



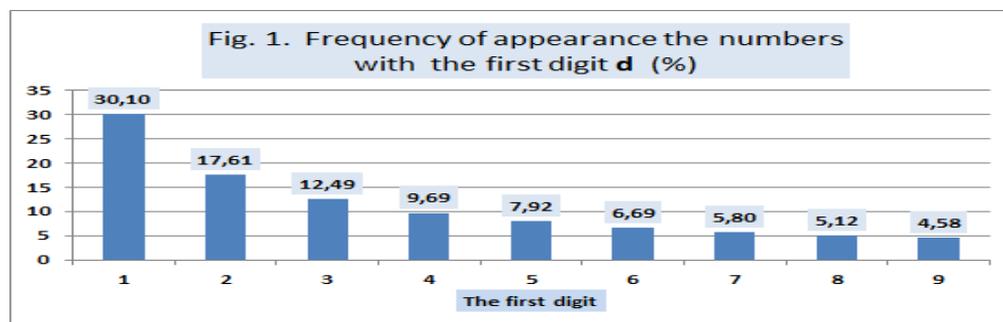
## ALTERNATIVE POSSIBILITIES OF DETECTING MANIPULATION OF THE ACCOUNTING DATA

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### SUMMARY

The fraud reporting and data manipulation is discussed across the various scientific fields – in economy, finance, sociology and many others. Particularly, the economic and finance data are under the strong scrutiny. In literature we can find extensive discussion on the creative accounting, which is considered as the source of the intensive data manipulation. It is pointed on the fact that the managers may adopt various methods to manipulate the financial statements of their firms to show their higher/better performance and to receive the higher managerial earnings. The Benford law as a statistical tool is illustrated as a possible tool in detecting this problem.

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The Benford's Law is an empirically derived and validated rule according which the numerical data starting with an arbitrary figure of 1, 2,..., 9 occur in large size data files with a certain, exactly defined frequency. The first attention to this fact was studied by Newcomb (1881)<sup>3</sup>. This regularity was in 1938 confirmed by Benford (1938)<sup>4</sup>. According

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<sup>3</sup> Newcomb, S.: Note on the frequency of use of the different digits in natural numbers, American Journal of Mathematics (American Journal of Mathematics, Vol. 4, No. 1) 4 (1/4): 39–40

<sup>4</sup> Benford, F.: The law of anomalous numbers, Proceedings of the American Philosophical Society 78 (4): 551–572. JSTOR 984802



the Benford's Law the frequency of appearance the numerically defined data beginning with figure **d** ( $d=1, 2, \dots, 9$ ) in sufficiently large data sets is defined by the formula

$$F(d) = \text{LOG} (1+1/d) \quad (1)$$

The situation is presented on Fig 1. It is evident that the frequency of appearance of numerical data according their first digit differs significantly. While numbers starting with digit **1** occur with frequency 30.01 %, the numbers starting with digit **9** appear with only 4.58 % frequency.

The deeper analysis of the accounting data according to Benford's methodology are presented on real accounting data generated by custom administration. This account contained 5 000 items. Results of the analysis of this data set in terms of their frequency distribution according the Benford's law are presented in **Table 3 in** in following order:

- The second column - expected frequency of occurrence of the data  $T_i$
- The third column - empirical frequency of occurrence of the data  $E_i$
- The fourth column - difference of frequencies  $T_i$  and  $E_i$

<b>Table 3. Custom statistics data - 5000 numbers</b>			
<b>Frequency of incidence of data with the 1st digit</b>			
<b>First digit</b>	<b>E<sub>i</sub></b>	<b>T<sub>i</sub></b>	<b>E<sub>i</sub>-T<sub>i</sub></b>
1	32,748	30,103	2,65
2	16,601	17,609	-1,01
3	13,380	12,494	0,89
4	8,280	9,691	-1,41
5	7,144	7,918	-0,77
6	6,835	6,695	0,14
7	4,811	5,799	-0,99
8	5,513	5,115	0,40
9	4,687	4,576	0,11
<b>Minimum</b>			<b>-1,41</b>
<b>Maximum</b>			<b>2,65</b>
<b>SUM of absolute differences in %</b>			<b>8,36</b>

As shown in the table there are some differences between expected and empirical frequencies in occurrence the numerical data on accounts under consideration. The data starting with digit **1** represent 32.86% of the total number of numerical data, which is 2.76% above the expected frequency, in case of data starting with digit **2** the difference is 1.04%. The sum of these deviations for all first digits in absolute values reaches 8.47%.

The above presented case illustrate that the introduction of reliable information support significantly improves the possibilities for checking the quality of accounting information. The Benford's methodology, as well as the EBRL applications, could serve as an efficient starting point for dealing with the problem of manipulation with the accounting data.

**Keywords:** accounting data, creative accounting, forensic accounting, data manipulation, Benford Law