

# **A CASE STUDY IN FRAUD PREVENTION: CHARLENE CORLEY**

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## **ABSTRACT**

*This case study discusses fraud, and illustrates several preventive and detective fraud methodologies as they apply to a historical case study (United States of America vs. Charlene Corley). Criminal fraud cases have emerged with greater frequency over time, which has resulted in improved detection methodologies; such as Embedded Audit Modules and Benford's Law, and preventive methods, such as budgetary controls. These methodologies are discussed and analyzed in great detail in this paper, and may be implemented by companies to ensure compliance with internal control policies developed by regulatory agencies.*

**JEL:** M40, M42

**KEYWORDS:** Benford's Law, Audit, Fraud, US vs. Charlene Corley, Budgetary Controls, Embedded Audit Modules, Detection Controls, Preventive Controls

## **INTRODUCTION**

This case study illustrates a real fraudulent case known as Charlene Corley, which was perpetrated against the US government at a cost of over \$20 million. Part 1 of the paper provides an overview of the case, and an introduction to fraud. In part 2, several methodologies are introduced and explained in detail, which are aimed at preventing and detecting fraud, and include; Embedded Audit Modules, Benford's law and Budgetary Controls. In part 3, questions are addressed relating to this case study which can be assigned in a relevant accounting class. Part 4 is the conclusion section which summarizes the key points of this paper. This case study can be used at both, the undergraduate as well as the graduate accounting curriculum in an Internal Auditing class, Auditing and Assurance class, an Accounting Capstone course as well as an Accounting Forensic course.

## **CASE DESCRIPTION**

### Case Overview

Fraud and errors in accounting dates back to the 13th century where Europe became a monetary economy and began to develop bookkeeping. Luca Pacioli had developed the Double-entry Bookkeeping system in the late 14th century which led to more in-depth and accurate transaction recording. Since it was developed, today we are continuously improving this system, but as we improve it, recurring problems appear through a diverse volume of cases (Lee, 1977).

According to Jim Powell, author of America's First Great Champion for Liberty and Peace, historical fraudulent schemes date back to the time of Philip Ford in the 1700's; At the time Philip Ford embezzled large sums from the profitable estates owned by William Penn by means of getting Penn to sign a deed that would then transfer Pennsylvania to Mr. Ford. This scheme resembles patterns that

still happen today and have led to an increase in accounting fraud throughout the years (Powell, 1995).

Darlene and Charlene Corley were twin sisters from Lexington, South Carolina. Charlene worked at the South Carolina budget and control board while Darlene was a school teacher. In 1991 they both decided to open up their own small hardware store C&D Distributors. C&D Distributors LLC, was a registered government contractor with the Department of Defense which supplied hardware components, plumbing fixtures, electronic equipment and various other items to various military installations worldwide. In 1993 they began distributing hardware to the military; AKA the Department of Defense.

In July of 2000, there was an accounting error in the shipping costs which had been paid. They received five thousand dollars and at first weren't sure from where it came from but as soon as they figured it out that it was due to a loophole in the Department of Defense's automated payment system, they leveraged the situation. The Department of Defense had been using a system that had been automatically accepting shipping expenditures, it is known as the Defense Finance & Accounting Service (DFAS). It is the payment service center of the Department of Defense based in Columbus, Ohio and controls invoices submitted by government contractors for shipping costs paid electronically by DFAS. The sisters found out about this system and were able to charge any amount they wanted for shipping and the Department of Defense would pay for it. They were submitting bids and inflated shipping costs for those items. At this time the military was at war, supplying our soldiers as fast as they could, approving all costs that were needed; as in this case for bolts and screws. Shipping charges of tens of thousands of dollars eventually increased into hundreds of thousands of dollars. In all, they submitted almost seventy-two million dollars in fraudulent shipping costs and a little over twenty million were paid. With their lucrative scheme they bought several beach houses, matching Mercedes cars, and took lavish vacations. They even opened a Nestle Toll House franchise called, Dough and Cookie LLC.

