COMPARATIVE ANALYSIS OF MILLING-BAKERY AND CONFECTIONERY INDUSTRY IN SERBIA BASED ON BENFORD'S LAW

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ABSTRACT

This study aims to apply Benford's Law when detecting fraud and errors in financial statements. The research includes the practical use of this law on examples of large and medium-sized enterprises in the milling, baking and confectionery industry in Serbia. Based on the conducted data analysis and the obtained results, the authors ranked the companies, after which, through a comparative analysis between these two branches, they showed which data in the Cash Flow Report have greater deviations from Benford's analysis. The obtained data are determined by means of a statistical investigation of the probability distribution of a random variable, where it should be borne in mind that data with lower figures are expected to be more numerous than data with higher figures. The results of the analysis tabularly and graphically present an overview of the movement of cash flows of companies in the milling, baking and confectionery industry.

Introduction

Benford's law represents the law of the leading digit, that is, the phenomenon of anomalous numbers, the main purpose of which is to determine anomalies in numbers in financial statements. Through the presented research, the authors will present the phenomenon of Benford's law and, based on that, the determination of the validity of financial statements. This law is based on the probability that the frequency of occurrence of data starting with the digit 1 makes up a third of the data, while with the increase in

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the value of digits from 1 to 9, that probability gradually decreases (Cvetković, 2023). The first written paper on Benford's law was presented by the American astronomer and mathematician Dr. Simon Newcomb (Tödter, 2009). He noticed that the first pages of the logarithmic tables with lower numbers were significantly worn compared to the back pages with higher numbers, because his colleagues most often used the tables of lower numbers to look up logarithms. Based on this, he concluded that most natural data sets meet the established regularity (Durtschi et al., 2004). He described his research in a paper published in The American Journal of Mathematics as early as 1881. Newcomb logically concluded that raw data with low initial numbers are more numerous than those with high ones (Jukić & Muhurdarević, 2003). However, the article he wrote went unnoticed because he did not support his theoretical research with any arguments. About fifty years later, in 1938, an American physicist named Frank Benford checked this regularity and obtained the same results indicating that data beginning with the digit 1 has a probability of appearing in 30% of a set of numbers, and that the frequency of data decreases as the digits increase (e.g. only 4% of the data starts with the number 9). This law can be applied in all areas of life (length of rivers, population, height of mountains, number of inhabitants or astronomical data where the figures of the data approximate a logarithmic distribution), and it is especially applied by forensic accountants and auditors when detecting falsification of data in financial reports (Watrin et al., 2008). They collect the data for processing in order to determine the deviations of certain parts of the financial statements from Benford's analysis and the reasons for the disagreement, in order to finally form their opinion (Milojević et al., 2018). Before conducting a Benford analysis, forensic accountants and auditors conduct an examination of the situation and record every detail, thus securing a database and only after completing these actions proceed with data analysis (Hoopwood et al., 2014)

The problem of this kind of research in numerous works are criminal acts and manipulations in financial reports in Serbia. The emphasis is on reliable financial reporting, where the responsibility for preventing financial manipulations and errors lies mostly with the management of the company (Deckert et al., 2011; Halilčević, 2019). Specifically, the authors will analyze the financial statements, i.e. Cash flow reports using Benford's law in the Serbian food industry. In doing so, it will include large and medium-sized legal entities that operate within two branches of the food industry, namely the mill-bakery industry and the confectionery industry. For this analysis, the Report on the movement of cash flows was used for a period of time covering three years, namely 2022, 2021 and 2020. This report is used for the reason that cash flows represent the "blood stream" of a business as inflows and outflows are constantly circulating. Based on these flows, it is determined how liquid and solvent the company is, which is important for business decision-making. Data on companies were taken from the Agency for Business Registers.

The goal of this research is to determine abnormalities in accounting data, on the basis of which manipulations in the financial statements of economic entities are detected (Singleton et al., 2006; Kruger & Yadavalli, 2017). The priority of financial reporting is

the provision of quality financial information on the movement of cash flows in order to satisfy the information needs of users of financial reports (Petrović et al., 2023). However, it should be borne in mind that if there is a deviation in the figures from Benford's law, it does not necessarily mean that the data has been manipulated, but it can also be a random error that forensic accountants should keep in mind. Through research in the paper, the authors will present the results for each individual company that operates in one of these two segments of the food industry, after which they will compare the results with the set values in Benford's Law. Consequently, their deviations will be determined and a comparative analysis will be carried out to determine in which companies of these two branches of the food industry there are the greatest abnormalities in the Cash Flow Statements.

Literature review

There is a large number of relevant scientific sources that deal with the phenomenon of the leading figure, as well as its application to determine fraudulent actions in financial statements. At issue is the law that data starting with low starting numbers are more numerous than data with high ones, which is contrary to normal human thinking. The numbers 1 through 9 should have an equal chance of coming first in the data. However, based on the above, in the opinion of researcher Benford, the figures in the data do not have an equal chance of being in the first place, but follow an uneven distribution. Benford called this phenomenon the Law of the First Digit and published it in 1938 in his paper entitled "The Law of Numbers with Anomaly" in an American scientific journal. It is a logarithmic distribution. He proved his experiment based on a calculation he performed manually on 20,229 analyzed natural sets (Benford, 1938).

