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An Investigation into the Efficacy of Nonprofit Organizations

Roshan Amble

BASIS Independent Silicon Valley, San Jose, USA
Email: roshanamble0@gmail.com

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Abstract

Many nonprofit organizations allocate their funds inefficiently. Inefficient spending within a nonprofit organization diminishes its ability to positively influence communities and causes. Prominent online platforms like Charity Navigator, Charity Watch, and GuideStar exist to vet the transparency, reliability, and efficacy of nonprofits around the world. Other nonprofit researchers have also attempted to combine and compare multiple databases, typically consisting of 990 forms and auditing reports, to evaluate the accuracy of documentation and probabilities of fraud. I built a custom database using all publicly available 990 forms available from the U.S. Internal Revenue Service, sorted nonprofits on each scraped metric, and created correlation matrix plots to establish cases of inefficiency through composite metrics. These metrics were augmented to find general relations that could form a set of financial protocols which will increase efficiency. I then used common economic principles to deduce correlations across 40 variables. The inefficiencies prevalent in the nonprofit industry are induced by certain economic principles that pertain specifically to the nonprofit industry. When these metrics are evaluated in correlation with each other, specific cases and possible solutions to the inefficiencies faced by thousands of nonprofits emerge and can be further analyzed.

Keywords

Nonprofit Efficiency, Nonprofit Management, 990 Form, Financial Correlations

1. Introduction

The nonprofit industry adds over a trillion dollars to the U.S. GDP (NonProfit Times, 2022). Understanding how these funds are being allocated is therefore an important dimension of understanding the U.S. economy. To establish the au-

thenticity of nonprofits, companies have created platforms that assess a nonprofit's efficiency in accomplishing its goals through a variety of metrics. These metrics are sourced from public data and augmented with raw data from data partners and directly from institutions (Charity Navigator, n.d.). This data is then cross-referenced with other databases to find cases of inefficiency. These findings lead to ratings made available to donors to evaluate different nonprofit organizations against one another. The ratings listed on these sites are generally reliable but lack the certainty that could be present with raw transactional data. This is evident in cases such as the Clinton Foundation scandal in 2016, wherein Charity Watch failed to recognize massive unreported foreign contributions to the foundation. The Clinton Foundation was rated higher than the esteemed American Red Cross during the fraudulent activities of the Clinton Foundation (LaCapria, 2016).

Analyzing nonprofit IRS submissions to detect fraud and inefficiency has the potential to eliminate inefficiencies and aid nonprofits in sustaining healthy contributions and effective spending on useful, helpful causes. This outcome favors earnest donors and underserved beneficiaries alike and is the primary motivation behind the research presented in this paper.

The research identified in this paper aims to answer two questions: 1) What patterns and trends can be found from analyzing spending and revenue data from US-based nonprofits from their Form 990 EZ submissions to the Internal Revenue Service (IRS) and 2) How can findings from this analysis aid nonprofits in their financial and institutional goals? Inefficiencies in this context refer to unnecessary spending by nonprofits, which could be reduced without purchasing new products or services or resorting to financially unstable spending methods. By addressing these inefficiencies, nonprofits can operate more effectively and significantly improve their chances of achieving their goals. Identifying these correlations can provide individual nonprofits with a fresh perspective on financial analysis, enabling them to make strategic changes, such as reallocating funds between marketing strategies, selecting suppliers that boost profit margins, or adjusting spending in specific expense categories. Enhancing efficiency in this manner will benefit communities globally, as it equips local nonprofits with a comprehensive understanding of how to manage their finances.

The rest of the paper is formatted as follows. First, an overview of the applicable research to the studies conducted in the paper. Next, a description of the methodology used to extract the data required for analysis. Next, the results include descriptive correlations and deductions involving real-world applications for trends. Finally, the discussion introduces further applications of the data involving fraudulence detection, the paper's shortcomings, and a future approach to enable further discoveries in the nonprofit efficacy genre of academia.

