HOW CAN A "FAUSTIAN" SERIES BE DEFINED, EXEMPLIFIED AND INVESTIGATED STATISTICALLY AND INTERACTIVELY?

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Abstract

This article is certainly more crossdisciplinary than multidisciplinary, a paper of an interrogative type in keeping with the title, and, above all, one that tries to offer not so much an answer, be it relative, as one that is predominantly a useful illustration. How a "Faustian" series can be defined, exemplified and investigated statistically and interactively represents a question that invalidates, from the very beginning, the idea of normality, which characterizes a Gaussian distribution, reconsidering the importance of rare and very rare events. The introduction provides a logical justification for an interrogative approach specific to this article, starting from a triple motivation of the paper. A brief presentation of some paradigms authored by Nassim Nicholas Taleb, together with the obsolescence or precariousness of the Gaussian distribution, in the modern big data type universe, and the originality of the "Faustian" series concept, shifted over by the authors from the philosophical universe, into the space of statistical thinking, to finally reach the (by no means secondary) significance of the Faustian pact, accounts for the multiple roots of the investigation. Identifying some processes characterized by seemingly aberrant values and exemplifying some statistically quantified demographic "Faustian" developments provide a necessary illustration in the major section of the research. The section dealing with simulation by illustration underlines and motivates the importance of approaches characterized by an interactive and crosdisciplinary manner, based on the sociophysical method of renormalization, and also on Taleb's three-dimensionality of the fragile, robust, antifragile type (with final accents of anti-robustness in the case offered by the "Faustian" series of fertility in interaction with the religion variable). Some final remarks by the authors of this article reveal the specificity of the statistical concept of "Faustian" series, in parallel with the express need to continue the series of creative examples, through conceptualization and cross- and multidisciplinary approaches, and

also through trans- and interdisciplinary interactivity, in the future topics of other research.

Keywords: Faust, Faustian pact, distribution, Gaussian distribution, probability, distribution density, interactivity, rare and very rare events, skewness and kurtosis, thin or big tail distribution, hypotheses, statistical experiments and examples, renormalization method

1. About Nassim Nicholas Taleb, or the erudition and creativity of the mathematician-philosopher

In his almost unique capacity as author of five books that have become as many international bestsellers automatically over the last 25 years, Nasim Nicholas Taleb features a variety of practically authenticated skills, starting from that of a risk analyst in investment placements to that of a passionate practitioner of uncertainty and randomness, from the mathematician expert in probability theory, to the antigaussian statistician, from a free essayist to a professor with a declared adversity to classical academics, an original philosopher and author of Proctustian aphorisms - he had an ever more profound multidisciplinary impact in the development of modern statistics. Both Nassim Nicholas Taleb's origin and his family or friends are likely to give him uniqueness in terms of erudition, and depth due to the courage of his approaches, drawing a special ethical and cultural "outline", baed on the roots of its scientific personality. Born in Lebanon, in a family of intellectuals with a deep and long tradition for multidisciplinarity, in a multicultural linguistic cohabitation and under the influence of the conceptual diversity of ideas specific to magistrates, medical doctors and researchers in anthropology etc., Nassim Nicholas Taleb is a French citizen, with ancient Greek Antiochian origins, who lived through the Lebanese drama, and he is currently living in the United States, cherishing both the freedom and the distinctive dynamics of American society. A well-balanced mix of unique scholarship and real expertise are ubiquitous in all five of his bestsellers brought together in the collection entitled Incerto - A Philosophical Essay on Incertainty, a collection that includes: Fooled by Randomness (2001 - not yet translated in this country), The Black Swan: The Impact of the Highly Improbable (2007 – going by the Romanian title Lebăda Neagră sau impactul foarte puțin probabilului), The Bed of Procrustes Philosophical and Practical Aphorisms (2010 - or Patul lui Procust – un volum de aforisme filosofice și practice), and Antifragile: Things That Gain From Disorder (2012 – translated as Antifragil: Ce avem de câștigat de pe urma dezordinii), plus his most recent book, Skin in the Game: Hidden Asymmetries in Daily Life (2018 – Când pielea ta e în joc: asimetrii ascunse în viața de zi cu zi).

