Dr. Anand Sasidharan
Subject Matter Expert,
Governance, Risk & Compliance

Neelesh Pal
Senior Director, Governance,
Risk & Compliance

Not So Risky Business: Leveraging Analytics to Fix Blind Spots in Auditing

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Executive Summary

Conventional Finance and Accounting (F&A) analytics has a void in terms of detecting financial leakages. As the analysis is often done on summarized numbers, the finer transactional anomalies or idiosyncrasies go undetected. Moreover, as analytical methods are largely based on past patterns, there's a challenge in identifying ever evolving patterns of fraud.

Digit Distribution Analysis (DDA) can fill this void and can be an important component on the dashboards of Chief Financial Officers (CFOs). Based on Benford's law of digits in a data set, DDA can provide 100 percent coverage of transactions, overriding the biases of sample auditing and enabling a granular view into transaction patterns. It is also a context and scale-independent technique that can be used to detect potential vulnerabilities in F&A processes without historical patterns or delving into the details of every transaction.

In this paper, we look at how routine DDA of transactions can enable businesses to screen transactions and identify vulnerable departments, process inefficiencies, control weaknesses, transaction clustering, risky agents, misreporting and fraud vulnerabilities.

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Introduction

Finance and Accounting (F&A) risk auditors have a good understanding of the vulnerabilities in the system, and use this to identify the samples for scrutiny. Now, as a result of increased penetration of technology, there is an abundance of data within organizations. This richness of data has stepped up demands for continuous auditing.

But large volumes of data create two problems for auditors. First, it is difficult to engage in continuous auditing. Second, even if they resort to sample auditing, identifying the audit targets becomes tricky, and certain biases may creep in. For instance, there is likely to be a bias towards high-value transactions.

However, if there are vulnerabilities in low-value transactions, left undetected, these can cumulate over time. Eventually, such transactions can become a haven for fraudsters. In the 2016 Global Fraud Study, the association of Certified Fraud Examiners (ACFE) found that the most common form of fraud within organizations caused the smallest dollar losses.

Fraudsters are also always on the lookout for vulnerabilities and keep exploring new ways of exploiting it. Hence, depending only on past experience in fixing vulnerabilities in an evolving business landscape may not be the most effective way to curb fraud.

Fixing Blind Spots in Auditing

When auditors are not in a position to do continuous and sweeping audits, blind spots arise due to the biases that creep into the sample selection. An ideal solution is to implement a screening process that assesses the entire transaction database scientifically, and enable objective selection for sample auditing.

Digit Distribution Analysis (DDA), based on Benford's law of digits, is a slightly unorthodox but highly effective algorithm. It has been popular as a forensic analytics tool to highlight potentially fraudulent transactions. The advantage of DDA compared to other analytical methods for fraud detection is that it is an unsupervised learning algorithm. Supervised learning algorithms are trained on previous instances of fraud and non-fraud cases. DDA, on the other hand, is an unsupervised method that can detect anomalies without having to learn from previous instances of the same. DDA has immense potential in auditing, and can be explored as a screening tool and not just for scenarios where a forensic investigation is warranted.

How it Works?

DDA is based on Benford's law of digits that describes the probability of the appearance of leading digits in a numerical data set. The leading digit is the leftmost non-zero digit that appears in a number. For example, in the number 3592, '3' is the first digit, '5' the second and '35' the leading first two digits. According to Benford's law, the leading digits in a set of numbers are expected to appear with a particular probability. For instance, the digit '1' is expected to appear about 30 percent of the time as the first digit in a large set of numbers. For the number 3592, '3' is expected to appear as a leading digit 12.49 percent of the time within a large set of numbers, while '5' is expected to appear as second digit in 9.67 percent of the cases. The combination '35' is expected to appear as the first two digits 1.22 percent of the time.

Plotted graphically, the distribution of the leading digit, second digit and first two digits will appear as shown in Figures 1, 2 and 3.