2. Literature Review

Communities around the world rely on local and global nonprofits for support

and aid, and as such nonprofit managers often are forced into decisions with the lives of people in the balance. Managing nonprofits is no easy task, and if it is possible to aid nonprofit management with statistical or qualitative probabilities towards success, researchers must understand optimal action plans that will allow for the impact of a nonprofit to be felt by society. We will briefly discuss the effectiveness of 990 form data, the data used in this analysis, and current nonprofit management strategies that are suggested by quantitative results and qualitative strategies.

2.1. 990 form Integrity and Application

An investigation into the authenticity of the data present in IRS 990 Forms showed that, while 990 Form data is generally reliable, the data does often show inconsistencies and errors regarding the varied interpretation of the meanings of categories amongst other factors (Gordon et al., 2007). This article shows the flaws in the form regarding the IRS assuming that nonprofit managers are knowledgeable on the topic of financial metrics and are accustomed to filling our complicated forms that force nonprofits to segment their revenues and expenses with vague boundaries. The author urges the IRS to make educative efforts toward nonprofit managers, as significant amounts of data are being misreported for no better reason than an innocent lack of understanding to follow the 990 Form guidelines.

When examining the differences between the data derived from auditing and the data reported in 990 forms, researchers found that the data in 990 forms are generally more useful than that of auditing data as auditing data can often be too intricate for analysis, but more than anything there are significant discrepancies between 990 form data and audit data (Fischer et al., 2002). The author attributes the causes of these discrepancies to differences in accounting practices, variations in the required information, and the lack of a standard framework among both financial reporting systems. The article highlights the need for increased transparency and standardization in nonprofit financial reporting and suggests that a more unified reporting framework could help to address some of these issues.

2.2. Nonprofit Management Strategies

The topic of quantitative analysis for assisted nonprofit management involves numerous statistical modeling such as regression analysis, data envelope analysis, and multilevel modeling (Bielefeld, 2006). The purpose of quantitative analysis in nonprofit management is to corroborate any correlations involving commonly detrimental or beneficial practices with statistical significance and generalization. With these common statistical analysis techniques, researchers can gauge the best practices of nonprofits across industries and advise nonprofits in the ways prescribed by holistic data. Bielefeld emphasizes the importance of using statistical data to improve the effectiveness of nonprofits, as long as the data

is of quality and that the data analysis methods are used to ensure the reliability of results.

The qualitative strategies used by nonprofits to better their chances of success involve the utilization of strategic planning, which is an umbrella term that signifies developing a clear vision regarding objectives that fall in line with the institutional mission, and to set strategic goals that will pave the path for growth and success (Mulhare, 1999). Mulhare suggests the importance of short-term planning over long-term goals, suggesting that the former will lead to the success required to establish long-term stability and growth. The author also emphasizes the limitations of strategic planning, which speaks to the necessity of a clear understanding of the nonprofit's culture and values. The author used various real-world examples to corroborate her statements, including organizations such as the National Society of Fund Raising Executives and events such as the formation of the Commission on Private Philanthropy.

3. Method

The data used in this project came from IRS Form 990 submissions, available to the public on the IRS website *IRS* 990 *XML*. We downloaded over 2 million individual Form 990 XML files to an Amazon Web Services S3 bucket. After assembling a representative sample of Form 990 files, we moved to the data-scraping portion of the algorithm to associate data values with financial categories. To accomplish this, we collected every data tag standard among 990 EZ, 990 Standard, and 990 PF forms, each with a different set of common category tags. For the purposes of this paper, *solely* 990 *EZ forms were used to display correlations and interpretations*, as these forms deal with the fewest number of financial variables and are easier to interpret.

