Vladimir Baranov, Ph.D.,

Viktor Dvurechenskikh, Ph.D.

Translation from Russian:

Dmitri Gorbatov, Master's Degree

On the Quality of Information from *Transparency International*

"This is worse than a crime: this is a mistake!"

Talleyrand about the execution of Count d'Enghien by Napoleon I

This article aims to determine a degree of truthfulness of information about the situation with corruption in various countries over the world, which information is spread out by *Transparency International (TI)*, an independent international organization. The article consists of:

A) critical analysis of *TI's* methods of corruption assessment in various countries;

B) reasoning of a method of corruption assessment being alternative to *TI's* methods.

We will try to ground the following statement in Part A: both Corruption Perception Index (CPI) and Bribe Payers Index (BPI), being calculated by *TI* according to methods [4] and [5], are not adequate to a phenomenon of corruption. So, correspondingly, all calculated figures of the mentioned indexes do not reflect a real situation with corruption within the countries inspected.

We will discuss a system approach to the modeling of corruption as a global phenomenon in Part B.

However, we will start with an analysis of some general and quite typical misbeliefs accompanying data processing, including econometric data as well.

Numerology in the Data Analysis as an Infantile Disease

Any formula (CPI or BPI, in the instant case) describing a state of the physical world shall be a logical *statement* expressed in a form of a verbal sentence. Any statement, formal by definition, may not have its physical referent. However, a sentence, in its essence, must express some physical law. If the latter condition is not observed, then statements (for example, CPI and BPI) become objects of *numerology*, a pseudo-scientific discipline, rather than indicators of a condition of a certain part of the physical world. Interpretations of the biblical Numbers could be taken as an example. Using methods based on numerology, one can present numerical arguments in favor of any preset statement, but these sentences will have no sense in the context physically perceived.

Bunge's Theorem (1973). Given n non-negative numbers $a_1, a_2, \ldots, a_n$. Then there are infinitely many n-fold real numbers $b_1, b_2, \ldots, b_n$, which are unequal to zero and meeting the formula: $a_1^{b_1} \cdot a_2^{b_2} \ldots a_{n-1}^{b_{n-1}} = a_n^{b_n}$.

The proof is quite trivial [1]. First we take a logarithm and analyze the case when n=2; then we inductively spread the result over for n>2. Having n-fold exponents, it is easy to approximate each of them with a simple fraction, which gives us the requested "phenomenal" proportion as a result. One can repeat the procedure afterwards for other real numbers, this time, to be selected as exponents, which gives us a new proportion; thus it can be repeated infinitely. Let's call this procedure Bunge's algorithm.

Here we should note that the result is determined exclusively by the psychology of algorithm users rather than by any limitations of the physical world, which numerology method is in no way related with. One can easily multiply other examples of phenomenological "fits" of randomly chosen proportions in order to describe the material world. Particularly, manipulations with the use of such constants as e (Napierian logarithms base), π (Archimedean number), "golden section" (Fibonacci's constant), etc. are widely known. There are simply "classical" "researches" whose meaning fully fits Bunge's algorithm.

Obviously, the problem of changeling scientific arguments with numerology deserves attention. Although here, within the context of the analysis of *TI's* information quality, we should limit ourselves with references to just two monographs [7, 10], which have been reissued quite a number of times and differ from endless numerological "opuses" at least by the fact that their authors are academic scientists whose mentioned works are issued by scientific publishing houses.

Thus, [7] introduces a so-called "hierarchy of critical constants" (see p. 119) caused by the following recurrent formula:

$$N_{|k|+1} = \exp\left[(sign\,k) N_{|k|}\right], k = 0, \pm 1, \pm 2, \ldots ; N_0 = 1,$$

which, in its turn, causes the following series:

$$\ldots (1/e)^{(1/e)^{(1/e)}}, (1/e)^{(1/e)}, 1/e, 1, 0, 1, e, e^e, e^{e^e}, \ldots .$$

This series is announced as a certain regularity describing some "critical levels of natural systems." Having received the mentioned series following simply numerological ideas, the authors [7] look for appropriate figures in their real researches and, which is obvious, find out that the figures of their "critical constants" are close to the descriptions of certain phenomena of the real world. All is absolutely the same at the level of ideas of the author [10]: the only difference is that he includes another constant into his recurrent proportion, $(\sqrt{5}-1)/2$, also known as the "golden section proportion," rather than e.