Figure 1: Benford's Distribution for Leading Digits

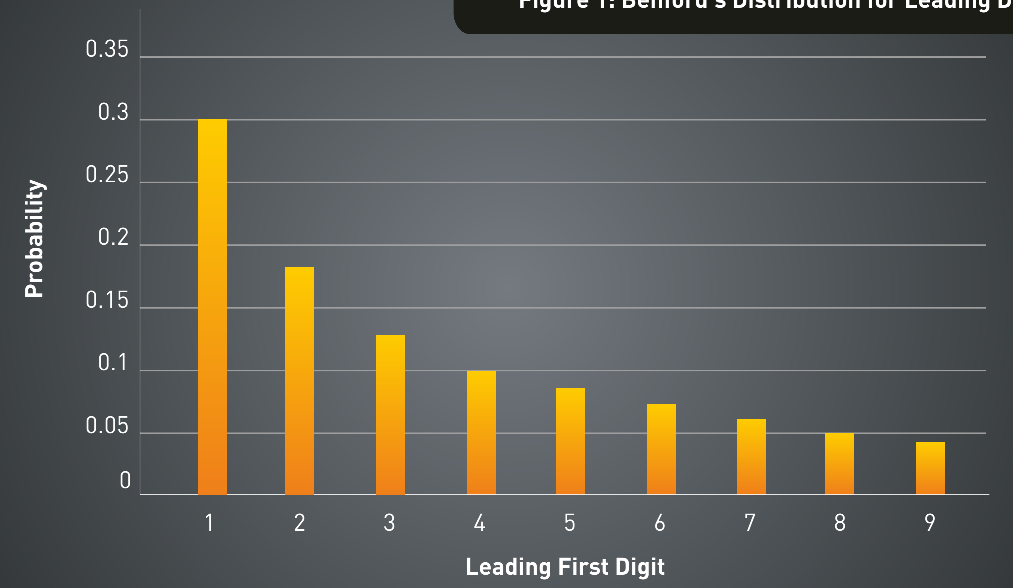


Figure 2: Benford's Distribution for Second Digit

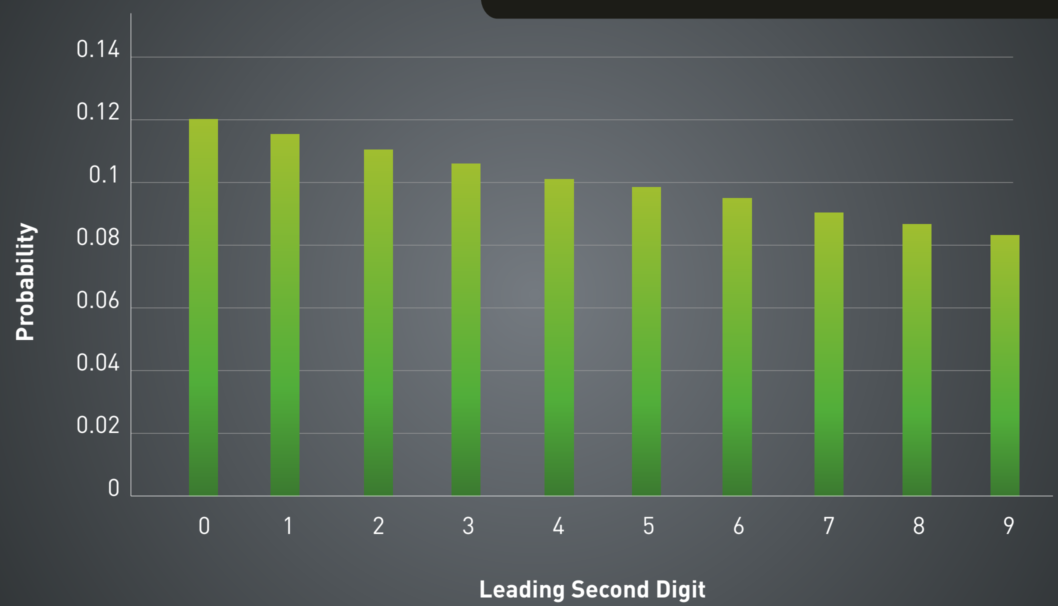
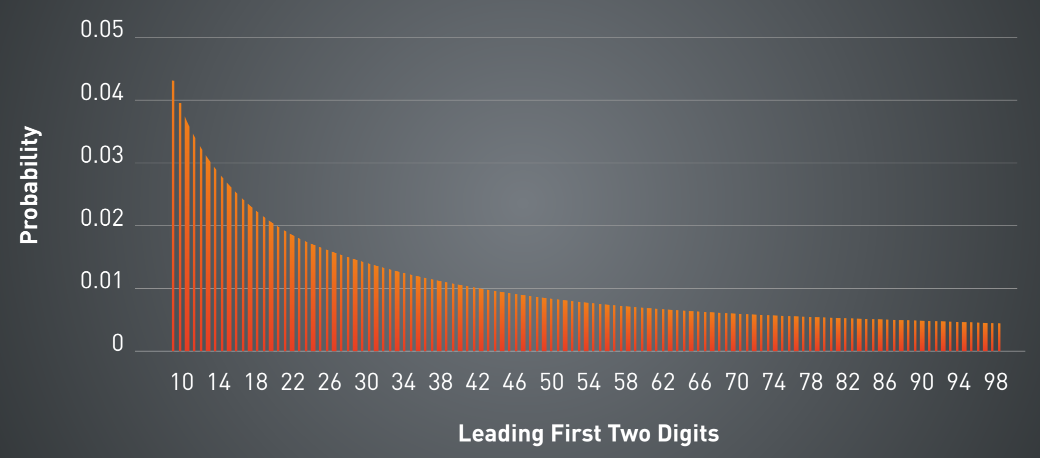