To identify these tags, we created a HashMap in which each key represented a new tag found on a specific category's 990 form, and the value indicated the frequency of that tag on 990 forms. We considered these tags to be representative and comprehensive when they were associated with over 50% of the 990 forms in a category. After compiling an array of tags that could effectively analyze a certain category of nonprofits, we initiated the scraping process. This process involved a script that sifted through all stored 990 forms, categorizing them into standard, EZ, and PF, while looking for the corresponding tags. Each 990 form was easily searchable since the first non-space character marked the beginning of the tag, which ended with the first numeric value related to the tag. By processing each line input as a string, trimming that string, and then searching for the syntax stored in the array, we could find the data value we sought. After obtaining data from every common tag of each 990 XML file provided by the IRS, we generated a CSV file containing this data, with the first line serving as the header for the respective categories.

Once finished, we used a Python Pandas data frame and read the CSV into the data frame. We began by grouping the nonprofits by EIN, which allowed us to

analyze the percentage changes in data points we inspect and enabled us to understand trends within the same nonprofit over time. We then created scatter plots using Matplotlib to visualize correlations. Then we plotted one variable on one axis, and any other variable on another axis, and observed whether the plots were simply random or were correlated. Upon finding cases where variables were correlated, we spent additional time researching the definitions and context of these variables. We also introduced composite metrics (e.g., ratios between relevant variables). This process allowed us to examine more than just direct correlations and understand how changes in one financial category may have altered the finances of the entire institution.

We positioned our correlation hypothesis within a correlation matrix plot, which was crucial for efficiently uncovering unexpected correlations. By examining the meanings behind each matrix plot, we were able to select graphs that appeared most indicative of inefficiency in a particular format. After repeating this process for hundreds of correlations, our data represented ways to enhance efficiency, enabling significant cost reduction and overall improvement in the nonprofit sector. Once we achieved these goals, these computations were incorporated into the coefficients of an algorithm designed to assess efficiency. These coefficients were then checked against specific real-world examples for accuracy.

We employed several composite metrics to simplify the understanding of financial trends. The metrics, along with their mathematical formulas, are provided on the next page. Each variable was thoroughly explained and implemented during the presentation of research results.

$$\text{Salary Expenses Ratio} = \frac{\text{Salaries \& Employment Benefits}}{\text{Salaries} + \text{Printing Costs} + \text{Fees} + \text{Rent} + \text{Other Expenses}} \tag{1}$$

$$\begin{aligned} \text{Net Profit}\left(\text{Expense } X\right) &= \sum_{i=1}^{n}\left(\text{Revenue}\left(X\right)\right)_i - \text{Value}\left(X\right) \\ &= \sum_{i=1}^{n}\left(\text{Compound Costs}\left(X\right)\right)_i \end{aligned} \tag{2}$$

$$\begin{aligned} &\text{Excess}\left(\text{Category } X\right) \\ &= \text{Associated Revenue}\left(X\right) - \text{Associated Costs}\left(X\right) \end{aligned} \tag{3}$$

For a scatter plot with n points:

$$\text{Representative Point}\left(x, y\right) = \left(\frac{\sum_{i=1}^{n} x_i}{n}, \frac{\sum_{i=1}^{n} y_i}{n}\right) \tag{4}$$

4. Results

All graphs presented in this section were created by the author using Matplotlib, a Python library for data visualization, to analyze the data obtained from IRS 990 EZ forms.

All graphs have a color scheme such that the more *blue* a point is, the *lower* the ratio from the y variable to the x variable, and the more *red* a point is, the *higher* the ratio from the y variable to the x variable (magenta represents the points between extremes). Color is not an indication of inefficiency or any other descriptive indicator. The *black line* on each of the graphs is the line of best fit or the *regression line*, which serves as a representation of the trend across all points. The 1e followed by a digit seen on many of the graphs to the top left or bottom right indicates that the scale of the graph is 10 to the power of the following digit ($1\text{eX} = 1 \times 10^{X}$). A 990 EZ form is a tax form used by nonprofits that have a total revenue of under USD 200,000 and a total asset base of under USD 500,000 (Internal Revenue Service, 1970).

