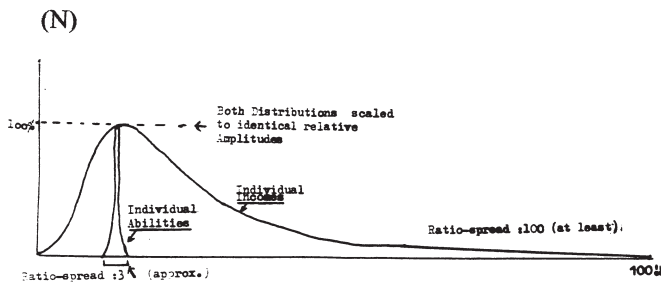


(L) The authors point to that the "paradox" of income dispersion as illustrated in the above figure. The bell shaped peaked (dotted) curve shows how commonly measured abilities are distributed. The much flatter black curve shows "how much more unequally distributed are incomes".

(Do we hear, may be, faintly in the distance the by now familiar beatings of the drums like... unfair- unjust- unequitable - exploitative- ..?) They are restating the painfully obvious when they subtitle their graph:

ABILITIES ARE MUCH MORE EQUALLY DISTRIBUTED THAN ARE INCOMES. Human traits such as measured intelligence (e.g. IQ), height, weight or strength are much more equally distributed than incomes. While human traits seldom differ by more than the factor three, personal incomes to day in a given free national economy show a ratio-spread of often more than a 100 times between the lowest and the highest examples.

(M) Those are fundamental phenomena which perennially reestablish themselves after wars, revolutions, economic and political upheavals, and when top-down attempts towards social reengineering are abating and the interplay of market forces is allowed free reign again.. We feel this phenomenon is of significant importance that it merits a redrawn special graph which brings out visually that staggering discrepancy. We therefore modified the above figure by projecting the two curves' typical ratio-spans onto a common abscissa which is graduated in a numerical scale representing the ratios of dispersion of the frequency distributions, e.g. 3 over one and 100 over 1.



(O) Looking at these two types of frequency distributions spread over a common relative- dispersion- yardstick we cannot help to be struck by the absurdly irrational, needle-sharp, oscilloscope-screen-spike appearance of the very distribution that was formerly considered "normal". Whereas the distribution of incomes stretches along the entire horizon like a diffuse cloudbank. Simple everyday experience and plain commonsense tells us that these two distributions are bound to belong to fundamentally different species of frequency distributions.

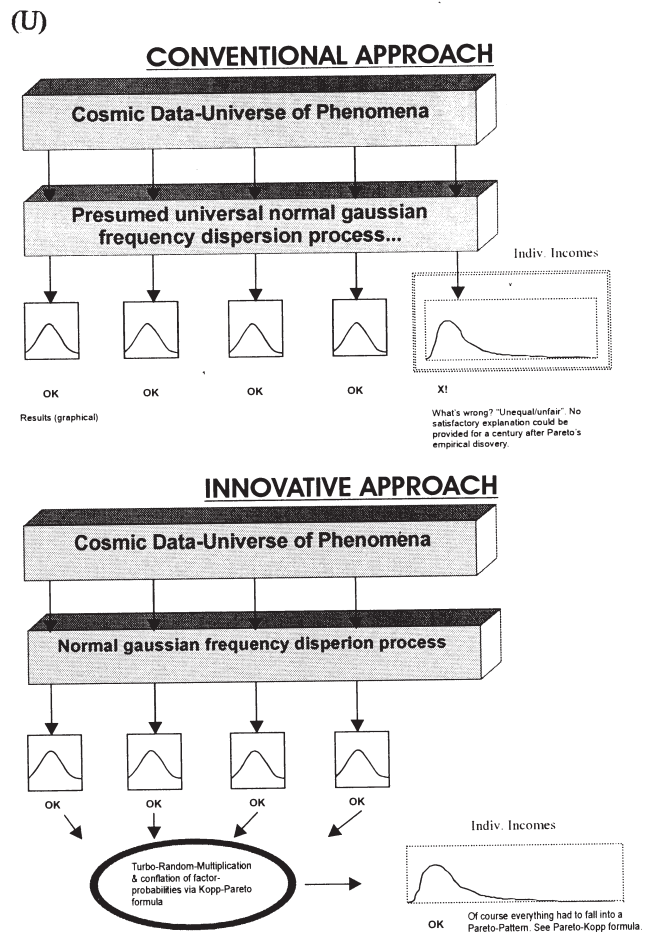
(P) The two illustrious authors of this authoritative flagship-tome ("ECONOMICS") discuss over many pages and at length the "puzzle" of individual income dispersion. Over several pages they wallow in Lorenz curves and income differences between menial workers and some of the glamour professions and colour of the skin, gender, etc. But they don't even claim to have found a satisfying comprehensive answer. We were vicariously embarrassed by their rather helpless and vague hints at the conclusion of the chapter.... important determinants must be sought in "peculiar talents" such as risk-taking luck ((sic)), stroke of genius, inheritance and capacity for hard work ..none of which turns up in standardized tests ....