This described phenomenon is also addressed in other research studies. One of them is a study related to the application of Benford's law in detecting anomalies in the financial statements of large companies in Serbia (Milojević et al., 2014). In the aforementioned research, an analysis of certain accounting positions for large companies in Serbia was carried out. Namely, fixed assets are included in the balance sheet and net result in the income statement. The obtained results showed that the fixed assets were realistically presented, but that there were significant deviations in the net result compared to the realized net result. These results indicate that some companies show a lower net result compared to the realized one in order to avoid paying profit tax, while other companies show a higher result than the realized one in order to have a better image in the public. The following research applies Benford's law to accounting data related to health institution costs (Cvetković, 2023). In this paper, the cost structure for each department and each activity is analyzed. Based on the data analysis performed using the Microsoft Excel package, the auditors determined that fraudulent actions are possible in the provision of hospital services, pathology and pharmacy operations. In addition, they found that the data related to the frequency of occurrence of the first and second digits of Benford's law in the resuscitation and emergency departments did not agree. Both studies conclude that this law represents a warning signal and a red flag that there

may be fraudulent activities in the analyzed data, but the aforementioned law does not provide absolute proof in detecting fraud.

In a study related to the effective use of Benford's law in detecting fraud in accounting data (Durtschi et al., 2004) it was explained that the phenomenon of Benford's law should help auditors and forensic accountants to use digital analysis to determine which figures deviate from the Benford distribution. The authors indicated that auditors should use this analysis with some caution, as it can only identify sets of numbers that deviate. This means that a deeper analysis cannot be performed, nor can the causes of these deviations be determined. Therefore, they suggest that auditors and forensic accountants when performing analytical procedures should apply different types of digital analysis when determining the validity of observed data.

The next interesting research is a study in which the question was raised whether the macroeconomic data of the member states of the European Union truthfully depict the state of a country (Rauch et al., 2011). These researchers assumed that if Benford's law can be applied to determine the veracity of a company's financial statements, then it can also be used to determine the validity of government financial reporting. Accordingly, they conducted a survey of the quality of macroeconomic indicators for those countries that sent reports on the realized deficit in the year. Their results showed that the data sent by Greece had the biggest deviations compared to other members, which is why they questioned the validity of this data.

Another research focusing on Benford's analysis was done by a Harvard mathematics professor and grandson of Frank Benford named Steven J. Miller (Miller, 2015). In his book written in 2015, he emphasized that the descendants of Simon Newcomb have every right to complain about the historical injustice towards their ancestor, because he was the first to notice this legality, but failed to prove it empirically. In the same book, he showed that Benford's law can be applied in various disciplines such as accounting, economics, medicine, computer science or psychology.

The phenomenon of the first digit is based on the attitude that half of the numbers from the observed population start with the digits 1 and 2, which means that each digit individually does not have an equal chance of appearing (Nigrini, 2012). Data are tabulated next to each digit they start with, such as population by city or portfolio of securities. It's an uneven game because the lower digits have priority to be in first place. This phenomenon was described by Nigrini, who is a pioneer in the application of Benford's law in the world of forensic accounting and auditing, as a tool for detecting financial manipulations and errors.

Materials and methods

Benford's law is a numerological phenomenon that determines the expected probabilities, more precisely the frequency of occurrence of digits in the first position. The essence of this analysis is the detection of abnormalities in the data based on the observed frequencies of digits in a certain set (Diekmann & Ben, 2010). With the application

of this law, testing is carried out with coverage of 100% of the observed population (kilograms, euros, volume of trade, costs, etc.). This is especially important for auditors and forensic accountants when determining whether there has been manipulation in the transactions of the observed population (Mrvaljević et al., 2022).

Calculation of the frequency of occurrence of the first significant digit will be presented using the logarithmic formula (Miller, 2015). This means that a set of certain digits satisfies Benford's law in the event that the calculation of the probability of the frequency of the first digit equals (Kaisher, 2019):

$$P(d) = \text{Log}\ (1+1/d)$$

where the number is: d number 1,2,3…, 9 and

P - probability of occurrence.

Benford presented the expected frequencies of occurrence of digits in the first position in the following table, guided by the fact that in nature there are many more small sizes compared to large ones (Kossovsky, 2014):

Table 1. The probability of the digit appearing in the first position according to Benford's law

Digit	Expected probability of the digit appearing in the first position	Expected probability of the digit appearing in the second position	Expected probability of the digit appearing in the third position
0		0,1197	0,1018
1	0,30103	0,1139	0,1014
2	0,17609	0,1088	0,1010
3	0,12494	0,1043	0,1006
4	0,09691	0,1003	0,1002
5	0,07918	0,0967	0,9980
6	0,06695	0,0934	0,9940
7	0,05799	0,0904	0,9900
8	0,05115	0,0876	0,9860
9	0,04576	0,0850	0,983

Source: Nigrini, 2012.

