



USING BENFORD'S LAW TO DETECT TAX EVASION IN MICRO-ENTERPRISES IN SERBIA

Marko Milojević^{1*},
Ivica Terzić¹,
Snežana Stanišić²

¹Singidunum University,
Belgrade, Serbia

²Sinergija University,
Bijeljina

Abstract:

The subject matter of this paper is to analyse the tax evasion by micro-enterprises in Serbia in respect of income tax. By applying Benford's law, we will empirically determine the degree of authenticity of the revenues disclosed by micro-enterprises in their financial statements and whether the tax base to which income tax is paid is disclosed realistically. The research was conducted on a sample of 45 micro-companies and analysis of their financial statements for the period from 2017 to 2019. The research results show that micro-enterprises in Serbia, for the most part, disclose their net income realistically and in accordance with Benford's law, meaning they don't show the tendency to underestimate their income with the aim to pay lower taxes or avoid paying them entirely. However the worrying results were obtained when the operating profit was tested. The findings of this research may yield great benefits both to auditors and tax authorities.

Keywords:

Benford's Law, tax evasion, fraud, net income, income tax.

1. INTRODUCTION

Public revenues are monetary liabilities which individuals and companies are obliged to pay, under threat of enforced collection, to the state, local self-government units and certain state-run mandatory social security funds to be used for the settlement of the needs of the society as a whole. Public revenues can also be defined as transactions which increase the government's net assets on all levels of government while simultaneously decreasing the purchasing power of the individuals and companies. The world recognizes four classifications of public revenues, and what they have in common is that majority of taxes can be classified into direct taxes (property tax, corporate income tax and individual income tax) and indirect taxes (VAT, excise tax, customs duties). Though indirect taxes are the most prolific type of tax in total public revenues, corporate income tax plays an especially important role in the consolidated balance of public revenues.

Accordingly, our research will be focused on the analysis of income tax evasion of the micro-enterprises in Serbia. Among creative accounting techniques used domestically, the accounting manipulations of income and profit are the most common. Small, and particularly micro-enterprises in our country, tend to deflate revenue to reduce the positive operating profit and thus decrease the amount of income tax payable and the amounts of advance income tax payments.

Income is an indicator of company's growth and entrepreneurial skills and it does not come as a surprise that owners of such companies opt for this creative accounting technique in order to pay as little tax as possible. It is believed that disclosure of lower-than-actual income most often implies the informal sale of products/services,

Correspondence:
Marko Milojević

e-mail:
mmilojevic@singidunum.ac.rs





which are not recorded in business books, including the exchange of fictitious invoices between several companies to increase expenses and thus deflate the operating profit.

In countries undergoing transition, such as Serbia, failure to disclose income and illegal sales are techniques deployed by offenders to manipulate financial statements in micro, small and medium-sized enterprises to avoid paying income tax. The consequence of such illegal actions, e.g. manipulation of income financial statements is reflected in the fact that liabilities, which are not disclosed, will not be paid, whereas in case of illegal sales, the tax balance sheets do not disclose the actual state of affairs.

Tax evasion is an action or omission on the part of a taxpayer aimed at evading tax when such taxpayer believes his true tax liability and tax burden are too high. These are the reasons why he opts for tax evasion, under the threat of the penalty. Tax evasion can take the form of legally permitted and illegal or unpermitted evasion. The analysis will deal with unpermitted evasion which takes place when the taxpayer violates the law or other regulations governing this matter in terms of tax evasion. It frequently results in the material undermining of the goals of the tax policy and practically annuls the objectives of taxation which is to establish a tax system characterised by a high degree of rationality, purposefulness, fairness, and efficiency.

The effectiveness of the tax system can be ensured only if there is an adequately trained, well-organised tax authority, which has available state-of-the-art equipment and properly educated and motivated, conscientious and honest tax officers who perform complex and highly sensitive duties of tax apportionment and collection, including the inspection of the tax collection process. However, the practice shows that it is often the case that companies attempt to disguise their true income and thus opt for partial or even fully fraudulent disclosure. When a company fails to report or inaccurately reports the elements essential for tax apportionment, the tax authorities may be misled about the actual taxpayer's financial capacity.