The scheme was uncovered when the sisters sent two invoices for the same contract. The system "kicked it out" which lead to further review and discovery that the shipping charge for two lock washers that were nineteen cents each was nearly a million dollars. At that time, when both Charlene and Darlene Corley realized the Department of Defense found out about their scheme, the sisters tried to mend the situation by paying back four and a half million dollars, sending the message that they will repay their debts. Investigators came to see Darlene, where she asked them to let her gather her thoughts and papers and to return the following day. However, Darlene chose instead to commit suicide. Charlene, left to defend herself, stated that her sister had been in charge of the entire operation. However, it was noted that "Charlene Corley was the president of the company, she was the managing partner and she was the designated contact for the Department of Defense."

Hence this case concluded that Charlene was actually in charge. On August 16<sup>th</sup> of 2007, Charlene Corley pleaded guilty for wire fraud and money laundering. It was looked at as an anti-American crime, taking money away from our soldiers and our country. It ended with Charlene being sentenced to six and a half years in prison.

"Fighting fraud has become an escalating war. Even those firms with the most advanced tools and processes to detect and prevent fraud feel like they are falling behind. The technical advancement and globalization of fraud will continue to provide new challenges to a firm's ability to manage fraud" (Ness, 2009). It is clear that numerous firms have faced instances of accounting fraud since the 13th century and this highlights the need for Embedded Audit Modules and Benford's Law as representative detection tools, and budgetary controls to prevent fraud before- the-fact. In summary, the main question is: what particular methods might have been implemented to prevent fraud like

the one in the Charlene Corley Case?

## CASE INFORMATION

### Fraud Preventive and Detective Methodologies

#### *A: Embedded Audit Modules*

Fraud has become prevalent in society (Morey, 2010). One methodology that is used in this escalating war involves Embedded Audit Modules, which is a topic in embedded controls inserted into a system. These types of controls can be helpful to organizations by reducing costs, making response times quicker, avoiding unnecessary business exposures and making multiple tasks more efficient (Turner, 2009). “By continuously monitoring core business processes, via embedded controls and mathematical modeling, you may locate material errors in real-time/run-time, strengthen the control environment, and manage down business risks” (Kneer). These points of embedded controls are impressive elements that can be used for fraud prevention today with the application of their quick response time.

“Embedded controls, designed to prevent and detect fraud can be automatically reported in real time leveraging a predetermined work flow for investigation and remediation” (Simon, 2011). Having embedded controls may have impacted on the criminal act involved in the Charlene Corley case. Even though embedded controls were used to detect and prevent fraud in the Corley Case they were developed only enough in this case to prevent the situation from escalating. In this case, shipping costs were paid without any indication that fraudulent actions were in the making. In the case hearing, the judge had said “Miss Corley was stealing from the Department of Defense during a nine-year time period, and the majority of that time period this country was at war... And, as you know, the Department of Defense's mission is to protect this country, to preserve our national security. We had soldiers in Iraq and Afghanistan risking their lives for the Department of Defense and to preserve our freedom in this country and she was stealing \$21 million from that agency.” This clearly implies that embedded controls require improvements, especially given this time when everyone was very concentrated in the war and was not able to give their full attention to the charges being processed.

A particular embedded control segment mainly relevant to the Corley case is Embedded Audit Modules (EAM). “EAMs are software applications embedded in host systems or linked to host systems to externally monitor such systems. EAMs are applications that continuously monitor flows of transactions, identify transactions that match certain pre-determined integrity constraints and, in the event of a constraint violation, alert the auditor and copy the transaction data to a file” (Roger, 2005). Since EAMs are continuously monitoring flows of transactions they make for a valuable auditing tool. “Early examples of EAMs were implemented in proprietary accounting information systems and production systems” (Roger, 2005). In the Corley case the Department of Defense used the aforementioned DFAS which automatically accepted shipping costs. This system could have been strengthened by employing Embedded Audit Modules which would have connected with the system to help externally monitor the enduring course of transactions.