With each new book the amplitude of Taleb's creativity and scientific personality grows beyond the temporal limits of the classical values of the ancient times, discretely outlining the interconnectedness of the discerning nature of his simultaneously pragmatic and theoretical decisions with the perspective of his modern multidisciplinary approaches. A philosopher, with a natural hobby as a linguist, a philosopher with a clear appetite for scientific papers, a mathematician with a strong emphasis on probabilities and statistics, Nassim Nicholas Taleb is simultaneously a fine connoisseur of ancient languages such as Aramaic, Hebrew, Greek, Latin, Arabic, Syrian, and also an active speaker of modern languages such as English, French, Spanish, Italian, etc.

A crystal clarity and a "submicronic" accuracy of the language characterize a rigorous mathematician and a statistician endowed with the passion of significant details, a scholar who remains hard to overcome in the field of terminological correctness and applied conceptualizations, possessing a profoundly original, and endowed with a natural thinking ability to generate his own paradigms, some of which have become famous, e.g. i) the black swan, or the event with an extremely rare probability of occurrence; ii) asymmetric distribution (marked skewness) and fat tails, or big tail distribution in the world of rare and very rare events; iii) Taleb's fourth quadrant; iv) convex and concave distribution with Talebian impact; v) fragility, robustness, antifragility or the triple solution in the face of contemporary chaos; vi) the interactive approach, as a methodological necessity of scientific research; vii) dynamism and ergodicity as evidence, and even motivations for the change and dynamization of modern scientific thinking, including current statistics...

2. Three major benchmarks in a retrospective approach to statistical series

Nasim Nicholas Taleb is already considered an important 21st-century philosopher-mathematician, having a major impact on current multidisciplinary scientific research, including modern mathematical statistics. He points out that a classical statistical approach, using normal or Gaussian distribution in the context of big data developments or distributions, practically transforms it into a great contemporary intellectual fraud, similar to treating the universe in an exclusively Newtonian manner, in the context, already demonstrated and validated, of the verisimilarity of relativity theory. *"The Black Swan (in capital letters) is a historical economic, technological, personal event that is unforeseen for an observer, which has serious consequences* [...] *an event that has an extremely rare probability of occurrence"* (Taleb, 2007). In strictly probabilistic terms, a black swan is an event having a very low probability, which is often quite impossible to calculate (Ross, 2006, Dunbar, 2016)...

The growing population of *black swans* conceptualizes the manner in which rare or even extremely rare events having a high impact dominate history, while statistical distributions that do not include them give us the retrospective illusion of understanding them through narratives or narrative errors; thus, it becomes virtually impossible to estimate and predict them scientifically, and if a statistician is stubborn enough to do it, then the prospective is totally unpredictable and lacks a factorial or explanatory basis. Since the past is not a portrait of the future, the way in which the methods of confirmation by (false) experts - "faux experts" - or blind experts predispose, at the same time, the statistical thinking to constructing systems that are increasingly fragile to extreme events. New approaches, which are suited to new distributions of reality and to unexpected or unlikely dynamics, are vital requirements in solving the problems arising in most modern multidisciplinary researches. Probability theory and probability distributions are keys with universality valences, as pointed out by Carlo Rovelli, as early as 2014: "One cannot predict the spot where an electron will reappear, one can only calculate the probability of it occurring here or there. Probability therefore penetrates right into the heart of physics, where everything seemed to be governed by firm, universal and irrevocable laws..." (Rovelli, 2016, p. 27).

A second landmark, seemingly parallel to the outdated character of the Gaussian series or of the normal distribution, is that of a need for the informational investigation of a holistic and especially systematically materialized type, in which interaction should become the major axis of a new integrated information theory, as pointed out by Giulio Tononi, in 2012: *"All things interact permanently with each other, and thus the state of each one bears the traces of the state of those it has interacted with. In this sense, all things are constantly changing information about each other..."* The rule of the 3 σ or 6 σ (sigma) theoretically and practically describes a variable of Gaussian or normally distributed type X: N (μ , σ), which has significative values only within the range (μ -3 σ , μ +3 σ):

 $P(|X - \mu| \ge 3\sigma) = 1 - P(|X - \mu| < 3\sigma) = 1 - \phi(3) = 0,0027 \text{ or } 0,3\% (1)$

a value that can, in the vast majority of cases, be neglected or considered negligible.