Based on the presented table 1, one can see the expected probabilities of digits appearing in the first, second and third positions of a certain set. It should be emphasized that in the case when the value of the digit in the data sets increases, the probability of the first digit appearing in the Benford analysis decreases (Amiram et al., 2015). This is contrary to human logic, according to which each of the given digits should have the same probability of appearing first in a given set. However, according to Benford, the first digits have a logarithmic distribution where the highest frequency of occurrence in column 1 is digit 1 with 30.1%, and the frequency of occurrence of digit 2 is 17.1%, which means that the first digits 1 and 2 account for 47.7% set of observed data (Miller et al., 2010). The digits with the lowest frequency of occurrence are 8 with 5.15% and 9 with 4.57%, which makes up only 9.72% of the observed data. As shown, Benford's

law represents the expected frequency of occurrence of digits in tabular data, keeping in mind that half of the digits of one set in column 1 will start with the numbers 1 and 2 (Nigrini, 2012).

The expected frequency formula for the first digit of a set reads (Durtschi et al., 2004):

$$\text{Probability } D_1 = d_1 = \log (1 + 1 / d_1)$$

where is $d_1 = (1, 2, 3\ldots, 9)$

The formula for the expected frequency for the second digit of a set is:

$$\text{Probability } D_2 = d_2 = \sum_{d1=1}^{9} \log (1 + 1 / d_1 d_2) \sum_{d1=1}^{9} \log (1 + 1 / d_1 d_2)$$

where is $d_2 = (1, 2, 3\ldots, 9)$

The formula for the expected frequency for two combinations of probabilities is:

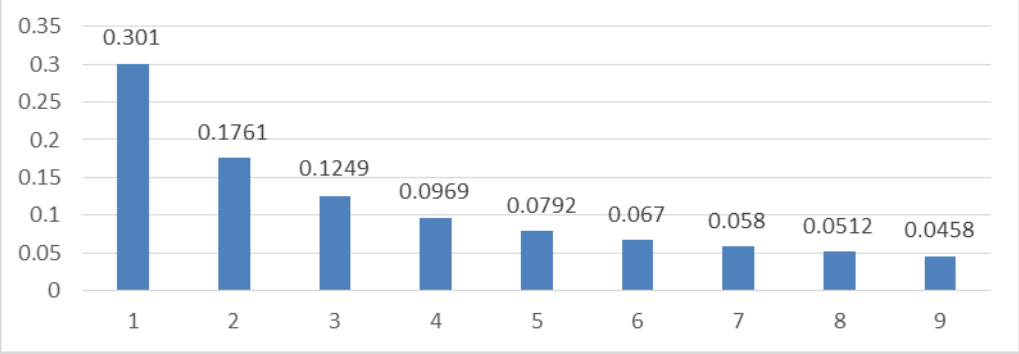
$$\text{Probability } D_1 D_2 = d_1 d_2 = \log (1 + (1 / d_1 d_{2)})$$

$$\text{Probability } (D_2 = d_2 \text{ I } D_1 = d_1) = \log (1 + (1 / d_1 d_2)) / \log (1 + 1 / d_1)$$

where D_1 represents the first digit, and D_2 the second digit, etc.

The frequency of occurrence of the first digits can be shown graphically where it is best seen that the numbers of the data set are geometrically distributed. The focus is on the exponential decrease in the frequency of occurrence of members in a one-dimensional sequence (Beger & Hill, 2011).

Figure 1. Benford's distribution of occurrences of first digits



Source: Walthoe, 2011

This methodology will be applied when analyzing the data in the Cash Flow Report for large and medium-sized enterprises of the milling, baking and confectionery industry operating on the territory of Serbia in a period of three years. A comparative analysis will provide data on whether the Cash Flow Statements realistically show the inflows and outflows of these companies or whether there are certain abnormalities. When it comes to the milling and baking industry, the most important companies will be

included such as: Pekara Pons doo, Bečejska pekara ad, Klas group doo, Don Don doo and Moka doo. In addition, cash flows of the following companies will be analyzed in the confectionery industry: Atlantic Štark doo, Jaffa doo, Nelt Co doo and Bambi ad. The authors will first calculate the frequency of the figures appearing in the Cash Flow Report of the listed companies of these two branches of the food industry and, based on that, perform a comparison and comparative analysis of these companies. The results will be tabulated and graphically presented in order to see which companies have significant deviations. At the end, these two activities will be compared in order to obtain a result in which it can be seen whether the movement of cash flows is more realistically shown in the mill-bakery or confectionery industry.

Results and disussions

On the official website of the Agency for Economic Registers (APR), data from the Cash Flow Report of the mentioned companies for the period of three years (2022, 2021 and 2020) have been downloaded. The data were then sorted individually in Excel, backwards in time, for each company, and the results of Benford's analysis were calculated on the basis of pre-given formulas.

Important for this analysis, the following columns are shown in the tables: First, Count, Actual, Benford Law, Difference, AbsDiff and Z-statistics. The First column lists the digits from 1 to 9, to calculate how many times they occur first in the sorted data for all companies, individually, by the LEFT function. This is shown by the Count column, where, based on the CountIF function, it was calculated exactly how many digits there are from 1 to 9 in the total number of digits for each company. The Actual column shows the percentage of the actual number of occurrences of each digit in the total amount (individually by company). This, then, is the actual number of occurrences of each digit from 1 to 9 as the first number in the cash flow statements for the listed companies, and this constitutes the null hypothesis in our case. The next column is the Benford Law, which is calculated by the formula =ROUND(LOG10(1+1/FIRST),5). After that, the actual percentage numbers (Actual column) are compared with the expected percentage numbers (Benford Law column) and the deviation is calculated. The actual obtained percentages, most often, to a greater or lesser extent, deviate from the expected percentages according to Benford's law due to random variation. To determine the size of the deviation, a Z-test (Z-stat column) is used, which detects whether the percentage deviation of a certain figure is too high, indicating that the number is subject to manipulation or that there may be an error in the cash flow statements.