EAMs have certain characteristics including “an end-user environment that allows the auditor to establish a set of queries to test transaction integrity constraints either from a pre-defined suite of queries, the modification of the attributes of pre-defined queries, or by the creation of new queries by the construction of simple scripts” (Kuhn, 2010). EAMs also permit the recording of transaction details which can then be reported electronically if a violation or query is observed (Roger, 2005) In the DFAS system there could have been EAM queries to allow some form of notification of violations that may be uncovered in the transaction that the system otherwise accepts as customary.

In an article by Daniel Draz, “According to the Institute of Internal Auditors (IIA), "responsibility for the system of internal control within a typical organization is a shared responsibility among all the executives, with leadership normally provided by the CFO" ”(Draz, 2011). This informs that a segregation of duties should be assigned, to monitor from time to time the processes of the system being used by the Department of Defense. Moreover, “An effective notification system operates over a central server, delivers event messaging to predefined employees in "real time," as the event occurs, and is sent directly to the employees and their smart devices. This level of event notification ensures that the people who need to know about an incident are made aware in a timely manner and fosters immediate and unified response as required” (Draz, 2011). This is a system that could have helped prevent fraud during the arising active transactions in the Corley case.

In addition to improving on creating more queries in a company’s system and creating Embedded Audit Modules, another factor that is included in the embedded control process is the point of segregating duties. Draz’s article states that, “One way to strengthen internal controls is by improving the communication process”. Another point made was to “include communication to employees regarding increased awareness, correct handling processes and policy adherence. It may simply be that employees performed as expected under the circumstances but there were insufficient internal control policies in place to guide their behavior. Lessons learned here will strengthen internal controls through the creation of new ones. “Since communication is such a large issue in embedded controls there shouldn’t be one person or system to have sole authority over all transactions without appropriate sign off processes and differing levels of management approval.” Draz emphasizes that “a lack of proper segregation of duty in company policies are most often the root cause of many fraud and theft events in companies without strong internal controls in this area.” Having more people overlooking activities thought out a business can help detect fraud more easily at the time of the act, which could’ve been used in the time of the Corley case when the DFAS system had total authorization.

Embedded Audit Modules may have prevented the fraud in this case by having alerts sent that notify users of violations being attempted to be processed in certain transactions. With these internal controls there might also have been a segregation of duties to ensure that no specific individual can control both the recording function and the procedures relative to processing the transaction. The DFAS system did both of these on its own without any other sources to overlook its processes. Besides using Embedded Audit Modules and other internal controls, another form of a detective control is Benford’s law.

### *B: Benford’s Law*

In 1938 Frank Benford analyzed the digit patterns of 20 data sets with a total of 20,229 records. His results showed that 30.6 percent of the numbers had a 1 as the first digit, 18.5 percent of the numbers had a 2 as the first digit, with the 9 being the first digit only 4.7 percent of the time. The first digit of a number is the leftmost digit and any minus sign or decimal point is ignored Zero is never a first digit and so the first digit of both 2,214 and 0.0025 are a 2. Benford then noticed the logarithmic

pattern in the actual digit frequencies, and derived the formulae for the expected frequencies of the digits in tabulated data. These are shown in Table 1. The expected proportions for the first, second, third, and fourth digits are shown in Table 1. From Table 1 it can be seen that as one moves from left to right, the expectation is that the digits tend towards being evenly.

Benford noted that his probability law was derived from “events” through the medium of their descriptive numbers and that it was not a law of numbers in themselves. In other words, the expected proportions are not a consequence of the number system itself.

Research papers have highlighted a number of data sets related to financial data that conformed to Benford’s Law. In 1996, Mark Nigrini had shown that the digit frequencies of the interest received amounts on 91,022 tax returns for 1985, and 78,640 tax returns for 1988, had a close conformity to Benford’s Law. The dollar amounts of 30,084 invoices approved for payment by a NYSE-listed oil company analyzed in 1997 (Nigrini and Mittermaier), and 36,515 invoices were approved for payments by a software company (analyzed in 2000 by Drake and Nigrini) that had also conformed to Benford’s Law. In 2005, Nigrini analyzed the revenue numbers from 4,792 quarterly earnings releases in 2001 and 4,196 quarterly earnings releases in 2002. The first digits of the revenue numbers conformed to Benford’s Law. However, the second digits showed a pattern (excess second digit 0s and a shortage of second digit 9s) that was consistent with rounding up of revenue numbers around psychological reference points (such as \$200 million). These papers (and other unpublished studies) show that as a general rule that financial data within and across companies conforms reasonably well to Benford’s Law (Nigrini, 1996).