A statistical distribution under the impact of big data or big tail would require an extension of modern inferences from the Gaussian interval $[-3 \sigma; 3 \sigma]$ to $[-5 \sigma; 5 \sigma]$, or even to $[-7 \sigma; 7 \sigma]$, a radical transformation of statistical thinking similar, in terms of the impact of thinking, to giving up deterministic reasoning in favour of the probabilistic reasoning... The predominance of thinking under the impact of the rare or very rare event, in the contemporary context, has become the new rule of the 5 σ or 10 σ , or even 7 σ or 14 σ .

A modern kind of statistics, adapted to the thinking of statistical physics, or in accordance with Giulio Tononi's theory, must "try to quantitatively characterize the structure that a system must have in order to be aware" (Tononi, 2012, pp. 56-90).

Hence a third reference, related to the awareness of the researcher appears, namely a concept with cultural and ethical origins linked to the Faustian series, which outlines a new feature of this article, as a mean approach to signifying the Faustian event, and implicitly the Faustian series. The Faustian (or Faustic) Pact, concluded with Mephistopheles, provides an exceptional solution, or an abnormal one – through its connotations and, especially, by its consequences -, in an attempt to satisfy Faust's nature, which became devoid of meaning, and transform his dissatisfaction into existential satisfaction, or even happiness, whose duration is shorter or longer, but with apparent certainty.By generalizing or statistically extrapolating Goethe's parable, one can therefore reach the Faustian series, a statistical series in which Faust is still apparently the only variant obtained under abnormal conditions, which are difficult to imagine, impossible to predict, completely uncertain, improbable by definition, etc. The rare and very rare event actually provides concreteness to the Faustian variant as a probability of occurrence, one that is really not small, but very small or extreme, generating the Faustian series, and this special type of series has to be analyzed permanently with the help of simultaneous and/or offset interactions. An in-depth recourse to the classics, conducted by means of the myth of Faust, induces the idea that God prefers the predominantly Faustian evolution, a dynamic occurring in leaps, and less that of a Gaussian type, an aspect that can be deduced from Goethe's verse poem (or novel), considered the magnum opus of German literature (published during the author's life, by the title Faust. Eine Tragödie – Faust. A Tragedy, in 1806, in a single first part, as a pact with local – microcosmic – impact, – and posthumously, in a volume titled *Faust*. Der Tragödie zweiter *Teil – Faust. The Tragedy's Second Part*, in 1832, in the complete form, i.e. in two parts, as a pact with a universal – macrocosmic – impact):

"A good man in his darkest aberration,

Of the right path is conscious still." (Goethe, p. 44 – in the Romanian or Rom. version).

"Hence this companion purposely I give, Who stirs, excites, and must, as devil, work" (Goethe, p. 45 – Rom. version).

"It is the sign of the one who has no spring ..." (Goethe, p. 82)

Could one not find, from Goethe's thoughts, that the Faustian variant represents a pronounced deviation from the right path of normal distribution, if one considers *Gauss's bell*, through an original, creative process, capable of generating sources, based on the very fact that this variant not have a source, meaning a sense of expected evolution?

Whence and how did Goethe establish that an exceptional dynamics essentially characterizes the Faustian series, a series defined much more clearly by very rare values, or values that are extremely rare compared to the avergae/ ordinary or normal ones? Let us consider some excerpts from Goethe's work, illustrating his impressive specific way of thinking (1955):

"Thy worthy avocation now I guess! Wholesale annihilation won't prevail, So thou'rt beginning on a smaller scale" (Goethe, p. 84 – Rom. version);

"Mephistoteles: And how by method all things to reduce" (Goethe, p. 98 – Rom. version);

"And so the greatest work may stand, One mind equal to a thousand hands" (Goethe, p. 520 – Rom. version).