The goal of this paper is to propose the use of this technique to tax authorities but also to point out the importance which Benford's law and analyses can play in trying to discover anomalies in financial statements of small and medium-sized companies in Serbia which have direct consequences on income tax evasion or fraud. Bearing in mind the set goal, this paper will test the main hypothesis: Can Benford's law be used as a tool to investigate in detail the presence of any manipulations in the income statement (profit and loss) and net income disclosed or whether they are the result of employees' errors or other errors?

The remainder of this paper is divided into the following sections. The first section presents a short overview of corporate income tax regulations in Serbia and the concept of creative accounting.

The second section gives an overview of the research methodology applied. The third section is dedicated to empirical research of potential tax evasion on a sample of 45 micro-companies in Serbia, including the presentation of the results obtained through research. The last section deals with conclusions reached.

2. INCOME TAX AND CREATIVE ACCOUNTING

Corporate income tax is one of the most significant forms of public revenues but its tax balance amount can't measure up to value-added tax and excise tax but still, it serves a development and stabilisation purpose. The income tax levied on legal entities in Serbia is called corporate income tax in all OECD member states.

According to provisions of the Law on Corporate Income Tax, a taxpayer is a legal entity i.e. company organised in one of the following forms: joint-stock company, limited liability company, partnership, limited partnership, public enterprise and cooperative which generate revenues by selling products/services on the market, and other legal entities, including non-profit organisations which are not organised in the abovementioned forms if it generates revenues from selling products on the market or provision of services for a fee.

In Serbia, there is no inspection envisaged for sole traders who are subject to lump-sum taxation. Tax administration once a year imposes a fixed amount of taxes and contributions payable by these sole traders/stores who are not required to keep business books, except KPO form, i.e. sales book. For this reason, such stores are frequently exploited for money laundering and other kinds of white-collar crimes. Namely, the owners of larger profitable companies open stores, subject to lump-sum taxation, in other people's names which issue invoices for services not provided. Then, the store is paid for such services from the company's bank account. Afterwards, the sole trader withdraws cash from his bank account, without providing any justification to the state as the law entitles him to cash withdrawals up to 150,000 RSD a day.

Rulebook on independence test for sole traders, effective from 1 January 2020, determines the position of the sole trader in a relationship with the company he works for. The inspection into the independence of sole traders was about to be conducted by the tax administration but the pandemic and the onset of the economic crisis have certainly largely compromised the efficiency of inspection of stores and small-sized enterprises.

Regarding the improvement of efficiency of tax administration in the period from 2008. to 2017., taxpayers, tax administration personnel and other employees have improved their knowledge to ensure efficient communication with Tax Administration electronically.



MSMEs are taxpayers and therefore subject to payment of taxes. Tax administration pays most attention to medium and large enterprises as large sums of money are involved in their operations and therefore the “creative accounting” is expected to be put to use.

Creative accounting has been long and widely in use in our country. Company owners and managers wish to present to the public a better image of the company i.e. to demonstrate high quality and good performance. A lot of attention has been invested in curbing creative accounting and we have seen frauds involving fake financial reporting both elsewhere in the world and domestically. (Škarić, 2007). Kaparavlović claims that creative accounting is used to make the financial results such as they would please the company i.e. to deviate from true and fair presentation (Koletnikć, 2011.). American Institute of Certified Public Accountants (AICPA) claims that creative accounting is a deliberate disclosure of inaccurate amounts or hiding of amounts in the financial statements. Creative accounting implies modifications to all accounting records, transactions and documents used in the preparation of financial statements; presentation of inaccurate transactions for certain accounts or failure to disclose transactions, as well as misapplication of accounting rules (Diekmann, & Ben, 2010).

In the beginning, all companies' efforts to manage income are legal, legitimate and within the applicable financial reporting framework. They arise from the liberal shaping of accounting policy which is allowed under flexible accounting principles and standards, alternative accounting methods and the need for professional judgement. Over time, the use of accounting techniques applied to manage profit is rare at first, of low value and within the financial reporting framework, but then it broadens to include unallowed, illegal techniques which are contrary to the generally accepted accounting principles, regulations and other applicable legislation. This is the turning point at which “cooking the books” becomes illegal and grows into forgery of financial statements (Milojević, 2015).

The tax base for the corporate income tax is taxable profit. Taxable profit is determined in the tax balance by reconciling the taxpayer's profit disclosed in the income statement, presented in compliance with IAS i.e. IFRS and legislation governing the area of accounting and auditing. To determine the amount of taxable profit, the expenses are recognized in amounts disclosed in income statements in compliance with IAS i.e. IFRS and legislation governing the area of accounting and auditing, except as otherwise prescribed by law.