A spontaneous use of Bunge's algorithm is the general idea of both works cited [7, 10]. It is natural that all authors of such "researches" face the problem of a precision criterion; however, all of them avoid discussing it. Instead of discussing the importance of discrepancy criterion between results of phenomenological "fits" and real data, such authors present those discrepancies themselves. The latter ones are often little by their absolute value, which fact "proves" itself for the laity. For example, performing certain manipulations with the Napierian constant (e), the authors make an e-like proportion: $e(e-1) = 4.6707742694\ldots$ [7 (p. 83)], and compare it with Feigenbaum's constant: $\delta = 4.6692016091\ldots$ [3]. The authors announce that the result of their comparison is the proof of the mutual closeness of the named figures, and the solutions they tend to make from such a "closeness" are quite ambitious.

What could we say about this kind of a "proof"? When the authors of this article were young students, the Russian vodka bottled in standard 0.25- and 0.5-liter portions (8.33 and 16.67 US fluid ounces) used to be sold for 1.49 and 2.87 rubles respectively [1], which would form the following nice proportion: $1.49^{2.87} = 3.1408311\ldots$. One could clearly see that this is an excellent approximation of $\pi = 3.14159265\ldots$, which is by an order of magnitude more precise than that in the numerological "fit" described before. Nevertheless, it caused no scientific consequences, and neither did the result [7].

Let's concentrate on the essence of non-correspondence of a numerological approach to a scientific method. The latter is characterized by a tendency to avoid two extremes. One extreme is a *prior theory* that doesn't need any data whatsoever; the other extreme is a theory that accepts all possible data, even contradictory thereto. Any "right" scientific theory must need physically semantic "inlet" data, whereas it must have an "outlet" opportunity of getting another set of possible data; provided that such an "inlet" and "outlet" should both correspond to the theory assumptions (laws, connections, etc.).

Any theory that can be developed by way of explaining new empirical data, is capable of forecasts and "retrocasts." Conversely, any theory that is void of its forecasting force may not be used in practice and, therefore, cannot undergo any empirical tests. In other words, theories may forecast certain data; however, the opposite is wrong: no theory can be produced from any data *as such*. It is all attempts of such a deduction that are pure numerological tests. Still, the main thing is that numerology is not a theory, since it doesn't lean upon any physical laws; therefore, it cannot pretend to explain any phenomena of the physical world in principle.

The last thought should be emphasized specifically, because every time when a certain amount of unprocessed data is gathered within any subject field, there is a temptation to get an answer from manipulations with statistics rather than from provisions of an appropriate theory that would explain those data. The problem gets also complicated with the natural fact that Internet tools spread faster than book learning over today's world, which often causes the spread of false information. After all, we must put up in our real life with the fact that, except for scientists who make their mistakes fairly, there are, on the one hand, politicians eager to solve their problems leaning upon the authority of science, and, on the other hand, almost unlimited Internet resources, which both extremely simplify a task of creating and spreading out clearly believable, easily understandable, almost unverifiable information. And this is precisely where the necessity of Methodology Audit begins [6].

The Essence of *TI's* Methods

Now let's go back to CPI and BPI in order to view the essence of methods [4, 5] determining procedures for calculating both indexes. At the same time it should be stressed that the only thing we analyze is the *essence* of the methods, i. e. methodological principles founded into the procedures by means of which *TI* issues its information on corruption assessment.

Paradoxical as it may seem, the very indexes, expressed in a form of final expressions (as, for example, the Dow Jones Industrial Average), are absent within *TI's* Internet resources. The latter ones contain only tables of the index figures and a verbal description of rules for their calculation, which resembles an algorithm rather distantly. Anyway, one could discuss only the information which is present.