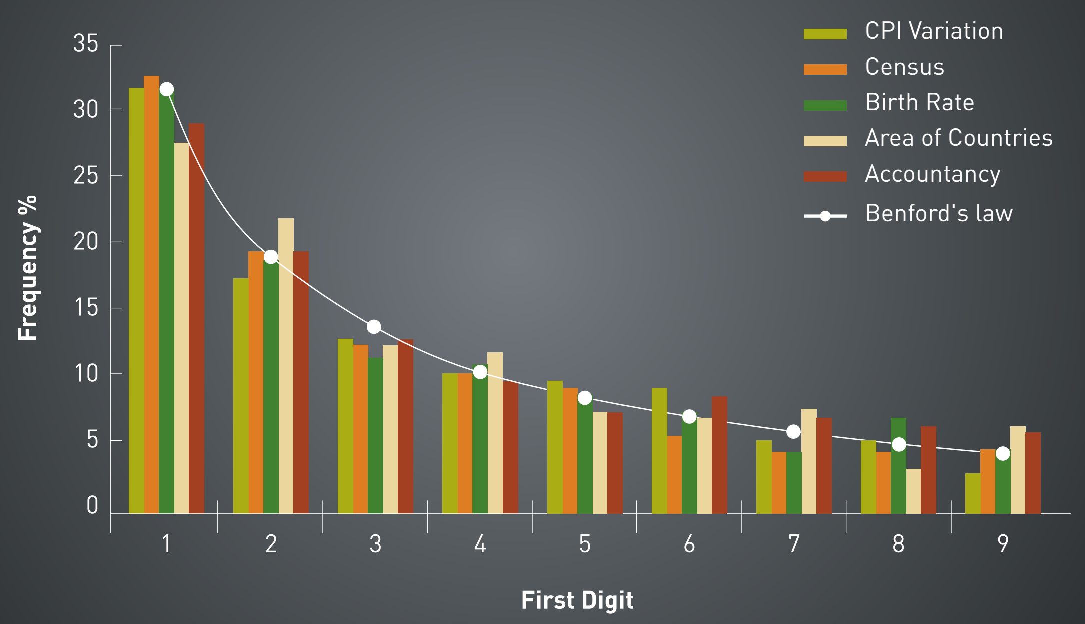
Figure 3: Benford's Distribution for First Two Digits



Benford's law can be applied to a variety of elements ranging from electricity bills to length of rivers.