According to Thomas Mann's original manner of portrayal, the Faustian series is a model of rigor and construction. This results from the consequences of the Faustian pact, as described in the incomparable Chapter XXV, from *Doctor Faustus* (1957), where the dialogue between the Devil and the signer of the pact, the young composer Adrian Leverkuhn, becomes as difficult to explain through statistical interactions as the recourse, , by Thomas Mann – quite inexplicable in this novel – to Dürer's magic square: "*A whole horde and generation of receptive lads, all healthy to the core, throw themselves upon the work of the diseased genius whom disease has made a genius, admire, praise, and exalt the work, carry it away with them, refashion it among themselves, bequeath it to the culture, which does not live by homebaked bread alone, but equally by donations and poisons from the apothecary of the Blessed Messengers. Thus saith the untransmogrified Sammael".*

Remarkably numerous questions elude or escape, from now on, the apparent control of classical statistical thinking, and complicate the modern methodological reasoning and discernment specific to this science. Does a single human individual, a single existential variant, a single manifestation, change the entire population of which he/she is accidentally part?

What significance does this extremely rare value have, and what role does this aberrantly rare manifestation play for the population it occurs in?

Can there appear, as a result of simultaneous or offset interactions with other very rare or even extremely rare values, dynamics that tend to ensure the statistical ergodicity of a population, an ideal form of manifestation of both the individual and the community of which he/she is part? Do all those extreme values coexist, plus the idea of the Faustian series, alongside of the improbable but repeatable manifestation of natural selection, according to which human evolution becomes the result of major influences of several minor groups, which of course definitely annihilates the concepts of average man, average value, average indicator, central tendency – if this apparent infringement at the scale of history was still needed?

3. Research methodology

Two questions provide the backbone structure of this investigation, but especially the methodology that anticipates and prepares to provide a scientific framework for this article – and these two questions focus on exemplifying the Faustian series, providing a dominant case study, or a simulation case with an explanatory role.

The first question describes an undisguised attempt by the authors to identify a valid answer to the question whether or not a new concept is necessary, such as the Faustian statistical series, which appears initially in cultural or ethical terms rather than statistically?

In this case, the methodological approach is based on the threedimensional Talebian synthesis, having recourse, as was indeed attempted in the previous section of this paper, to three essential arguments such as fragility, robustness, and antifragility (Taleb, 2012).

The mythological argumentation of the Talebian method of the threefold structuring, which plays the part of validation or invalidation, replaces the fragility of the myth of Sisyphus or of the sword of Damocles, the robustness of the myth of the Phoenix bird, and the antifragility of the myth of Hydra.

In this article the exemplified fragility becomes the tendency of Gaussian abnormality of Romania's population, starting from the fertility hypothesis identified by level and impact, the apparent robustness is conferred by the behaviour in relation to the birth rate in the mixed families or couples, and the antifragility results from the interaction of religion with the fertility as demographic impact.

"What does that mean? ... We have to accept the idea that reality is simply interaction..." (Rovelli, 2016, p. 29). This aspect is perhaps a natural one, as considered by Carlo Rovelli, for whom "the universe and the world mean interactive relationships rather than objects or individuals" (Rovelli, 2016, p. 70).

In an original manner, the detailed illustration made in this article does not provide an antifragile argument, but an antirobust argument, with a return to a more dramatic context of fragility, in other words, the authors proposes a four-dimensional evaluation of a fragile, robust, antifragile or antirobust type. The second attempt can be summarized in the question about the concrete way in which such a simulation is constructed, or how Faustian series could be best exemplified?

4. An illustrative experiment

The ambivalence of Taleb's Black Swan has been diverted or distorted over a minimal interval of only one decade. If at the beginning Nassim Taleb allowed the possibility that the black swan had a negative or positive character, the subsequent interpretations exclusively provided a negative, catastrophic dimension, to this unlikely event, an extremely rare, unforeseen one, and the unidirectional understanding and the diversion of meaning became widespread, i.e. general.

The Faustian statistical series, as a statistical concept, focuses on the positive and the interaction, in an attempt to highlight the importance of the Faustian pact concluded with no one other than the Devil...

A first example or theoretical experiment inspired by the demographic realities of the European Union over the last two decades is represented by the Faustian series of a demographic type.

A human population structured by gender, with 52% women and 48% men, with certain aging tendencies in terms of the weight of the age groups 0-15 years (15%), 15-50 years (50%), and over 50 years (35%), having a life expectancy of 75 years, a fertility rate in women in the 15-49 years age group of 2.0 children/woman in the fertile group is exposed to tendencies to decrease their number for various economic, social, religious, etc. reasons.