Even worse, no convincing, watertight, answer has been forthcoming from any other quarter after half a century or so of exposure of this paradoxon and after 13 reviewed and updated re-editions of ECONOMICS; it was left unchanged in this respect right up to the 14th edition.

(Q) So, after half a century they must have arrived at the wise admission that this approach led into a cul de sac, dropped it without comment or fanfare and rather concentrated on the parts that were established and well understood.

(R) What the justly illustrious, intellectually extremely high-powered team of economics-authors, which certainly and continually scanned the scientific horizon, still lacked, at that point of time, was of course the basic, deeper understanding of the nature of Pareto density distributions.

The instrumental Kopp-effect and the Pareto-Kopp-formula were still unknown.



(S) The underlying pitfall in their stultifying approach was the silent assumption or unconscious expectation that income-distributions should behave statistically just like any other single human-related magnitude. They should form symmetrical "normal" bells, with a plausible dispersion-sigma. Apparently neither they nor anybody else was aware during the past century of one important aspect. The income frequency- distribution curve (Pareto) is the result of a multiplicative random -turbo mixing of normally, bell -dispersed contributive factors, a diffuse conglomerate of a myriad of churned together multiple interactions of dispersed probabilities. This is of course the missing link, the tin-can-opener- insight, which was simply not existing yet.

(T) This dramatic impact of an intervening additional mixing-cum-processing stage involving the Kopp-effect and based on the Pareto-Kopp formula is shown in the following picture.

(U) Pic: See previous page.

(V) The above picture unravels the puzzle. Individual incomes are determined by a large number of factors or abilities (each one distributed as a symmetrical normal bell) and their mutual multiplicative functionality interaction results in a heavily lopsided, long-stretched-out diffused distribution. It bears only a faint resemblance to the original input of many bell-shaped distributions. The Pareto distribution of incomes is therefore not a sinister conspiracy of malignant hidden powers but a probability-mathematical inevitability. {Many factors must be above average so as to arrive at a good confidence level for being in the top 20% bracket of individual incomes). This is one example of the practical benefit of this new insight.

(W) Further details can be found in:  
#1 Pareto Density Distributions, H.C.Kopperer, Quality and Quantity, pp.43-67, Vol.37, March 2003, Kluwer Academic Publishers, P.O.Box 322, 3300 AH, Dordrecht, The Netherlands.

#2 Reflections on the Structure and Origin of Pareto Income Distributions, H.C.Kopperer, Quality and Quantity, pp.213-227, Vol.32, Nr.3, Aug 1998, Kluwer Academic Publishers, P.O.Box 332, 3300 AH, Dordrecht, The Netherlands.  
(Kluwer Website: <http://www.wkap.nl>)

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