Table 1: Benford's Law: Expected Digital Frequencies

Position in Number Digit	1st	2nd	3rd	4th
0		0.11968	0.10178	0.10018
1	0.30103	0.11389	0.10138	0.10014
2	0.17609	0.10882	0.10097	0.10010
3	0.12494	0.10433	0.10057	0.10006
4	0.09691	0.10031	.10018	0.10002
5	0.07918	0.09668	0.09979	0.09998
6	0.06695	0.09337	0.09940	0.09994
7	0.05799	0.09035	0.09902	0.09990
8	0.05115	0.08757	0.09864	0.09986
9	0.04576	0.08500	0.09827	0.09982

*The number 312 has three digits, with a 3 as the first digit, 1 as the second digit, and a 2 as the third digit. The table indicates that under Benford's Law the expected proportion of numbers with a first digit 3 is 0.12494 and the expected proportion of numbers with a third digit 2 is 0.10097 (Nigrini,1996).*

In Mark Nigrini’s article “I’ve Got Your Number,” he states “Benford’s Law is quite counterintuitive; people do not naturally assume that some digits occur more frequently.” This is seen in the Corley case when the Department of Defense didn’t check their statements; they could have used this method in order to detect a large amount of 9’s. Benford’s Law would have detected that an amount of this magnitude had never before been wired to that account number, as the test was designed to detect data errors (Nigrini,1999). This would have been a perfect method to be used around November of 2003 for detecting the beginning of this scheme.

“Benford’s analysis tests for fraudulent transactions based on whether digits appear in certain places in numbers in the expected proportion” (Durtschi,2004). This is first shown in the Corley case when there was a large cluster of transactions with shipping costs beginning with first-digit of four. Throughout the increase in transactions the proportions of the cost of the items and shipping costs

grew larger and larger, till the point where the proportion grew to a nineteen cent lock-washer was charged over nine hundred thousand dollars for shipping expenditures.

Benford's Law is a great detective method for fraud prevention with its straightforward use of detecting data anomalies. This method would have been a good choice in the Corley case by means of detecting a large repetition of number that go in opposition to the parameter distribution of Benford's Law. Using this quick method could have potentially saved the military millions of dollars that could have been used to supply our soldiers.

The case document states that "the bottom line is that Miss Corley made choices, nine years of choices, and today she must be held accountable for those choices." The opinion here is that if Benford's Law had been used it would've detected these nine years of anomalies from occurring. Alternatively, if the Department of Defense applied this approach, it might have lessened the severity of the charges in the end. The next section proposes another approach, based on preventive control.

### *C: Budgetary Controls*

A budget is defined as a formal written statement of management's plans for a specified future time period, expressed in financial terms. According to Wiley's Managerial Accounting book it is explained that a budget, "provides a basis for performance appraisal (variance analysis). A budget is basically a yardstick against which actual performance is measured and assessed. Control is provided by comparisons of actual results against the budget plan. Departures from the budget can then be investigated and the reasons for the differences can be divided into controllable and non-controllable factors" (Weygandt, 2011)

In an article about budgetary controls, the budget evaluation process was described as, "During the year the management accountant will prepare statements, as quickly as possible after each operating period, in our example, each quarter and setting out the actual operating costs against the budgeted costs. This statement will calculate the difference between the 'budgeted' and the 'actual' cost, which is called the 'variance'" (Carter, 1997).