Structural synthesis of a population similar to that of Romania

Fig. 1



Source: Made by the authors

This population is described over 25 equal variation intervals, each having 200,000 inhabitants, of which about 100,000 women who belong to a fertile quota (with a tendency of evolutionary parity with respect to gender for a simplified calculation).

Exemplification of a Faustian series in terms of demographic statistics, structured in keeping with successive and normally distribuited fertility groups

Table no. 1

Interval (4%)	Fertility -no. children /woman 15-49years	After first group (35 years)	After second group (70 years)	After third group (105 years)	Number of children born	After first group (35 years)	After second group (70 years)	After third group (105 years)
	SER01	SER02	SER03	SER04	SER05	SER06	SER07	SER08
1	0	0	0	0	0	0	0	0
2	1	0	0	0	200000	0	0	0
3	1	0	0	0	200000	0	0	0
4	2	0	0	0	400000	0	0	0
5	2	1	0	0	400000	200000	0	0
6	2	1	0	0	400000	200000	0	0
7	3	2	0	0	600000	400000	0	0
8	3	2	1	0	600000	400000	200000	0
9	3	3	2	0	600000	600000	400000	0
10	4	3	2	0	800000	600000	400000	0
11	4	4	3	1	800000	800000	600000	200000
12	4	4	3	2	800000	800000	600000	400000
13	4	4	3	3	800000	800000	600000	600000
14	4	4	3	2	800000	800000	6000000	400000
15	4	4	3	1	800000	800000	600000	200000
16	4	3	2	0	800000	600000	400000	0
17	3	3	2	0	600000	600000	400000	0
18	3	2	1	0	600000	400000	200000	0
19	3	2	0	0	600000	400000	0	0
20	2	1	0	0	400000	200000	0	0
21	2	1	0	0	400000	200000	0	0
22	2	0	0	0	400000	0	0	0
23	1	0	0	0	200000	0	0	0
24	1	0	0	0	200000	0	0	0
25	0	0	Ó	0	0	0	0	Ó
Total	62	44	25	9	12400000	8800000	10400000	1600000

Source: Made by the authors

The descriptive statistics of these hypotheses, whose role is to exemplify a process of normal evolution towards abnormality or disappearance, underline a dramatic decrease in the average number of babies born within the fertile group or contingent, from 2.48 to 1.76, and subsequently to 1, and 0.36 in a final hypothesis.

Descriptive statistics of variables in Table 1

Table no. 2

	SER01	SER02	SER03	SER04	SER05	SER06	SER07	SER08
Mean	2.480000	1.760000	1.000000	0.360000	496000.0	352000.0	416000.0	72000.00
Median	3.000000	2.000000	0.000000	0.000000	600000.0	400000.0	0.000000	0.000000
Maximum	4.000000	4.000000	3.000000	3.000000	800000.0	800000.0	6000000.	600000.0
Minimum	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Std. Dev.	1.294862	1.562050	1.258306	0.810350	258972.3	312410.0	1187322.	162069.9
Skewness	-0.366493	0.206513	0.640348	2.142781	-0.366493	0.206513	4.398196	2.142781
Kurtosis	2.052933	1.556067	1.696676	6.413087	2.052933	1.556067	21.24303	6.413087
Jarque-Bera	1.493964	2.349513	3.477953	31.26585	1.493964	2.349513	427.2757	31.26585
Probability	0.473794	0.308894	0.175700	0.000000	0.473794	0.308894	0.000000	0.000000
Sum	62.00000	44.00000	25.00000	9.000000	12400000	8800000.	10400000	1800000.
Sum Sq. Dev.	40.24000	58.56000	38.00000	15.76000	1.61E+12	2.34E+12	3.38E+13	6.30E+11
Observations	25	25	25	25	25	25	25	25

Source: Made by the authors with the help the E-Views software package

The initial data series having a seemingly normal distribution describes, after several generations, a tendency of destructuring into two subpopulations, one of which has a tendency to disappear around the central value of zero fertility, and another that slowly extinguishes, with decreasing values of the number of births. for a woman belonging to the fertile group... In essence, even in simple theoretical hypotheses focused on the demographic evolution in relation to the apparently normally distributed series of data, one eventually reaches the series with initially thickened tail, and then long and very long tails...