According to [4] and [5], CPI and BPI are the results of a "secondary data processing": "The index is a 'poll of polls'," *TI* informs about each of them. In addition, the very name of CPI includes a notion of *perception*. However, BPI contains no mentioning about the subjective nature of the procedure, although BPI is also a "poll of polls" by its origin, as well as CPI. *TI* receives all primary information for calculating the indexes from independent sources, such as organizations dealing with polls of experts in various fields of business and law on a professional basis. The data are analyzed by means of their statistical processing with the use of standard techniques whose essence is nothing but assessment of mathematical expectations, dispersions and correlations of the data received after the polls. However, due to [4] and [5], *TI* merely doesn't have any other (non-statistical) methodology, except for an analysis of the selected data. So, it comes out that it is statistical analysis which wholly determines *TI's* corruption assessment methodology. But, in this case, CPI and BPI figures are no more than a result of manipulating the data received after the polls of experts.

Let's word this important statement otherwise. Not only does *TI* present any economic and/or state control models that would allow searching the factor of corruption influence with the use of figures, but it also seems that *TI* doesn't even need those models. Nevertheless, from the polls of experts to the show of final results, the method doesn't mention any economic notions anywhere; there are only manipulations with the data.

The collection of the data requires a separate talk. For example, a procedure for the poll of experts in order to determine BPI seems at least arguable. According to [5], during the process of gathering information for calculating BPI in 2002, all respondents were asked the same question: "*With regard to the sector of business activity to the best of your knowledge, please mark: what is a probability that companies from the countries described below will bribe or will offer a bribe to any officials of these countries with a purpose to root into any one's economy or to preserve their position within the latter?*" In other words, it was requested that the expert point out a certain number. Moreover, it was intended simultaneously that all the experts possess a concept of probabilities and interpret the function of their distribution similarly.

Prof. Orlov, a leading expert on the problem of expert assessment in Russia, characterizes a question worded this particular way as follows: "To request that an expert's answer contain a number means to violate his mind" [9]. And he immediately explains it: "Why don't experts' answers usually contain any numbers? The most general answer would be: people don't think in numbers. <…> It is even in the economy that businessmen, making their decisions, lean against numerical calculations only partially."

In other words, according to recommendations of the theory, experts' answers should be *not numbers but ranges*. For example, the answers may include the results of paired comparisons or other objects of a non-numerical nature, *just no numbers* — and, moreover, no probabilities, being an integral part of *TI's* methods.

Another essential feature of *TI's* methods is a non-system approach to the corruption in today's world. The countries included into *TI's* rating list are mutually related either economically, or politically, etc. However, *TI's* methods intend that corruption in each country is autonomous by default, which intention does not correspond to the reality of today's world at all; particularly, it contradicts to a phenomenon of globalization.

Now let's pay our attention to a dimension factor. Corruption strikes financial relations; however, it is even financial content which is absent in *TI's* assessment. Instead of money terms, *TI's* assessment contains some kind of points. But what can be more natural than to express all losses that corruption causes to the countries under research, in money terms? It is precisely the way the law protective authorities express their assessment of losses from corruption. In particular, according to a statement of General Prosecutor of Russia, the country's damage from corruption reaches **$16 billion** per year [11].

It is logical to express corruption level in shares of Gross Domestic Product or in any other form that would be adequate to the *economy*. However, it is completely illogical to mutually relate such notions as corruption level and human *psychology*, even if it is a psychology of corruption perception by experts who are quite competent.

This is the best moment now to demonstrate the commonality between *TI's* methods and the numerological approach discussed before. What is the most important in that approach? It is to resemble a spy's legend, which means it is to be: a) easily understandable; b) difficultly verifiable; and c) clearly believable. In other words, it is: a) to be based on statistics; b) to use other data that aren't related to the matter; and c) to reproduce notoriously known results.