Table 2 shows the results of Benford's analysis for large and medium-sized enterprises of the mill-bakery industry. For each company, the numbers with the largest deviation of the actual numbers compared to the expected numbers are shaded.

Table 2. Benford's analysis for cash flow statements of companies in the milling and baking industry

Pekara Pons doo						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	33	39,76	30,10%	0,097	0,096560	2,3301408
2	12	14,46	17,61%	-0,032	0,031513	4,2733347
3	10	12,05	12,49%	-0,004	0,004457	0,5538322
4	4	4,82	9,69%	-0,049	0,048717	0,5610839
5	9	10,84	7,92%	0,029	0,029252	0,4688756
6	5	6,02	6,69%	-0,007	0,006706	2,1686178
7	1	1,20	5,80%	-0,046	0,045944	1,4496971
8	1	1,20	5,12%	-0,039	0,039104	0,3645336
9	8	9,64	4,58%	0,051	0,050628	0,0785473
Moka doo						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	26	34,21	30,10%	0,041	0,041075	3,38
2	12	15,79	17,61%	-0,018	0,018197	3,37512
3	11	14,47	12,49%	0,020	0,019798	0,58406
4	9	11,84	9,69%	0,022	0,021511	1,632539
5	1	1,32	7,92%	-0,066	0,066023	1,228571
6	6	7,89	6,69%	0,012	0,012001	0,50847
7	6	7,89	5,80%	0,021	0,020955	0,3309
8	4	5,26	5,12%	0,001	0,001479	0,57978
9	1	1,32	4,58%	-0,033	0,032600	0,57412
Don don doo						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	39	47,56	30,10%	0,175	0,174580	2,960266
2	10	12,20	17,61%	-0,054	0,054140	2,219145
3	2	2,44	12,49%	-0,101	0,100548	0,033432
4	3	3,66	9,69%	-0,060	0,060325	0,37043
5	7	8,54	7,92%	0,006	0,006185	2,756985
6	5	6,10	6,69%	-0,006	0,005971	1,938389
7	7	8,54	5,80%	0,027	0,027374	0,25167
8	6	7,32	5,12%	0,022	0,022018	0,02835
9	3	3,66	4,58%	-0,009	0,009172	0,53899
Bečejska pekara ad						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	12	21,43	30,10%	-0,087	0,086744	1,587872
2	10	17,86	17,61%	0,002	0,002480	1,587872
3	5	8,93	12,49%	-0,036	0,035653	2,478113
4	6	10,71	9,69%	0,010	0,010233	2,107379
5	6	10,71	7,92%	0,028	0,027962	0,46447
6	9	16,07	6,69%	0,094	0,093767	0,78243
7	1	1,79	5,80%	-0,040	0,040135	0,75046
8	6	10,71	5,12%	0,056	0,055990	0,100877
9	1	1,79	4,58%	-0,028	0,027900	0,339068
Klas group doo						

First	Count	Actual	Benford' Law	Difference	AbsDiff	Z-stat
1	22	24,44	30,10%	-0,057	0,056586	2,221597
2	8	8,89	17,61%	-0,087	0,087202	1,511278
3	11	12,22	12,49%	-0,003	0,002717	0,13975
4	10	11,11	9,69%	0,014	0,014201	0,64089
5	11	12,22	7,92%	0,043	0,043041	0,43257
6	11	12,22	6,69%	0,055	0,055275	2,189731
7	9	10,00	5,80%	0,042	0,042008	2,053418
8	3	3,33	5,12%	-0,018	0,017819	0,55766
9	5	5,56	4,58%	0,010	0,009798	0,60388