The benefits of budgeting involve: planning ahead by formalizing goals on a recurring basis, creating definite objectives for evaluating performance at each level of responsibility, constructing the budget to act as an early warning system for potential problems before they get out of hand, using it to facilitate the coordination of activities within a business, build correlated goals of each segment of the company objectives which leads to an improvement in management awareness and to motivating personnel by applying a sense of achievement for acquired money saving goals. All these concerns represent points that could have been used during the time of the Corley case. The Department of Defense could have used a budget in order to achieve all these benefits. "The audit logic in this example is check for significant variances in the purchase price against the standard prices in a particular period" (Roger,2005). This check against variances and standard prices could've been seen if a budget had been established in the DFAS system which controlled shipping expenditures it would have been easier to notice the large variance beforehand, preventing any other transactions from occurring before someone would verify historical recordings in the budget.

A cash budget is a specific type of budget limiting cash for a certain goal. It is thought of as a cash plan for a defined period of time. It summarizes monthly receipts and payments. Hence, it highlights monthly surpluses and deficits of actual cash. Its main uses are: to maintain control over a firm's cash requirements, e.g. stock and debtors; to enable a firm to take precautionary measures and

arrange in advance for investment and loan facilities whenever cash surpluses or deficits arises; to show the feasibility of management's plans in cash terms; to illustrate the financial impact of changes in management policy, e.g. change of credit terms offered to customers” (Roger, 2005).

Creating a budget might have prevented this scheme from developing. A budget for shipping would most likely have exceeded allocations after the first few fraudulent transactions and would have been noticed within the first year of this case. Budgeting, as a method for corporations to track and control all different types of expenditures being used frequently all through business activities, may have positive implications on situations such as the Corley case.

### CLASS QUESTIONS

**Question 1:** What mistakes did the federal government make in the Corley case and what could they do in the future to ensure that this does not occur again?

**Question 2:** Do you think the penalties imposed on Charlene were sufficient, too strong or not sufficient enough? In your answer compare the penalties imposed in this case with other similar high profile cases, such as Bernie Madoff.

**Question 3:** What could the sisters have done to limit the chance of getting caught in their scheme?

**Question 4:** If you are an auditor and/or an investigator, what type of evidence would you want to gather to support your case against the sisters?

**Question 5:** Describe several “red flags” exhibited by the sisters which represent indicators of fraud behavior?

**Question 6:** Suppose that the authorities examined the following 10 invoices received from the sisters:

Number	Invoice Number
1	456
2	512
3	745
4	988
5	2,566
6	4,690
7	6,623
8	7,890
9	8,221
10	9,988

Using Benford’s Law, is there evidence of fraud from the examination of these invoices?

### CONCLUSION

In summary, the methods discussed above might have provided both preventive and proactive approaches to addressing fraudulent activities such as those present in the Corley case. Embedded Audit Modules may establish fraud, for tasks done on an everyday basis in a company, by indicating any abnormal variances. This is an easy way for auditors and managers of a company to identify any red flags raised in the system. Companies might require there to be segregation among all duties being made to ensure better reliability.

Benford's is another impressive method that is cost efficient as well as time efficient, that can be used whenever checking quarterly reports for any business. By knowing this theory, any business owner can check that their financial statements follow the ruled first-digit distribution. It is a great method because it tells a person what the proportion of the first-digit numbers in a random set of numbers should look like before even calculating them yourself, it gives us a predetermined view of a business's financial statement. Companies can use this and correlate it using the Chi-squared test or other tests to set a range of variance that the proportions in Benford's Law could exceed.

Companies might "maintain budgets and review them monthly, investigating all major variances." Companies can accomplish this by using budgeting/ software can help eliminate one of the causes of fraud which includes manipulation of spreadsheets. One option would be to use the exception reporting in the software known as Calxa, to highlight large variances and then investigate the causes of them (Calxa.com). Budgets are overall a great method and inexpensive for all businesses to use as a foundation for preventing fraud before the fact.

In the hearing Corley was told that "people will remember for years to come the woman from Lexington who got a million dollars for shipping a 19-cent washer." This is the main issue she will have to think about, as regret, for the rest of her life. This could have been prevented before it escalated to that point, where she charged almost a million dollars shipping. Embedded Audit Modules, Benford's Law and budgets could have all prevented the fraudulent activity of Charlene Corley from intensifying the sum.