What is necessary to implement such an approach? One needs to take the notoriously known result and to apply Bunge's algorithm thereto. Taking the logarithm of Bunge's procedure, we get:

$$b_1a_1 + b_2a_2 + \ldots + b_{n-1}a_{n-1} = b_na_n,$$

where a_i are non-negative numbers, which are corruption assessment made by a group of *n* independent experts; b_i are "weighs" of the independent experts, which reflect a degree of their competence; a_n is assessment of a corruption situation within the present country, "weighed" with b_n coefficient, which is essentially a correction considering the corruption assessment within the same country for the previous year. It is clear that a_n may be "appointed" for random reasons (for example, political ones). Correspondingly, there must be no standardizing conditions for $\sum_i b_i$. Let's admit than *n–1* competent experts assessed corruption in a certain country as $a_1, a_2, \ldots, a_{n-1}$ marks, and some final mark a_n, which would generalize those experts' opinions, must be received on the basis of their marks. Then, according to Bunge's algorithm, a preset final mark of the assessment may be guaranteed for the experts' preset personal opinions.

The test here is nothing but writing out a formula meeting *TI's* methodology [5], which is named "standardization procedure" in this source. This formula is as follows:

$$S(j,k) = \left[S'(j,k) - Mean(S'(k))\right]\frac{SD(2000\ CPI)}{SD(S'(k))} + Mean(2000\ CPI)$$

Since $S'(j,k)$ is, by definition, a_k , a "weighed" sum of expert assessments, where *k=1, ..., n–1*, let's admit that $S'(j,k) = \sum_{k=1}^{n-1} b'_k a_k$ for *j*-th country, so, respectively, $S(j,k) = b_na_n$. Then, in terms of ideas set out in [5], the standardization formula will look as follows:

$$b_n a_n = \left[\sum_{k=1}^{n-1} b'_k a_k - A\right] \cdot B + C$$,

where, as it is prescribed by the standardization procedure [5], *A*, *B* and *C* are to be defined through $Mean(\cdot)$ and $SD(\cdot) / SD(\cdot)$ operators, whose meanings are unimportant. If we transform the latter formula as follows:

$$b_n a_n = \sum_{k=1}^{n-1} b_k a_k + \underbrace{(C - AB)}_{b_0 a_0}$$,

then, as a result, we will have the same proportion, which additionally considers a_0 assessment (a standardizing transformation parameter) with “weight” b_0:

$$b_n a_n = \sum_{k=0}^{n-1} b_k a_k$$.

It is easy to note that the latter formula is a true-sided image of the numerological proportion, which is so useful for consumers of information being created.

Résumé: Both the origin of corruption level data and the way of processing them by *TI* are notoriously fruitless numerological procedures.

Solution: As Honest Abe would say, “You can deceive a man for the whole life, you can deceive people for a long time, but you can’t permanently deceive everybody.” Therefore, many people will, obviously sooner than later, raise questions analogous to those discussed before, which will unavoidably lead to a radical update in *TI’s* methodology.

The Grounds of Corruption Assessment Methods Alternative to *TI’s* Methodology

This part of the article is basically an annotated reference.

Let’s first discuss what a “system approach to the modeling of corruption as a phenomenon” is. Undoubtedly, this is exactly what denies the *TI’s* approach discussed above. All critics lean on the system approach, because it is the traditional one. Therefore, we need to find a system that we couldn’t find in the approach we criticize. Such a system can be found easily: this is world economy where stable relations have already been formed. At the same time, economic relations themselves are the “driving-belts” of corruption all over the world. Therefore, it is necessary that the system approach to the global economic exchange process intend certain losses within that process, including those in the form of corruption.

Skipping a survey of numerous researches of our topic, we would like to refer to a comprehensive work [8]. It is worth to note though that the approach suggested below is not included into the survey, so it can pretend to be new (up until all respective references are found). Its essence is nothing but the following theses:

1. Concentration/dispersion processes are characteristic not only for economic systems but also for any others; at the same time, all statements about any laws influencing this kind of processes can be described within the framework of universal system models.

2. Whatever a phenomenon of corruption is, it will undergo the same concentration/dispersion processes as the economy in today's world being in the process of globalization, because corruption is still an integral part of the economy, though it is an obviously censurable thing.

3. The laws describing final results of concentration/dispersion have a form of distributions: a famous Price's law is their special case [2].