Income tax is calculated for the tax period which is equal to a business year i.e. calendar year. The corporate income tax rate is pro-rate, uniform and currently stands at 15%. The taxpayer is obliged to file to the competent

tax authority a tax return which includes the calculation of taxes and tax balance of the period for which taxes are accrued. In addition to the tax return and tax balance, the taxpayer is obliged to submit to the tax authority financial statements (balance sheet, income statement (P&L), cash flow statement, changes-in-equity statement, etc.) and other documentation prescribed by regulations. The tax return is due for submission within 10 days after the expiry of the deadline for submission of financial statements. In the tax return, the taxpayer is obliged to specify the amount of income tax for the tax period such tax returned in filed for.

3. METHODOLOGY

Benford's Law is one of the most common techniques for detecting anomalies and irregularities in accounting data. Its purpose is to analyse patterns of digits in numbers sets (Coderre, 2009).

Benford's law i.e. Benford's analysis was first discovered by Newcomb in the late 19th century, who was the first to notice that smaller digits tend to appear more frequently than larger digits in the sets of numbers. The Newcomb noticed that the first digit has the greatest prevalence which led him to conclude that the probability of the digit d as the first digit in any data set is equal to $\log_{10}(1+d) - \log_{10}(d)$, for all $d \in \{1,2,\dots,9\}$. Frank Benford noted the same phenomenon in 1938 when he carried out a thorough analysis of data sets and calculated the exact number of times the first digit appears, and other digits as well. He discovered a logarithmic distribution which governs the distribution of digits. Benford's law was named after Frank Benford (Milojević, et al., 2014).

Benford's law was deemed capable of detecting errors and frauds in financial statements based on the frequency of any digit in any given data set i.e. in financial statements. If the data set included in the financial statements does not follow this law, it can give rise to the conclusion that there could be an error present in data or that the company committed fraud (Milojević, et al., 2014).

The first article proposing the use of Benford's law as a means of finding frauds was published by the economist Hal Varian in 1972. Varian's idea was to compare the first two digits to see if any anomalies are present. Several years later, more precisely in 1999, Mark Nigrini published his research into how forensic accountants and auditor may apply Benford's law to detect indicators that potential creative accounting techniques have been used or that misrepresentations are present in financial statements. (Collins, 2017)



Numerical data collected in practice are modelled today by using random variables. Benford's law can be presented by designating random variable as X , and its first significant digit as $D_1(X)$. Benford assumed that the probability of distribution of the significant digit will follow the equation: $P(D_1(X) = d) = \log_{10}(1 + 1/d)$, for all $d \in \{1, 2, \dots, 9\}$. (Basrak, 2003).

If the data are taken from different orders of magnitude in one set, there is a probability that the set will obey Benford's law. Data that do not obey Benford's law are generally fictitious data, such as phone numbers and data used in students experiments. (Milojević, et al., 2014.) Abnormalities are noticeable if data do not obey the law i.e. in case of any deviations from the law which, more specifically, lead to the conclusion that there may be fraud or error present in the financial statements. The development of information technology has made the fraud detection technique i.e. Benford's law easily applicable using adequate software.

The role of Benford's law is to help forensic accountants and auditors in detecting anomalies in financial statements. They are under obligation to report any error or criminal offence to the company's management. (Mikerović, et al., 2012)

According to Benford's law, we should know the following: (Milojević, et al., 2014):

A. Distribution frequency of the first digit corresponds to the following algorithm equation:

$$F_a = \log_{10} \left(1 + \frac{1}{n} \right) \quad (1)$$

Where n is the significant decimal digit other than 1, 2, ..., 9.

B. Other digits

In numbers beginning a decimal digit n, z

$$F_b = \frac{\log_{10} \left(1 + \frac{nz+1}{nz} \right)}{\log_{10} \left(\frac{n+1}{n} \right)} \quad (2)$$

Where z may be 0, 1, 2, ..., 9.