Abnormalization of the demographic distribution of a population similar to that of Romania over three fertility groups/contingents



Source: Made by the authors with the help the E-Views software package

A spectacular immigration with very high fertility can be simulated, which also has a very low, or extremely low probability of emergence, then resuming all three successive investigations:

Exemplification of a Faustian series in terms of demographic statistics, structured in successive fertility groups affected by significant very high fertility immigration

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Interval (4%)	Fertility -no. children / woman 15-49 years SER11	After first group (35 years)	After second group (70 years)	After third group (105 years) SER 14	Number of children born	After first group (35 years)	After second group (70 years)	After third group (105 years)
1	0	0	0	0	0	0	0	0
2	1	0	0	0	200000	0	0	0
3	1	0	0	0	200000	0	0	0
4	2	1	0	0	400000	200000	0	0
5	2	2	1	0	400000	400000	200000	0
6	2	3	2	0	400000	600000	400000	0
7	3	3	3	1	600000	600000	600000	200000
8	3	4	4	2	600000	800000	800000	400000
9	3	4	4	3	600000	800000	800000	600000
10	4	6	6	4	800000	1200000	1200000	800000
11	4	8	6	6	800000	1600000	1200000	1200000
12	10	8	6	6	2000000	1600000	1200000	1200000
13	12	10	8	6	2400000	2000000	1600000	1200000
14	10	8	6	6	2000000	1600000	1200000	1200000
15	4	8	6	6	800000	1600000	1200000	1200000
16	4	6	6	4	800000	1200000	1200000	800000
17	3	4	4	3	600000	800000	800000	600000
18	3	4	4	2	600000	800000	800000	400000
19	3	3	3	1	600000	600000	600000	200000
20	2	3	2	0	400000	600000	400000	0
21	2	2	1	0	400000	400000	200000	0
22	2	1	0	0	400000	200000	0	0
23	1	0	0	0	200000	0	0	0
24	1	0	0	0	200000	0	0	0
25	0	0	0	0	0	0	0	0
Total	80	88	72	50	16400000	17600000	14400000	10000000

Source: Made by the authors

Actually, in real practice it is not possible to have such a high fertility level on the current demographic plane, where the highest value for the year 2017 is 7, and when such an event could still be achievable, then it would be a very rare one, which would occur with an extremely low probability (table 4):

Extract from the world hierarchy of the top 12 countries in the world in relation to fertility rates

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Rank	Country	Fertility rate in 2017 (births/ woman)			
1	Niger	7.0			
2	Somalia	6.2			
3	Democratic Republic of Congo	6.0			
4	Mali	6.0			
5	Chad	5.8			
6	Angola	5.6			
7	Burundi	5.5			
8	Nigeria	5.5			
9	Gambia	5.3			
10	Burkina Faso	5.3			
11	Uganda	5.1			
12	Tanzania	5.0			
157	Romania	1.6			
EU	European Union	1.6			

Source: Data retrieved online by the authors at https://data.worldbank.org/indicator/SP.DYN.TFRT.IN

The descriptive statistics of these new hypotheses, playing a role of exemplifying a completely normal evolution process through abnormal fertility, ensures a significant initial increase of the average number of babies born within the fertile group/contingent, from 3.28 to 3.52, followed by a natural slow decrease to 2.88 and 2.00.

Descriptive statistics of the variables in the hypothesis of a Faustian series or of the data presented in Table 3

Table no. 5

	SER11	SER12	SER13	SER14	SER15	SER16	SER17	SER18
Mean	3.280000	3.520000	2.880000	2.000000	656000.0	704000.0	576000.0	400000.0
Median	3.000000	3.000000	3.000000	1.000000	600000.0	600000.0	600000.0	200000.0
Maximum	12.00000	10.00000	8.000000	6.000000	2400000.	2000000.	1600000.	1200000.
Minimum	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Std. Dev.	3.034798	3.083829	2.619160	2.415229	606959.6	616765.8	523832.0	483045.9
Skewness	1.735660	0.524091	0.275294	0.724418	1.735660	0.524091	0.275294	0.724418
Kurtosis	5.227934	2.141870	1.695730	1.923469	5.227934	2.141870	1.695730	1.923469
Jarque-Bera	17.72266	1.911536	2.087780	3.393795	17.72266	1.911536	2.087780	3.393795
Probability	0.000142	0.384517	0.352082	0.183251	0.000142	0.384517	0.352082	0.183251
Sum	82.00000	88.00000	72.00000	50.00000	16400000	17600000	14400000	10000000
Sum Sq. Dev.	221.0400	228.2400	164.6400	140.0000	8.84E+12	9.13E+12	6.59E+12	5.60E+12
Observations	25	25	25	25	25	25	25	25