Figure 4 shows how Benford's law is applicable to several natural phenomena. As the law is scale-invariant, it does not matter in what scale each of this information was originally measured.

Figure 4: Examples of How Benford's Law Applies to Natural Phenomena

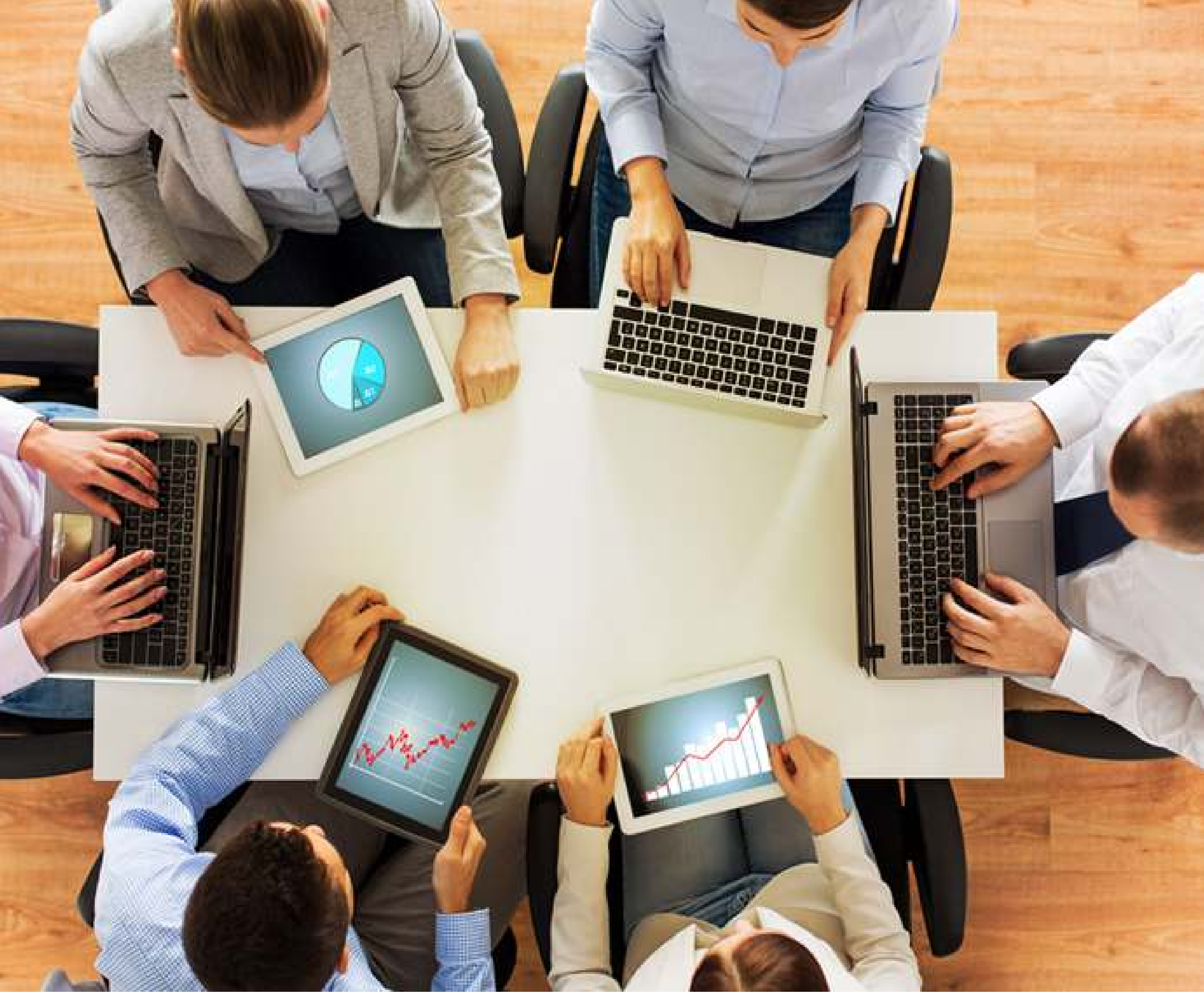


Source: Torres et al 2007

Benford's law can be applied to F&A data as well. The wisdom is that when numbers are not manipulated, the digits will follow Benford's law. Any alteration, tweaking or misreporting of the original values will cause the leading digits of such numbers to skew away from Benford's distribution. This has also been the basic premise of using DDA for fraud investigation. Anomalous digits are further investigated to understand the source, which could be malpractice or idiosyncratic clustering in certain digits due to the nature of business.

Using DDA as a screening technique also helps finance teams visualize the finer nuances of cash flows that might go unnoticed when numbers are summarized into financial statements.

We recommend that organizations routinely perform DDA on transactional data, and not restrict it to forensic investigations. The technique can be used as the precursor to any routine F&A analytics that Chief Financial Officers (CFOs) perform and should be a central component in CFO dashboards. It could fill an important vacuum regarding the 'volume to value' trade-off of transactions. Routine DDA screening can help target transactions that could lead to identification of process inefficiencies, control weaknesses, transaction clustering, vendor riskiness, vulnerable departments, misreporting and fraud vulnerabilities. The analysis considers each and every transaction, and is not just limited to high-value transactions or big-ticket items. It enables continuous auditing and identifying audit targets scientifically, thereby improving the auditing efficiency.



Case Study: Applying DDA to Accounts Payable Process

A global company with multiple operations suspected inefficiencies in its accounts payables process. Let's use the example of how DDA was applied in this instance to highlight certain rules of application as well as the key findings of the case.

Grouping Transactions for DDA

While performing DDA, it is not advisable to combine data from different currencies and departments. This is because deviations from two different groups could cancel out each other and make the combined data appear as confirming to Benford's law.

The period of analysis covered 50,000 transactions from 33 different divisions or Operating Units (OUs) in more than 20 currencies. The transactions were grouped first by currency and then by OU to extract the frequency distribution of the first two digits. Based on mean absolute deviation of the observed frequency from the expected frequency, the OU with the highest non-conformity with Benford's distribution was identified for deeper auditing.