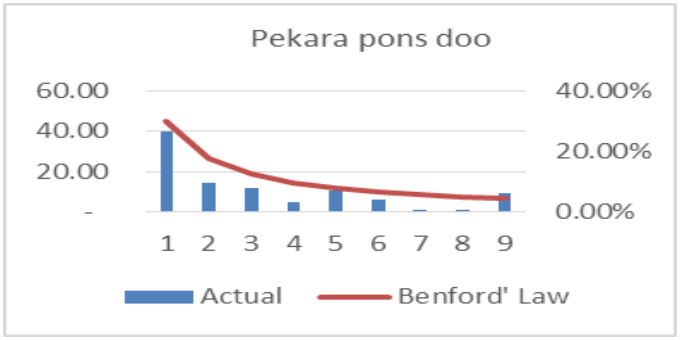
Source: Authors

As can be observed, in all enterprises of the mill-bakery industry, the first digits in real measurement are logarithmically distributed with the highest probability of occurrence of the digit 1 of 30.10%, and with the lowest frequency of occurrence of the digit 9 of 4.58%, which is in accordance to Benford's law (Wang & Ma, 2023). However, the actual number of occurrences of figures deviates from the expected, and that is with several figures, which indicates the desire of the management of the mentioned companies to embellish the financial statements. The analysis is aimed at showing the biggest deviations in each company, i.e. those deviations that are statistically significant. Specifically, the largest deviations in the cash flow statements of Pekara Pons doo refer to numbers 4, 7 and 8, while the company Moka doo has the largest deviation in numbers 5 and 9. Pekara Don don doo records the largest deviations in numbers 2, 3 and 4, and Bečejska pekara in figures 5, 6, 7 and 8. Klas group doo has deviations in figures 2, 5, 6 and 7. This indicates the fact that the positions in the Cash Flow Statements that begin with the mentioned numbers deviate statistically significantly from the predicted distribution. Therefore, forensic accountants and auditors must pay attention to these positions and investigate them. The deviations of the actual number of occurrences in relation to the expected number of occurrences of other digits are not statistically significant, which means that the probability of occurrence of each digit is in accordance with Benford's law.

Taking into account the results in Table 2, it can be seen that the distribution of figures with which companies from the milling and baking industry report cash flows in the corresponding statements does not behave completely in accordance with Benford's distribution. Unrealistic financial statements, especially cash flows, can mislead stakeholders about the company's earning capacity (Belopavlović, 2014). Therefore, a more detailed analysis of those reports is needed.

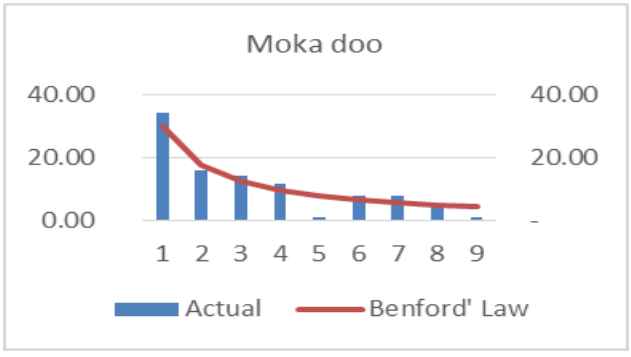
The results of Benford's analysis can be displayed graphically, where data from two columns (Actual and Benford' Law) are compared, i.e. the actual and expected number of occurrences of the first digit in cash flow positions. It also shows exactly where deviations occurred, to a lesser or greater extent (Lagarias & Soundararajan, 2006).

Figure 2. The relationship between the actual number of occurrences of first digits and Benford's law in Cash Flow Statements for Pekara Pons doo



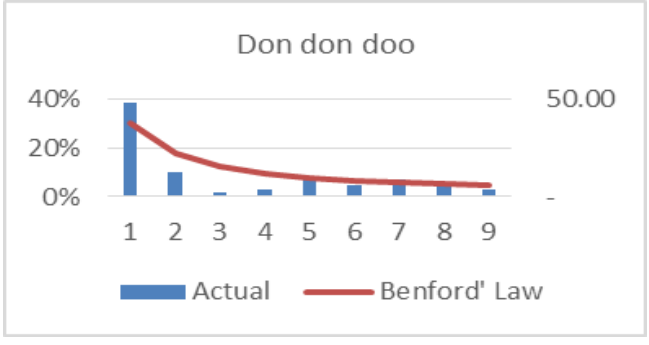
Source: Authors

Figure 3. The relationship between the actual number of occurrences of first digits and Benford's law in Cash Flow Statements for Moka doo



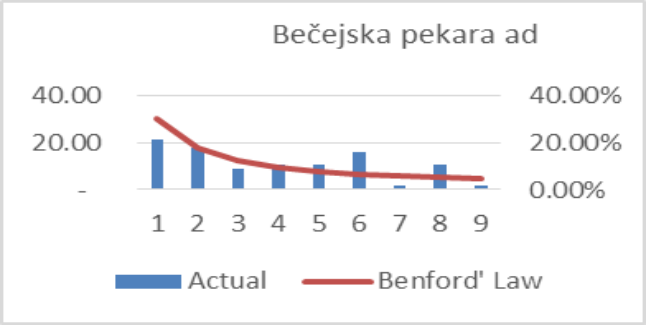
Source: Authors

Figure 4. The relationship between the actual number of occurrences of first digits and Benford's law in Cash Flow Statements for Don don doo



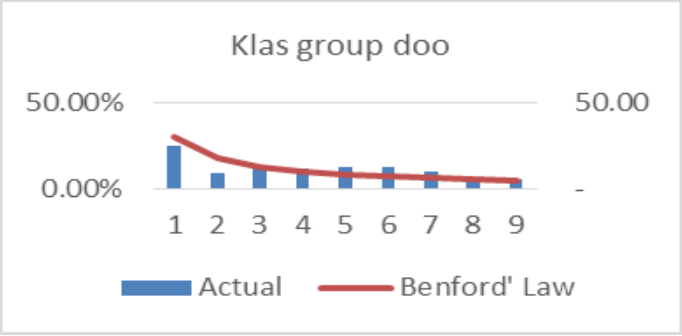
Source: Authors

Figure 5. The relationship between the actual number of occurrences of first digits and Benford's law in Cash Flow Statements for Bečejska pekara ad



Source: Authors

Figure 6. The relationship between the actual number of occurrences of first digits and Benford's law in Cash Flow Statements for Klas group doo



Source: Authors

According to the same procedure, Benford's analysis is performed for large and medium-sized enterprises of the confectionery industry, the results of which are shown in Table 3. For each enterprise, the numbers with the largest deviation from the actual numbers in relation to the expected numbers are shaded.