In conclusion, each company might use at least one detective and preventive control in their business in order to have some underlying basis of fraud prevention. Corporations can determine what method might be best; either underlines embedded controls like the Embedded Audit Modules and Benford's Law or embedded controls with creating budgets. An emphasis on the role of audits can be established to speculate any variances in costs throughout all aspects; creating a foundation approximating how much is okay to be spent of all expenditures. These procedures can save corporations a substantial amount of money if used for establishing detective and preventive controls, comparatively to the costs associated with fraud. It had been noted, by Calxa (budget software producer), "Businesses who do not take preventative actions could be exposed to a greater risk" (Calxa.com). Businesses of any sort can get damaged for bountiful sums of money from schemes like the Corley case.

## RECOMMENDED ANSWERS TO QUESTIONS

**Question 1:** What mistakes did the federal government make in the Corley case, and what could they do in the future to ensure that this does not occur again?

**Solution 1:** The government had no internal controls in place to safeguard against fraud scenarios similar to this. Interestingly, this occurred for approximately one decade. There were no duties of authorizing the purchase order, and there was no review of the software program in place, the purchases, payments and recordkeeping with respect to their business dealings with the sisters. Further, if the government has an internal audit staff and/or external auditors, negligence could possibly have been charged against them. Although management is responsible for fraud prevention and detection, supporting teams including the internal audit team is responsible to recommend procedures to accomplish these goals, and the external auditors are responsible to assess, evaluate and test whether the entity has procedures in place which will prevent fraud.

Going forward, internal control procedures have to be instituted by this governmental entity which will be



adequate to prevent fraud. Further, these procedures need to be communicated to employees, tested to see that the controls are being followed, and reviewed to check the continued effectiveness of such controls. Lastly, proper segregation of duties of such control processes has to be instituted. Although fraud prevention is never full-proof, control procedures are the best defense, and legally required post Sarbanes-Oxley in many cases.

**Question 2:** Do you think the penalties imposed on Charlene were sufficient, too strong or not sufficient enough?

In your answer compare the penalties imposed in this case with other similar high profile cases, such as Bernie Madoff.

**Solution 2:** The penalties for fraud are really two-tiered in nature, and depend on the period of conviction. Prior to 2002(2001 and before), fraud penalties were lax and it was quite uncommon for jail sentence for the convicted defendant. Post Sarbanes-Oxley (2002 and later) sentences have been strict and in many cases excessive. Sarbanes-Oxley regulation has instituted new penalties to fraud participants resulting in greater, longer, and stiffer penalties. The following are examples of high profile fraud cases post 2002 and the imposed jail sentences:

- 1- Bernie Madoff—150 years for a Ponzi scheme that caused investors to lose billions of dollars.
- 2- Mr. Petters— 50 years for a Ponzi scheme that caused investors to lose 3.65 billions of dollars.
- 3- Richard A. Harkless— 100 years for a Ponzi scheme that caused investors to lose \$39 million.
- 4- Mark Drier— 20 years for defrauding hedge funds with phony investments that caused loses of \$400 million.
- 5- Sholem Weiss— 845 years his role of the closure of a life insurance company that caused loses to over 25,000 policyholders.

Given that the conviction of Charlene occurred post 2002, which cost the government over 20 million dollars in losses over a ten-year period, a 6-year sentence does not seem sufficient for this case.

**Question 3:** What could the sisters have done to limit the chance of getting caught in their scheme?

**Solution 3:** The sisters could have done a number of things to limit their chances of getting caught. First, they could have stopped this behavior “while they were ahead”, and possibly get away with their fraudulent acts. Second, they could have closed their existing corporation on a yearly basis, and open and operate a new entity every year. Lastly, they made the mistake of submitting two invoices for the same transaction—which eventually ended their fraudulent schemer; a careful approach to their billing practices could possibly have continued their scheme. Note that an audit by the government at any point in time would probably have caught this scheme.