Figure 5: Observed vs. Expected Digit Distribution of an Operating Unit

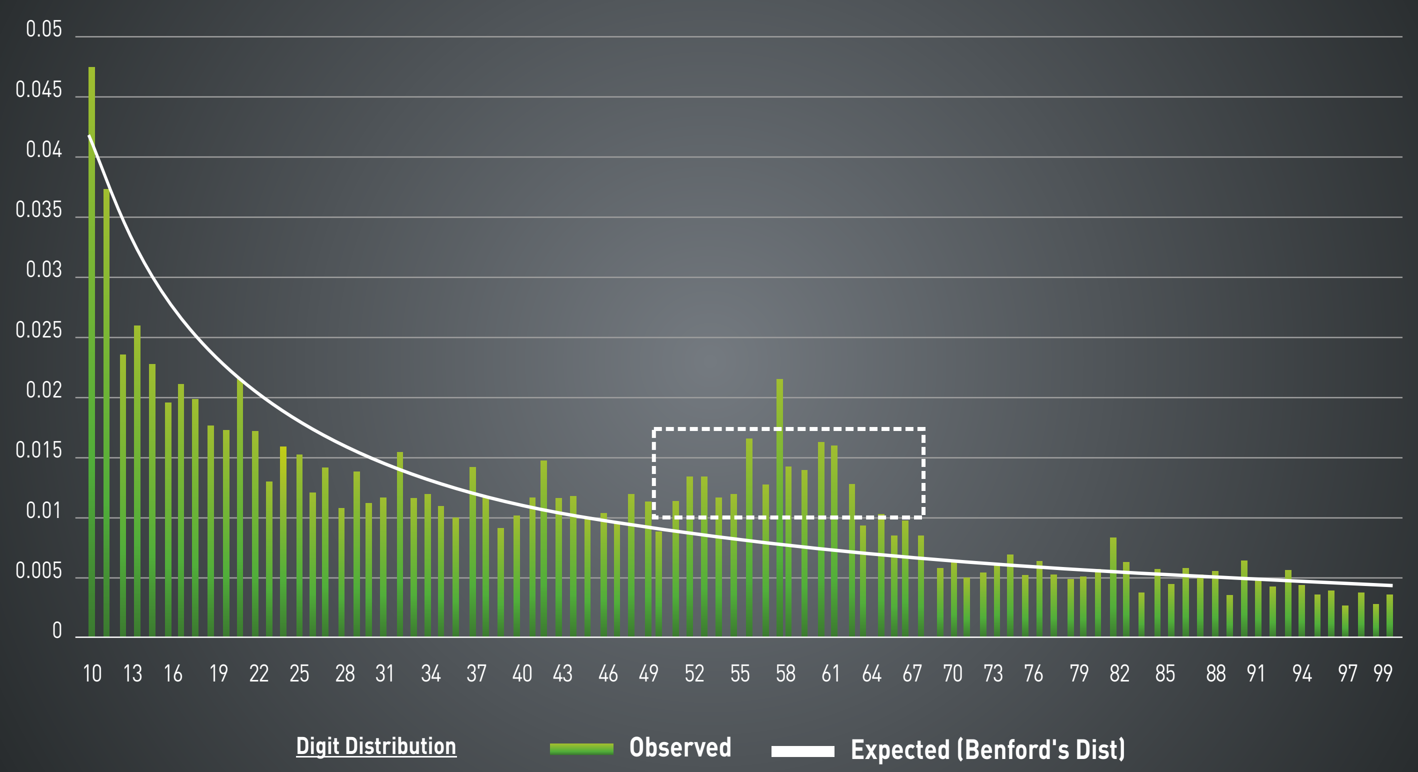


Table 1: Digits with the Highest Non-conformity with Benford's Law

First 2 Digits	Observed Frequency	Expected Frequency	Difference
57	650	230	420
60	485	219	266
61	478	215	263
55	497	239	258
58	427	226	201

Figure 5 shows the observed frequency distribution of the first two digits of invoice amounts, with those from the anomalous OU highlighted. Table 1 provides the details of the top five digits that were found to have the highest non-conformity among the transactions from the selected OU. The table shows that amounts starting with the digit '57' appear 420 times more than expected under Benford's law. Similarly, invoices starting with the digit '60' appear 485 times, which is 266 times more than expected.