Table 3. Benford's Analysis for Cash Flow Statements of Confectionery Industry Companies

Bambi ad						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	32	33,33	30,10%	0,032	0,032303	2,787629
2	20	20,83	17,61%	0,032	0,032242	1,942494
3	8	8,33	12,49%	-0,042	0,041605	0,171814
4	9	9,38	9,69%	-0,003	0,003160	0,66649
5	6	6,25	7,92%	-0,017	0,016681	0,65972
6	4	4,17	6,69%	-0,025	0,025280	2,109889
7	3	3,13	5,80%	-0,027	0,026742	0,940157
8	8	8,33	5,12%	0,032	0,032181	0,09046
9	6	6,25	4,58%	0,017	0,016743	0,3329

Jaffa doo						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	31	31,63	30,10%	0,015	0,015297	2,763007
2	13	13,27	17,61%	-0,043	0,043438	1,719438
3	7	7,14	12,49%	-0,054	0,053510	0,378376
4	8	8,16	9,69%	-0,015	0,015277	0,60742
5	13	13,27	7,92%	0,053	0,053472	0,54966
6	10	10,20	6,69%	0,035	0,035094	2,440802
7	7	7,14	5,80%	0,013	0,013437	1,508201
8	4	4,08	5,12%	-0,010	0,010336	0,35352
9	5	5,10	4,58%	0,005	0,005263	0,09196
Atlantic Štark doo						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	31	35,63	30,10%	0,055	0,055292	2,486345
2	8	9,20	17,61%	-0,084	0,084137	2,200947
3	7	8,05	12,49%	-0,044	0,044479	0,424
4	5	5,75	9,69%	-0,039	0,039439	0,60519
5	9	10,34	7,92%	0,024	0,024267	0,50105
6	6	6,90	6,69%	0,002	0,002019	2,317362
7	10	11,49	5,80%	0,057	0,056951	1,438579
8	5	5,75	5,12%	0,006	0,006319	0,2346
9	6	6,90	4,58%	0,023	0,023208	0,2487
Nelt Co doo						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	47	39,50	30,10%	0,094	0,093928	2,399476
2	23	19,33	17,61%	0,017	0,017186	2,336816
3	13	10,92	12,49%	-0,016	0,015695	0,44406
4	8	6,72	9,69%	-0,030	0,029683	0,49816
5	7	5,88	7,92%	-0,020	0,020358	0,49159
6	4	3,36	6,69%	-0,033	0,033333	2,365959
7	5	4,20	5,80%	-0,016	0,015975	2,124532
8	2	1,68	5,12%	-0,034	0,034346	0,41453
9	10	8,40	4,58%	0,038	0,038276	0,37937

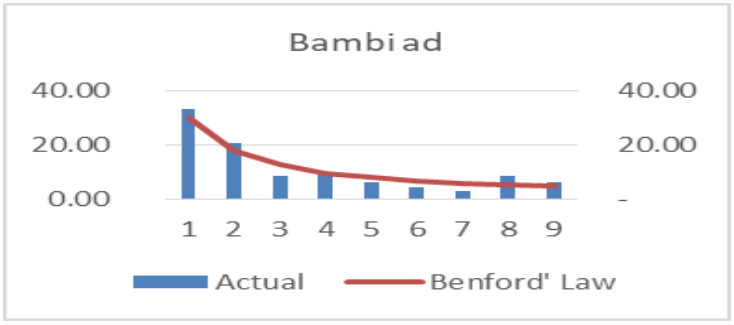
Source: Authors

As shown in the table, the actual number of figures appearing in these companies also deviates from the expected, but to a lesser extent, which indicates the fact that the management in confectionery industry companies presented the figures more realistically in the financial reports. Specifically, at the company Bambi ad, the largest deviations refer to digits 3 and 8. The company Jaffa doo has the largest deviations on digits 3 and 5. Atlantic Štark doo records the largest deviations on digits 2 and 7, while Nelt Co doo has the largest deviations on digits 2 , 3, 4, 5, 6 and 8. Other deviations are not statistically significant.

In these companies, as well as in the mill-bakery industry, regardless of the lower deviations, the arrangement of figures showing the cash flows in the Cash Flow Statements does not fully behave with the Benford distribution. Presenting a distorted picture in financial reports is most often aimed at misleading interested parties, which

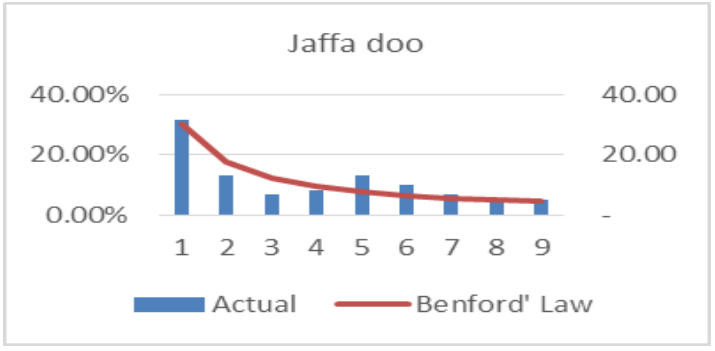
is why their more detailed analysis is needed (Cvetković & Bošković, 2018). The above results of Benford's analysis for companies in the confectionery industry can be presented graphically, from which the actual and expected number of occurrences of the first digit in the cash flow positions can be clearly seen.