**Question 4:** If you are an auditor and/or an investigator, what type of evidence would you want to gather to support your case against the sisters?

**Solution 4:** As an investigator, the key to this case against the sisters would be: (1) to prove that they committed fraud, (2) repossess all of their assets, and (3) evaluate the possibility of other criminal acts the sisters may have committed.

Fraud is an intentional act and not accidental. Establishing this intention (i.e. fraud) is the key. As such, one would gather the following evidence:

1. To prove fraud (i.e. intention)
  - A- Their pattern was not a one-time event, and was committed over a period of 9 years. This establishes intentional and non-accidental behavior.
  - B- The invoices billed to the government.
  - C- The checks paid by the government; which will include the bank statements showing all deposits made by the sisters.
  - D- The admittance that Charlene wanted to return \$4.5 million upon getting caught—depicts intention to defraud.
  
2. To repossess assets owned by the sisters:
  - E- A listing of all the assets the sisters owned so they can be repossessed by the government.
  
3. Evaluation of the possibility of other crimes committedly the sisters.
  - F- Finally, a review on the possibility of other criminal acts being committed. As an example, did they declare this income and pay the associated tax? If not, tax evasion charges can follow.

**Question 5:** Describe several “red flags” exhibited by the sisters which represent indicators of fraud behavior?

**Solution 5:** Research and practice has shown that fraud committers exhibit a form of behavior, known as “red flags”. These red flags are often used to identify fraud. Some red flag indicators exhibited in this case are: a change in lifestyle for the better, which is often exaggerated from the previous life style. As an example, the sisters bought Mercedes, fancy, super expensive residential and summer homes, purchased business franchises, and exhibited other related forms of exorbitant changes. These red flag behaviors often associate one with fraudulent/theft commitment.

**Question 6:** Suppose that the authorities examined the following 10 invoices received from the sisters:

Number	Invoice Number
1	456
2	512
3	745
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Using Benford’s Law, is there evidence of fraud from the examination of these invoices?

**Solution 6:** The examination of the 10 invoices applying Benford’s law, clearly leads to a high probability of fraud. Benford’s law establishes a first integer as 1, in approximately 30% of the cases/time. In these 10 invoices, none begins with the number 1. We would expect that 3 of the invoices would begin with 1; which is clearly materially different from 0. As such, Belford’s law would indicate a high probability of fraud occurrence from the above 10 presented invoices.

Note that this should be the first step of the investigation of the possibility of fraud occurrence, as it is quite possible that a low number of integers beginning with the number 1 does not result in fraud; whereas an expected incidence of integers beginning with number 1 can result in a fraudulent scheme. As such, this test should be performed as an analytical review procedure-ARP- (ratio type analysis to see whether material deviations occur from the expected output), and followed up with more relevant and reliable evidence, if, and when needed. This type of testing is efficient in that it entails a simple mathematical calculation, and as such, is highly recommended as a testing platform in the examination of fraud.

## REFERENCES

Benford, F. (1938). "The law of anomalous numbers". *Proceedings of the American Philosophical Society*, Vol.1(78), p.551-572.

Carter, S., Macdonald, N.J., and Cheng, D.C.B. (1997). "Basic finance for marketers: Chapter 4 - Budgetary control". N.p.: FAO Corporate Document Repository, ISBN 92-851-1002-9, at: <http://www.fao.org/docrep/w4343e/w4343e05.htm>.

Drake, P.D., & Nigrini, M.J. (2000). "Computer assisted analytical procedures using Benford's Law". *Journal of Accounting Education*, Vol.1(18), p.127-146.

Draz, D. (2011). "Fraud prevention: Improving internal controls Internal fraud controls aren't fire-and-forget. Smart collaboration and ongoing improvement will help keep fraud in check. Here are the basics". N.p.: CSO, at: <http://www.csoonline.com/article/678375/fraud-prevention-improving-internal-controls->

"Double-entry bookkeeping". *Wikipedia*. At: <http://en.wikipedia.org/wiki/Accountancy>.