Transactions originating with the digits with the highest non-conformity were chosen as audit targets. The investigation into transactions with amounts starting with 57 revealed 220 transactions for invoice amounts 57, 57.5, 571, and 572 — all to the same vendor. Though the total amount is not large, the very nature of these amounts and the category and vendor it belonged to warranted further scrutiny. Further investigations revealed over 350 invoices to the same vendor with '0' as the amount payable.

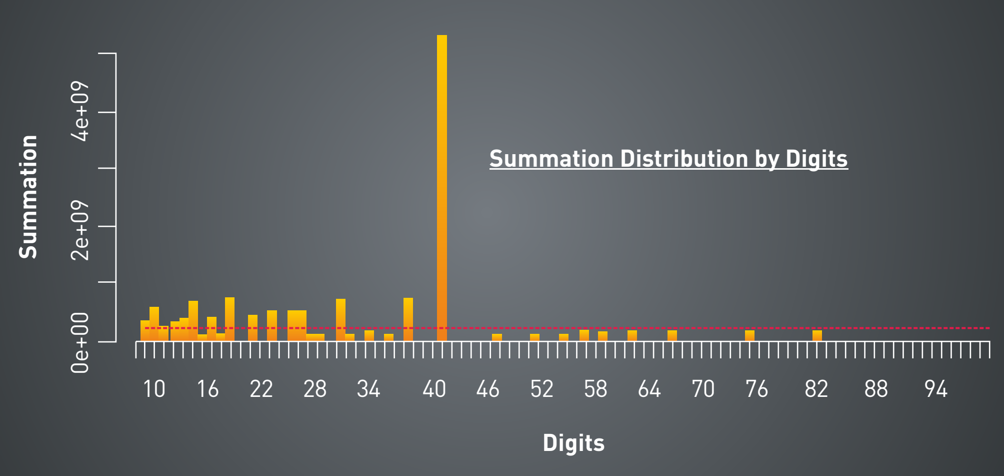
This triggered an investigation in small denominations across all payables. It was found that 13 percent of the total volume of transactions belonged to amounts less than USD 0.16. Given that the cost of processing an invoice can range from USD 5 to USD 26, the opportunity cost of separately processing too many invoices of negligible value is extremely high. Thus, DDA led to the discovery of serious process inefficiencies, if not vulnerabilities, resulting in high opportunity costs.