C. Benford's law on arbitrary numbers

The number beginning with decimal numbers $abc...opq$,

$$\log(1+x) \approx \left(x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots \right) \text{Taylor series} \quad (3)$$

$$\log(1+x) \approx \left(x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots \right) / \log(10) \quad (4)$$

$$F_q = \frac{\log_{10} \left(\frac{abc...opq+1}{abc...opq} \right)}{\log_{10} \left(\frac{abc...op+1}{abc...op} \right)} = \frac{\log_{10} \left(1 + \frac{1}{abc...opq} \right)}{\log_{10} \left(1 + \frac{1}{abc...op} \right)} \approx \frac{abc...op}{abc...opq} \rightarrow \frac{1}{10},$$

for growing q (5)

There is a slight difference between the distribution frequency in leading digits, so the calculation should be used instead of $\log_{10}(x)$, $\log(1+x)$.

The analysis was based on financial statements available on the website of the Serbian Business Registers Agency. To ensure easier processing of the chosen items from tax balance sheets, we converted them into MS Excel and then transferred to module ACL (Audit Command Language) to check Benford's Law in Practice.

4. DATA AND RESULTS

The research covered 45 MSME in Serbia over 3 years (2017, 2018 and 2019). The goal of this research is to determine whether Benford's law could help detect the tempering of the figures in the financial statements of the selected companies and identify any frauds or misrepresentations present in them. Using Microsoft Office Excel program we sorted the data taken from financial statements into tables. In this paper, we shall analyse the following items of the income statement: operating profit and net income. Data are sorted into a table, a certain number of companies had nothing to show under the analysed items or the items showed only negligible sums.

To determine whether the items obey Benford's law, each item must be analysed separately. For each item, the following must be determined: the first two digits, the first digit only, the second digit only, the third digit only and finally, the last two digits from the sample.

When the digits are isolated, a separate table is prepared to demonstrate the difference between the actual digits and digits obeying Benford's law. Afterwards, z statistics was applied to calculate whether the difference is statistically significant.



Table 1. Benford's law applied to operating profit

First	Count	Actual	Benford' Law cumulative	AbsDiff	Z-stat
1	11	24.44%	30.10%	0.123251	0,356
2	7	15.56%	47.71%	0.298025	2.5720
3	6	13.33%	60.21%	0.576423	1.321
4	5	11.11%	69.90%	0.65024	0.826
5	5	11.11%	77.82%	0.628462	1.121
6	4	8.89%	84.51%	0.805684	0.325
7	3	6.67%	90.31%	0.785961	0.684
8	3	6.67%	95.42%	0.751945	1.391
9	1	2.22%	100.00%	0.897928	0.526
	45	100%	100.00%	MAD=0.536751	