Durtschi, C., Hillison, W. and Pacini, C. (2004). "The Effective Use of Benford's Law to Assist in Detecting Fraud in Accounting Data". N.p.: *Edwards, Inc.*, Edition:1524-5586<sup>th</sup>, Vol. V.

Kneer, D. "ERP Controls Optimiz Ation For Fraud Prevention And Continuous Controls Monitoring ( Embedded Process - Level Controls In Sa P, Oracle, And Peoplesoft Etc.)". at: <http://www.dankneer.com/ContinuousControlMonitoringWrite-up.pdf#page=1&zoom=auto,0,308>.

Kuhn, J. & Sutton, S. (2010). "Continuous Auditing in ERP System Environments: The Current State and Future Directions". *Journal of Information systems* Vol.24(1), p. 91-112  
at: <http://www.acc.ncku.edu.tw/chinese/faculty/shulc/courses/cas/articles/continuous-auditing.pdf>

Lee, G (1997) *Accounting Historians Journal*. Vol. 4. N.p.: University of Mississippi Library. Accounting Collection, at: <http://umiss.lib.olemiss.edu:82/record=b1000778>.

Morey, C.P. (2010). "Accounting errors, fraud are common problems for small businesses". (July) at: <http://www.accountingweb.com/topic/accounting-auditing/accounting-errors-fraud-are-common-problems-small-businesses>

Ness, K (2009). "Integrating fraud detection and prevention into a GRC framework". N.p.: ORACLE: Financial Services.

Nigrini, M. J. (1996). A taxpayer compliance application of Benford's Law. *The Journal of the American Taxation Association*, Vol. 1(18), p. 72-91.

- Nigrini, M.J. (2005). An assessment of the change in the incidence of earnings management around the Enron-Andersen episode, *Review of Accounting & Finance*, Vol.4(1), p. 92-110.
- Nigrini, M. J & Mittermaier, L. J. (1997). “The use of Benford’s Law as an aid in analytical procedures”. *Auditing: A Journal of Practice and Theory*, Vol.2(16), p.52-67.
- Nigrini, M.J. (1999). “I’ve Got Your Number : How a mathematical phenomenon can help CPAs uncover fraud and other irregularities”. N.p.: *Journal Of Accountancy*.  
At:<http://www.journalofaccountancy.com/issues/1999/may/nigrini>.
- Nigrini, M.J. (1996). “A taxpayer compliance application of Benford’s Law”. *The Journal of the American Taxation Association*, Edition:18<sup>th</sup>, p.72-91
- Powell, J. (1995). “William Penn, America's First Great Champion for Liberty and Peace”. N.p.: *The Freeman*, (October), p.660-664 at: <http://www.unz.org/Pub/Freeman-1995oct-00660>
- Roger S. Debreceeny, Glen L. Gray, Joeson Jun-Jin Ng, Kevin Siow-Ping Lee, and Woon-Foong Yau (2005). "Embedded Audit Modules in Enterprise Resource Planning Systems: Implementation and Functionality." *Journal of Information Systems*, Vol.19(2), p. 7-27. At <http://aaapubs.org/doi/abs/10.2308/jis.2005.19.2.7>
- Simon, G. (2011). “Managing the Risk of Fraud and Error”. N.p.: *FSN Publishing Limited*. at: <http://www.oracle.com/us/solutions/corporate-governance/managing-risk-fraud-error-351078.pdf>
- Turner, L. & Owhoso, V. (2009). "Use ERP Internal Control Exception Reports to Monitor and Improve Controls". *Management Accounting Quarterly*, Vol.10(3), p.41-50  
at:<http://search.proquest.com/docview/222802758?accountid=12917>.
- Weygandt, J., Kimmel, P. and Kieso, D. (2011). “Managerial Accounting: Tools for business decision making”. Edition:6<sup>th</sup>. N.p.: *WILEY*, ISBN: 1118096894
- United States v. Charlene Corley, United states District Court: District of South Carolina. 3:07-929.

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