Source: Made by the authors with the help of the E-Views software package

The Faustian type series exemplified by means of the probability distributions as a long-tailed series becomes gradually normal, but cannot avoid the final trend towards another abnormal thick-tailed series (Figure 3):

The trend of abrupt renormalization of the demographic distribution of a population similar to that of Romania, starting from a hypothesis of generating a Faustian series





Source: Made by the authors with the help of the E-Views software package

Starting from the previous example, there also occurs an event that is otherwise very unlikely, as a result of the simultaneous interaction of a religious nature (characterized by the abnormality of final adherence of the inhabitants during three fertile contingents – 105 years) and demographic interaction (characterized by a sudden normalized fertility during the first and second contingents).

The method of analysis that is needed for the understanding and prospective analysis of the Faustian series, or of the unlikely event, is the *method of the renormalization group*, an instrument exploited by the physicists' thinking, and especially by that of the sociophysicists (as described by Serge Galam, in 2012, in the book entitled *Sociophysics, A Physicist's Modeling of Psycho-political Phenomena*, New York: Springer-Verlag, and also presented

by Nassim Nicholas Taleb, in 2007, in *The Black Swan: The Impact of the Highly Improbable*).

To better understand the applicability of the method to the phenomena having a social, religious and demographic impact, however, a prior detailed analysis of completely different aspects of the adherence of human individuals is required for at least three religions, specific through their final membership, according to a set of criteria, rules or norms, which arre completely different in Islam, Christianity and Judaism, without however omitting the fact that all of those were, and still remain, durable over time, being also treasured in written form in major books recognized as such (Koran, Bible, Torah or Talmud). Finally, what is interesting as an illustration of the interaction is the religious and marriage membership of both the mixed married couples, and their children. Islam imposes rules that virtually conduce to a nearly complete assimilation within a mixed matrimonial context with a partner or partner from any other religion (schematically, it all looks as in Figure 4, for a family with only one member who is initially a disciple of Islam, a or b)

Almost total religious assimilation to Islam in mixed families (when W and H are the parents, and C represents the children)



Note: Theoretically, only case 4a is firmly regulated in religious terms, yet case 4b has the same purpose through traditions and coexistence already demonstrated

Christianity is characterized by a total tolerance (schematically, it all is presented as in Figure no. 5a, where the man is Christian and 5b, where the wife is Christian) the openness towards adherence to other religions is total:

Almost total religious tolerance for Christianity, in mixed families, at the expense of their own religion (when W and H are the parents and C represents the children)



Judaism is distinguished by a diminution or severe criterion selection, the mother being the defining element for the subsequent religious adherence of the children (6b)

The restrictive and rigorous religious assimilation in Judaism of children in mixed families, occurring only if the mother is Jewish (when W and H are the parents and C represents the children)

a)		b)			U
H	H	H C	H	H	H C
W	W	W C	W	W	W C

Fig. 6

From the comparative analysis of the three figures it was found that it is always the most intolerant religious form that wins, and the most tolerant loses, or in other words, an intolerant minority can impose its religion of the tolerant majorities (which is known as the rule of the intolerant minority, which in fact the latter imposes upon a tolerant majority). The renormalization group method emphasizes, for example, that, by interaction, the very high fertility phenomenon presented as a positive one in terms of impact for immigrant populations in Islamism to Christianity and majority Judaism, can have a negative impact in terms of the influence of religious adherence, and will eventually make the distribution in the intial population abnormal, concentrating it instead on diversifying it. The premise of the authors' reasoning, before reading Nassim Nicholas Taleb's books, was that a society marked by diversity in fertility and religion is more democratic, and more evolved, with much greater chances of global survival for all traditions. Finally, and especially under the specific impact of the Nassim Nicholas Taleb's books, one finds that any intolerant minority can impose rules on tolerant majorities, and not vice versa, as one would have expected. The Faustian pact signed with the Devil of fertility fails to save European populations, except maybe insofar as they accept the loss of religious traditions, or regulate the religious balance and the diversity of religious beliefs to which European citizens can adhere. The Faustian statistical distributions appear more and more clearly in the technological fields or in scientific research, where very rare or extreme events can radically influence everything, in commercial activities generating very large statistical populations (sales of publishing houses or record companies, etc.). in the sensitive financial economy of commodity (stock) exchanges, on the Internet, in political decision-making and political life, etc. Many contemporary statistics do nothing but confirm the inadequacy of the old methods, in parallel with the need for new approaches and integrations of the data series that describe the *big data phenomenon*. Interactive (ergodic) inequality involves new statistical Faustian series, dynamic approaches to equally new ways of thinking statistically, situated, completely and naturally, outside the classical Gaussian distribution, as Nassim Nicholas Taleb points out.