We will analyze this law in terms of its adequacy to corruption as a phenomenon. The law was formulated by Derek John de Solla Price as an empirical scientometric result describing productivity of the scientific community. The idea of the law is that scientists from *N* countries make a non-uniform input into the world science: so, if one ranges their input, then N^{α} share of the countries will reach α, where $0 < \alpha < 1$. Later, Price's law was also discovered in other applications related with a notion of *productivity*.

The idea of our hypothesis is as follows: the corruption debit in today's world is as much non-uniform as the original wording of Price's law describes scientific productivity. It is possible that it meets Price's law or any other descriptions of concentration/dispersion as well.

Anyway, an attempt to assess corruption in today's world within the frameworks of a hypothesis, even though it hasn't yet found its proof, gets the following important advantages:

1. The presence of a worldwide corruption distribution model is a step away from pseudo-scientific numerological methods.

2. The use of this worldwide corruption distribution model makes it impossible to "appoint" any "favorite" or "unloved" countries, because all their "weight" proportions become determined by the distribution law (for example, by Price's law) to be taken as a model. At the same time, the currently existing *TI's* methods contain no normalizing conditions, which leaves some opportunities for methodical voluntarism.

These very ideas can already draw serious enough attention to such a suggestion. Also, we can add here a possibility of a transition from essentially abstract "corruption perception" points to real money, which law-protective authorities use in order to assess corruption everywhere. One could collect these data using a simpler method, because it is police statistics files which are their sources rather than protocols of the polls of experts.

In conclusion, we would like to stress that it is most desirable today to substitute a statistical approach in researches of such a global phenomenon as corruption with a system approach.

Sources Used:

1. Bunge, Mario. *Philosophy of Physics*. D. Reidel, Publishing Company Dordrecht; 1973.

2. Egghe, L. and Ravichandra Rao, I.K. (1992) *Classification of Growth models based on growth rates and its applications* // Scientometrics, **25**(1), 5–46.

3. Feigenbaum, M.I. *Quantitative Universality for a Class of Nonlinear Transformation* // Journal of Statistical Physics, 1978. **19**, 25–52.

4. Lambsdorff, J. Graf. *An Empirical Investigation of Bribery in International Trade* // *The European Journal of Development Research* (Special Issue: *Corruption and Development*; 1998). **10**, 40–59.

5. Lambsdorff, J. Graf. Background Paper to the 2001 Corruption Perception Index — Framework Document. (*The Transparency International*, USA, and Goettingen University; June 2001.)

6. Dvurechenskikh V.A., Baranov V.P. Metodologicheskiy audit (*Methodological Audit*) // Finansovyi kontrol (*Financial Control*), No. 3, 2002 (Moscow).

7. Zhirmunskiy A.V., Kuzmin V.I. Kriticheskiye urovni v razvitii prirodnykh sistem (*Critical Levels in Natural Systems Development*). — Leningrad: Nauka (*Science*), 1990. (223 pgs.)

8. Levin M.I., Tsirik M.L. Korruptsia kak obyekt matematicheskogo modelirovaniya (*Corruption as Mathematical Modeling Object*) // Ekonomika i matematicheskiye metody (*Economics and Mathematical Methods*, Science Academy of Russia). **34**, № 3–4, 1998 (Moscow).

9. Orlov A.I. Prikladnoy mnogomernyi statisticheskiy analiz (*Applied Multidimensional Statistical Analysis*). — Moscow: Nauka (*Science*), 1978. P. 68–138.

10. Soroko E.M. Strukturnaya garmoniya sistem (*Structural Harmony of Systems*). — Minsk: Nauka i tekhnika (*Science and Technology*), 1984. (284 pgs.)

11. Oustinov V.V. Verbal statement made on March 23, 2001 (Moscow).

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[1] It should be taken into consideration that it was early Brezhnev's era, so all prices for all goods were strictly fixed for decades and, therefore, were rooted into people's minds deeply. The same concerned an official US dollar rate in the USSR, which was 0.64 rubles per $1.00 about as long; so, the respective prices for vodka in standard bottles — had the Soviet ruble been convertible — could have corresponded with $0.95 and $1.84, which had as little to do with the real cost of vodka as much to do with Soviet people's long-term pricing habits. (*Note of the translator*)