Recurrence of Large-dollar Values

The summation test described in Continuous Auditing by M. Nigrini was used to identify abnormal recurrence of large numbers. It is performed by adding all amounts starting with each particular digit, and then checking whether the sum is greater than the expected value. The expected value is arrived at by dividing the grand total by 90. If there is high positive deviation from the expected value, then it indicates an abnormal recurrence of large dollar amounts.

The next focus was on exploring whether there was any abnormal recurrence of large-dollar invoices. Figure 6 shows the result of the summation test conducted for the company. The deviation shows abnormal recurrence of large values starting with the digit 40. A scrutiny of transactions starting with digit 40 showed that there was a re-balancing of investment portfolios. A large investment was broken in multiple small and equal investments, with the leading first two digits as 40.

Figure 6: Summation Distribution Analysis

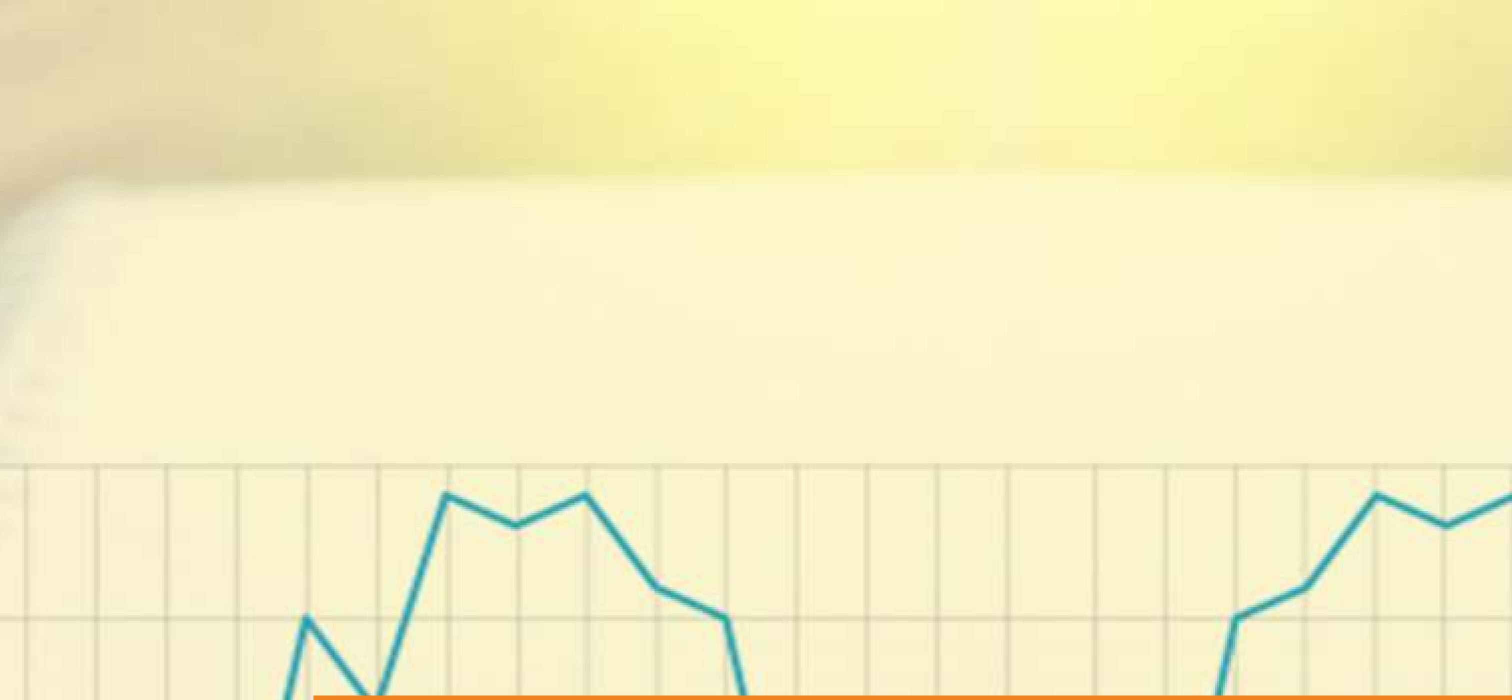


Amount Duplication

Though tracking duplicates is part of many systems, most cannot do fuzzy matching which can reveal approximate matches with some corresponding factors. Using fuzzy matching to examine amount duplication can help identify clustering of transactions around specific vendors.

A fuzzy matching of invoice details identified astonishing anomalies that would otherwise have gone undetected. For instance, there were 311 transactions for the amount of USD 11,489 all made to a single vendor. The investigation revealed an abnormal recurrence of the same invoice number for two different vendors at the same time. The two invoices always appeared together, on the same date, with similar time stamp.

DDA helped identify more such instances and it was determined that the exposure to or dependence on specific vendors should be re-examined.



Conclusion