Source: Author

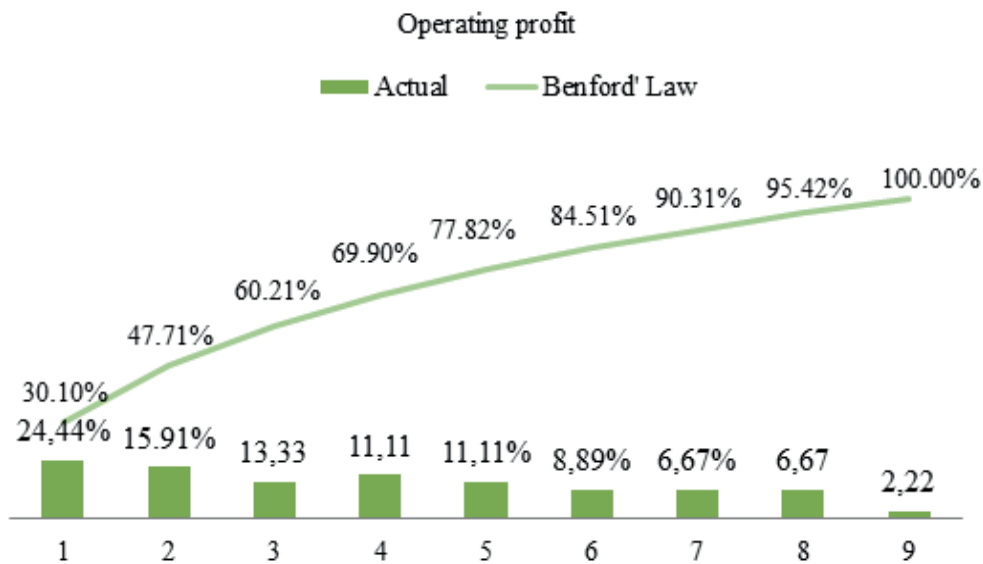


Figure 1. Distribution of the first digits in the item of operating profit

The diagram of the actual number and Benford's law makes it evident that there are big differences between these two items showing an operating profit. Out of 45 micro-enterprises, 11 of them start with digit 1, which is 24.44% of the total number of enterprises covered by the analysis. According to Benford's law, the expected distribution of the digit 1 is 30.1% which means that this deviation is significant because it demonstrates the gap between the actual number and the number obeying Benford's law which should call for additional verification of the item of operating profit for all 45 Serbian micro-enterprises covered by the analysis. This need not necessarily indicates malpractice or fraud in respect of the item of operating profit, however, since Benford's law is such that its curve

behaves otherwise i.e. its direction is the opposite, this diagram shows a significant deviation and that, though we could have expected the digits from 2 to 9 to decrease they are actually increasing in frequency. This, however, is a telltale sign that verification should be undertaken to determine whether the financial statements were subject to tampering or an error.

The following table represents the analysis of Benford's law for the net income which differs significantly from the operating profit and are more proximal to real-life results which are obtained when Benford's law is applied.



Table 2. Benford's law applied to net income

First	Count	Actual	Benford' Law	AbsDiff	Z-stat
1	13	28.89%	30.10%	0.01623	0.0342
2	9	20.00%	17.61%	0.01348	0.1024
3	7	15.56%	12.49%	0.02091	0.9734
4	5	11.11%	9.69%	0.07906	0.3345
5	3	6.67%	7.92%	0.03066	0.2687
6	5	11.11%	6.70%	0.02917	0.8641
7	0	0.00%	5.80%	0.05689	0.2626
8	1	2.22%	5.12%	0.02694	0.0402
9	2	4.44%	4.58%	0.00202	1.0624
	45	100%		MAD=0.028478	

Source: Author

Based on the table showing net income, we see significant differences in comparison to operating profit. The table clearly shows that there are very small differences between the actual number and the number obeying Benford's law. In comparison to operating profit, we see that the digits are distributed in compliance with Benford's law

i.e. digit 1 has distribution frequency of 28.89%, digit 2 has distribution frequency of 20.00% and this percentage decreases towards digit 9 which follows Benford's law. The following diagram shows the curve of Benford's law to see whether there are any deviations in certain digits within the data set.

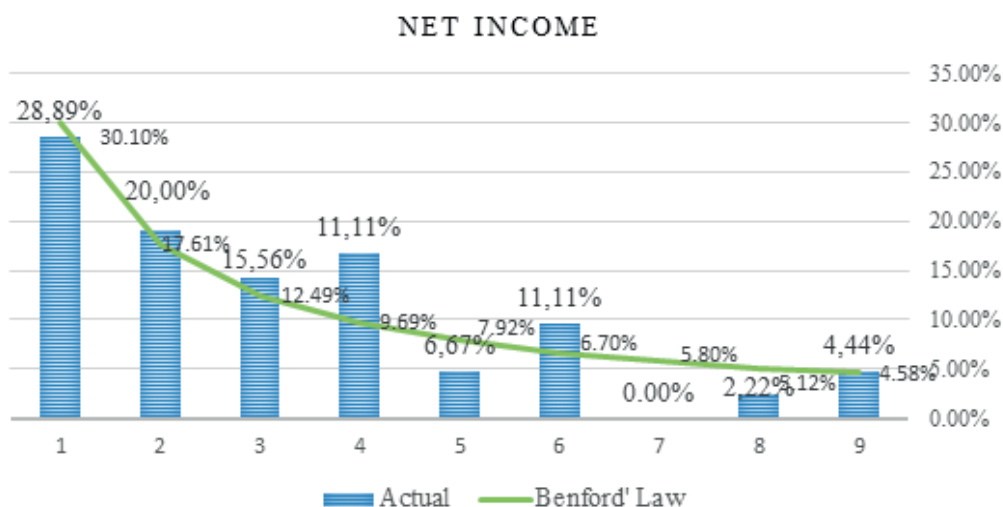


Figure 2. Distribution of the first digits in the net income item

What we can conclude is that the difference between the actual digit and the digit obeying Benford's law is very small thus indicating that the net income of micro-enterprises behaves in compliance with Benford's law except for certain digits, but these differences are negligible. The first thing we note is that digit 1 has the frequency distribution of 28.89%, digit 2 - 20.00% compared to Benford's law which indicates that the digits obey the law from 1 to 9.