Figure 7. The relationship between the actual number of occurrences of the first digits and Benford's law in Cash Flow Statements for Bambi ad



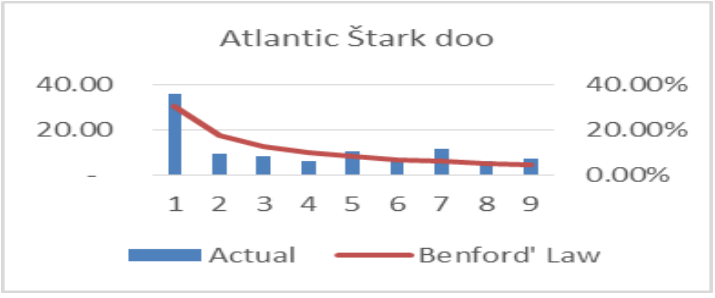
Source: Authors

Figure 8. The relationship between the actual number of occurrences of the first digits and Benford's law in Cash Flow Statements for Jaffa doo



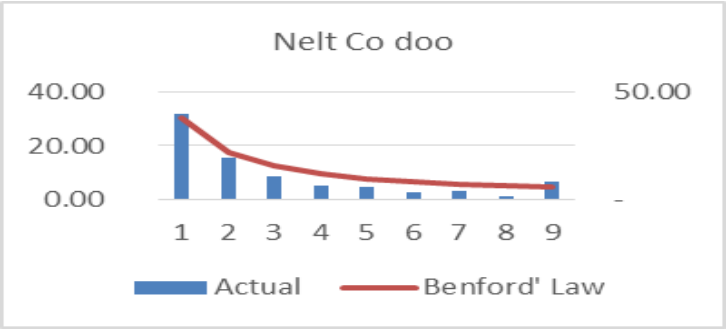
Source: Authors

Figure 9. The relationship between the actual number of occurrences of the first digits and Benford's law in Cash Flow Statements for Atlantic Štark doo



Source: Authors

Figure 10. The relationship between the actual number of occurrences of the first digits and Benford's law in Cash Flow Statements for Nelt Co doo



Source: Authors

Table 4 provides a comparative analysis of Benford's law for the mill-bakery and confectionery industries. In this case, the same procedure was applied as in the previous two cases, with the fact that the figures are presented collectively for all companies from one and the other industry in order to compare them. Their results can be seen in the table by columns: First, Count, Actual, Benford Law, Difference, AbsDiff and Z-statistics.

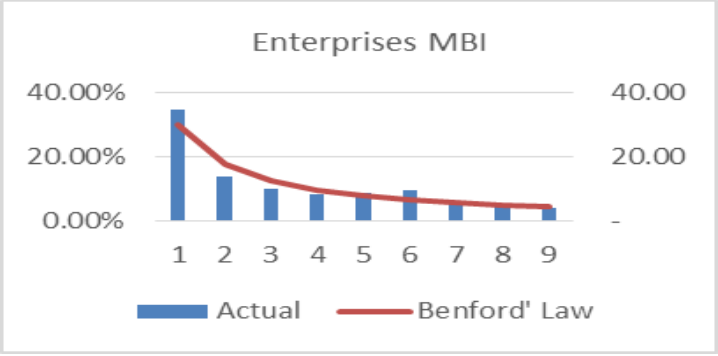
Table 4. Benford's Comparative Analysis of Cash Flow Statements for Mill-Bakery and Confectionery Industry Enterprises

Enterprises of the milling and baking industry (MBI)						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	133	34,37	30,10%	0,043	0,042639	0,216642
2	53	13,70	17,61%	-0,039	0,039140	0,194327
3	39	10,08	12,49%	-0,024	0,024164	0,41901
4	32	8,27	9,69%	-0,014	0,014223	0,4206
5	34	8,79	7,92%	0,009	0,008674	0,40028
6	37	9,56	6,69%	0,029	0,028660	0,181041
7	23	5,94	5,80%	0,001	0,001440	0,022586
8	20	5,17	5,12%	0,001	0,000527	0,37728
9	16	4,13	4,58%	-0,004	0,004414	0,31425
Enterprises of confectionery industry (CI)						
First	**Count**	**Actual**	**Benford' Law**	**Difference**	**AbsDiff**	**Z-stat**
1	141	35,25	30,10%	0,051	0,051470	0,340056
2	64	16,00	17,61%	-0,016	0,016091	0,2784
3	35	8,75	12,49%	-0,037	0,037439	0,28869
4	30	7,50	9,69%	-0,022	0,021910	0,32783
5	35	8,75	7,92%	0,008	0,008319	0,30533
6	24	6,00	6,69%	-0,007	0,006947	0,30355
7	25	6,25	5,80%	0,005	0,004508	0,1137
8	19	4,75	5,12%	-0,004	0,003653	0,24777
9	27	6,75	4,58%	0,022	0,021743	0,25082