Research has shown that companies with financial statements that do not conform to Benford's law are more likely to have poor internal controls. This indicates the direct impact of DDA on auditing effectiveness. DDA's ability to offer 100 percent transaction coverage in an ongoing, context-independent and non-invasive way makes it a strong tool in enabling auditors to deal with the growing complexity and volumes of transactional data.

By implementing routine DDA on all transactions with a DDA dashboard to continuously monitor different divisions or operations, companies can track the overall conformity of transactions in real time. This can enable businesses to screen transactional anomalies early on and weed out weak links and inefficiencies in their processes.

References

1. ACFE, 2016. Report to the Nations on Occupational Fraud and Abuse: 2016 Global Fraud Study, Association of Certified Fraud Examiners
2. Bolton, R. & Hand, D., 1999. "Statistical Fraud Detection: A Review." *Statistical Science*, 17(3), pp. 235-255
3. Drake, P. D. & Nigrini, M., 2000. "Computer Assisted Analytical Procedures Using Benford's Law." *Journal of Accounting Education*, pp. 127-146
4. Lu, F., Boritz, E. & Covvery, D., 2006. *Adaptive Fraud Detection Using Benford's Law.* Berlin, Springer
5. Nigrini, M., 1999. "I've Got Your Number." *Journal of Accountancy,* p. 79
6. Nigrini, M., 2000. "Continuous Auditing." University of Kansas
7. Nigrini, M., 2011. *Forensic Analytics: Methods and Techniques for Forensic Accounting Investigations.* John Wiley & Sons
8. Nigrini, M., 2012. *Benford's Law: Applications for Forensic Accounting, Auditing, and Fraud Detection.* John Wiley & Sons
9. Nigrini, M. & Mittermaier, L., 1997. "The Use of Benford's Law as an Aid in Analytical Procedures." *Auditing: A Journal of Practice and Theory*, 16 (Fall), pp. 52-67
10. Torres, J., Fernández, S., Gamero, A. & Solar, A., 2007. "How Do Numbers Begin? (The First Digit Law)." *European Journal of Physics*, pp. L17-25
11. Varian, H., 1972. "Benford's Law (Letter to the Editor)." *American Statistician*, 26(3), p. 65
12. https://www.invensis.net/blog/finance-and-accounting/ap-process-cost-critical-metric-f-and-a/

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