5. Conclusions

The evolutions of the statistical populations involving the Faustian series are anticipated by their tendency towards dismemberment in subpopulations, through distributional abnormality and practically through disappearance (failure, bankruptcy, etc.).

The symbol of the Faustian series or abnormally distributed series which, by the presence of unusual values in relation to the Gaussian distribution, suggests an apparent pact with the impact of value-related extremism or with the Nassim Nicholas Taleb's *black swan* (the very rare probabilistic event, yet having an impact that is difficult to predict or uncertain, at least initially).

- 1) the Faustian statistical series presents its own analysis features;
- 2) the Faustian statistical series is generated by multiple extreme variants;
- 3) the Faustian statistical series describes the evolution of dynamic populations;
- 4) the Faustian statistical series can be analyzed with the help of dynamic evolutions of homogeneity (the ratio between a seconddegree estimator and a one-squared-degree, or a standard deviation to a central tendency indicator, both in percentage expression);
- 5) by its very high values for the ratio between the significant dispersion and the value of a central tendency indicator, it gives a characteristic image of the verisimility or truthfulness of the Faustian statistics;
- 6) however, the most profound and relevant tools of descriptive statistics remain those of the skewness and kurtosis type, but only if temporarily or evolutionarily shifted (Săvoiu, 2010);
- 7) the Faustian statistical series is increasingly suited to the contemporary realities of economic, social, demographic, educational, scientific, cultural, etc. phenomena. (Săvoiu, 2013);
- 8) the Faustian statistical series challenges the priority of the Gaussian approaches and the stationarity nature of its descriptive statistics.
- 9) the biggest mistake that can be made in studying a Faustian series is that of not taking into account or calculating its interactions with

other series, dynamics, evolutions, associations, gaps, opposite, paradoxal or contradictory dynamics (Săvoiu, 2001; 2013a).

The distance from Pareto's early statistical thinking to Taleb's multidisciplinary thinking increases with each passing day, seriously overshadowing Thomas Piketty's economy of inequalities of 2014, which, as noted by the same remarkable mathematician, is focused on a theory that suffers from an excessively immobile or exclusively static approach, incapable of dynamic statistical investigations.

Thus, the Paretian optimum of the type 20% own 80% has become, with Taleb, in the so attractive dynamic view of the American economic reality: *"Thirty-nine percent of Americans will spend a year in the top 5 percent of income distribution, 56 percent will be in the top 10 percent, and 73 percent will spend a year in the top 20 percent"* (Taleb, 2007; 2018).

Another example, related to the uncertainty of the impact of late births as a difference or deviation between the age of the husband (father) and the wife (mother), in the case of scientific or cultural personalities, is relevant for identifying other characteristics of the Faustian statistical series.

The domain, in which the so-called rule of +7 years difference between spouses worked, is an outdated marriage-related domain.

Very much as the Gaussian law of apportionment proved unable to look beyond 3 sigma left or right, being blind in the face of extreme values and thick-tailed, and even long-tailed series, the rule of +7 years is just as harmful, related to the birth of Confucius, from parents whose age difference was 54 (70 to 16) – should it never have occurred?

The form of presentation or the very expression of all the above laws, extracted from the Faustian data series, becomes just as important, as the same mathematician and philosopher, the great Taleb, emphasized: "If people are told that, on average, investors are going to lose all their money every 30 for years, they are more likely to invest, than if one tells them there is a 3.3% probability of losing a certain amount of money each year" (Taleb, 2007).

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