Digits which do not obey Benford's law are 4, 6 and 9 because they deviate from the Benford's curve i.e. the actual number deviates from Benford's law. This result can be very useful to auditors of financial statements, forensic accountants and internal auditors, who are very scarce in our country because forensic accounting and forensic audit are very poorly developed in Serbia.



The analysis of 45 micro-enterprises leads us to the conclusion that the position of net income i.e. numbers 4, 6 and 9 disagree with the theoretical distribution which demonstrates the necessity to carry out more detailed tax examination and to test whether "creative accounting" was used. Of course, one can hardly avoid the fact that some companies do not make this error unintentionally.

5. CONCLUSION

Based on the analysis of financial statements of 45 micro-enterprises in Serbia, we may conclude that Benford's law can be used to identify deviations in digits in the data sets. Significant deviations were identified in disclosed values in the income statement and the expected theoretical distribution. The fact that 7 out of 9 actual digits did not obey Benford's law provides a reasonable basis for us to give recommendations to tax authority to inspect in detail financial statements of micro-enterprises, paying special attention to the offsetting of income and expenses and the disclosure of operating profit.

Analysis of the net income revealed that the data obeyed Benford's law except for minor deviations that can be checked by accountants. Detailed reviews and analyses are required to determine with certainty whether the deviations are the result of fraud or error present in the financial statements. Based on all of the foregoing, we can say that Benford's analysis does not suffice for detailed examination whether income statements and net income were tampered with or the consequence of employees' errors, but its usefulness in checking doubtful items and pursuing further analyses by accountants, tax inspectors and auditors is beyond doubt.

6. ACKNOWLEDGMENT

This paper is part of the project No. 22010083 entitled "Experience sharing of Visegrad countries to tax avoid activity" financed by the International Visegrad Fund.

7. LITERATURE

- Barjaktarović, L., Milojević, M., Terzić, I. (2014). Results of applying Benford's law on Serbian companies. XIV International Symposium SymOrg, Zlatibor
- Basrak B., Varga, I. (2013). Benford's law. *Math. e*, Vol.23., No.1., str.1-6.
- Coderre, D. (2009). Primena kompjutera u sprečavanju i otkrivanju kriminalnih radnji. *John Wiley&Sons, Hoboken, New Jersey*, 197-203.
- Collins, J. C. (2017). Using Excel and Benford's Law to detect fraud. *Journal Of Accountancy*, 223(4), 44-50.

Diekmann, A., & Ben, J. (2010). Benford's Law and Fraud Detection: Facts and Legends. *German Economic Review* 11(3), 397-401

Koletnik F, Kolar I., (2008). Forenzičko računovodstvo. *Zveza računovodij, finančnikov in revizorjev Slovenija, Ljubljana*

Milojević M., Terzić I., Marjanović V. (2014). Application of Branford Analysis in detecting anomalies in the financial statements – case of Serbian large companies. *Paper presented at Sinteza 2014 - Impact of the Internet on Business Activities in Serbia and Worldwide*. doi:10.15308/sinteza-2014-564-570, 2014.

Petrović, Z., et al. (2013). Značaj forenzičkog računovodstva u upravljanju pravnim licima. *The Significance of Forensic Accounting in Corporate Governance.USPON*

Serdar T. (2013). Otkrivanje i sprečavanje finansijskih prevara u cilju jačanja finansijskih performansi preduzeća u Republici Srpskoj, *Acta Economica, Sveska 11., Broj 19*, 179-200.

Spahić N. (2014). Otkrivanje prevara i pronevera u finansijskim izveštajima. *In International Scientific Conference of IT and Business-Related Research-SINTEZA*

Škarić-Jovanović, K. (2011). Finansijsko izveštavanje preduzeća u bankrotstvu. *Acta economica, Vol. 9., Br. 14.*, 9-36.

Vukoja B. (2012). Značaj forenzičkog računovodstva i revizije za pouzdanost finansijskih izveštaja u BIH, *Naučni časopis za ekonomiju: Financing, broj 2., Vol III*, 38-45.

Online sources:

Website of the Serbian Business Registers Agency. Retrieved from <http://www.apr.rs>

Legislation:

Law on Corporate Income Tax (2015).