Source: Authors

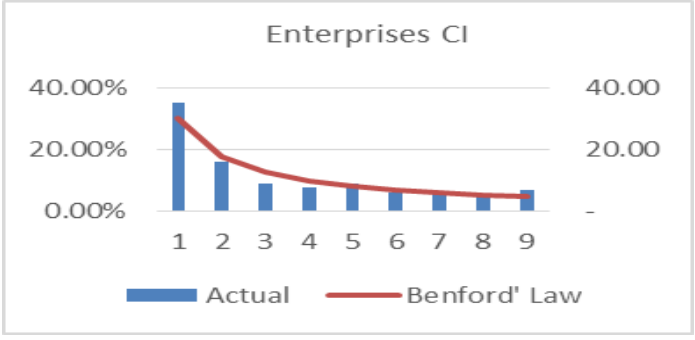
The results in Table 4 show that in all enterprises of the mill-bakery and confectionery industry (collectively) the first digits in real measurement are approximately logarithmically distributed with the highest probability of occurrence of the digit 1 of 30.10%, and with the lowest frequency of occurrence of the digit 9 out of 4 .58%, thus confirming Benford's law. However, as the comparative analysis shows, the biggest deviations of the appearance of the first digits in the mill-bakery industry companies refer to digits 2 and 6, while in the confectionery industry companies, these deviations refer to digits 1 and 3. However, these deviations are not statistically significant, which is why they are not shaded, as can be seen in the graphs that follow:

Figure 11. Deviations of the actual number from the expected number in the first digits of the Cash Flow Statements for companies in the mill-bakery industry (aggregate)



Source: Authors

Figure 12. Deviations of the actual number from the expected number in the first digits of the Cash Flow Statements for companies in the confectionery industry (aggregate)



Source: Authors

The obtained results show that, based on the overall comparison of companies in the mill bakery and confectionery industry, there are no significant deviations in relation to Benford's analysis, which is also shown graphically. This indicates that the Cash Flow Statements at the level of these two branches are realistically presented, which

is a good indicator for shareholders who want to invest their funds. Although the analysis done individually at the level of each company of these two industries shows different deviations, the shown difference occurred because the set of included data is (collectively) larger, i.e. data from the Cash Flow Report of all companies are included.

In addition, the level of the obtained results depends on the realized incomes and expenses, on the basis of which there is an inflow and outflow of cash flows. However, business, investment and financial activities that provide information on money flows should be included in the analysis in the business assessment, and therefore represent important indicators that should be taken into account when determining the difference between these two industries. Together, these activities affect the change in balance sheet positions in two successive accounting periods and show the sources (receipts) and uses (issues) of cash.

Conclusion

The authors presented the application of Benford's law on specific data on the cash flows of large and medium-sized enterprises in the milling, baking and confectionery industry in Serbia. This research was carried out precisely on the basis of the analysis of cash payments and payments for each company, because the movement of cash flows most realistically represents the financial condition of a company.

This analysis can be expanded, so it can be applied in other branches of the food industry as well as in other economic activities (agriculture, construction, tourism, etc.). In addition, it can be applied in analyzing macroeconomic data at the level of the economy of a country. Accordingly, Rauch, by applying Benford's law, cast doubt on the macroeconomic data of the Greek economy that were sent from this country as it entered the European Union (Rauch et al., 2011).

However, what many authors should keep in mind is that financial statement fraud does not necessarily occur if the data does not conform to Benford's law. Accidental errors or omissions in data entry may also occur (Milojević et al., 2014). Nevertheless, Benford's law is a powerful analytical tool for forensic application used by forensic auditors and forensic accountants in expert proceedings to detect fraud in court proceedings. It should be borne in mind that Benford's analysis is free from subjectivity when examining the possibility of errors in financial data, and it should be borne in mind that the greater the number of data, the more accurate the results (Kruger & Yadavalli, 2017).

The advantage of this analysis is that it can cover a larger number of time periods and that it flags suspicious data by observing the entire set on a large number of companies and financial institutions (Deckert et al., 2011). A deviation from Benford's Law is a red flag for auditors and forensic accountants to conduct a more detailed examination of a particular position. Finally, this analysis is considered a relevant indicator of data illogic that is applied in many countries around the world as a useful tool in detecting manipulations and contributing to quality financial reporting.

Based on the presented comparative results between mill-bakery and confectionery industry companies, the authors conclude that the observed companies present their Cash Flow Statements in accordance with legal regulations. A deeper analysis of individual balance sheet and profit and loss positions can determine the liquidity and solvency of given companies in the mill-bakery and confectionery industry, which also affects the results presented in Benford's analysis.

Quality financial reporting in the mentioned industries reduces the risk of presenting false financial information to auditors and potential investors. All of this affects the correct decision-making of financial information users and thus contributes to the creation of a stable environment in modern business conditions. Preservation of macroeconomic and financial stability represents the main indicators for the economic growth and development of Serbia.

Conflict of interests

The authors declare no conflict of interest.

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