Inefficiency, for the purpose of this paper, refers to an organization's excess spending in ways that will not increase future revenue or generate meaningful impact toward its stated causes. We, therefore, define *overspending* as spending more than what is financially sustainable.

The correlations involving spending and revenue categories are classified into 12 groupings, and the statistical data for each of these categories including the mean, standard deviation boundaries, minimum value, maximum value, and total number of data points analyzed can be seen in **Table 1**.

Table 1. Shows statistical data for each spending and revenue category in our analysis. All dollar values are in USD.

Category	Mean	Standard Deviation	Minimum Value	Maximum Value	Number of Data Points
Gross Receipts	$74,968	$51,352	$0	$199,999	668,108
Program Service Revenue	$35,774	$42,347	$0	$199,999	333,806
Contributions Revenue	$39,082	$44,135	$0	$199,999	530,463
Investment Income	$1406	$6213	$0	$197,607	366,363
Sale of Asset Gross	$9626	$24,298	$0	$199,900	61,252
Fundraising Gross Income	$35,396	$34,499	$0	$199,687	162,073
Gross Sales of Inventory	$16,271	$29,403	$0	$199,918	100,117
Other Expenses	$64,949	$77,826	$0	$20,837,521	667,826
Total Salaries	$32,323	$37,791	$0	$4,093,103	212,234
Special Event Expenses	$10,303	$19,266	$0	$458,416	380,695
Cost of Goods Sold	$3207	$11,367	$0	$309,312	302,464
Sum of Liabilities	$22,134	$912,379	$0	$482,478,241	407,470

There are eight primary spending categories for nonprofits to include in their 990-form report consisting of Salaries & Employment Benefits (S), Cost of Goods Sold (C), Fees & Payments (F), Rent & Maintenance (R), Printing Fees (P), Other Expenses (O), Grants & Amounts Paid (G), and Membership Dues (not used). To assist with two variable correlations used to derive conclusions about spending categories and their respective efficiencies, we have created an eight-dimensional regression model with the output variable being Gross Receipts to analyze the magnitude of revenue translation for each spending category. The regression equation is shown below. The results of this regression are shown in Table 2.

As seen with many of the scatter plots throughout the paper, the data observed between two financial variables are rarely linear, and a linear regression would be inappropriate in many cases. To harness the results above, we filtered for outliers that damage the linearity of correlations, specifically by eliminating nonprofits that were spending more than 3 times what they were earning, nonprofits that were earning more than 10 times their total expenditures, and nonprofits that were further than two standard deviations away from the mean in any independent variable financial category.

Table 2. OLS Regression summary table describing correlations between spending methods and gross receipts.

Dep. Variable:	Gross Receipts	R-squared:	0.612
Model:	OLS	Adj. R-squared:	0.612
Method:	Least Squares	F-statistic	6529
No. Observations:	33,087	Log-Likelihood:	−380130
Df Residuals:	33,078	AIC:	760,300
Df Model:	8	BIC:	760,400
Covariance Type:	nonrobust		

	coef	std err	t	P > |t|	[0.025	0.975]
Constant	18,980	307.549	61.724	0.000	18,400	19,600
Salaries & Employment Benefits	0.1198	0.023	5.100	0.000	0.074	0.166
Cost of Goods Sold	0.6062	0.009	64.511	0.000	0.588	0.625
Fees & Payments	0.0980	0.027	3.564	0.000	0.044	0.152
Rent & Maintenance	0.1284	0.024	5.390	0.000	0.082	0.175
Printing Fees	0.1723	0.021	8.373	0.000	0.132	0.213
Other Expenses	0.9590	0.021	46.521	0.000	0.918	1.000
Grants & Amounts Paid	0.2474	0.023	10.941	0.000	0.203	0.292
Membership Dues	−0.0104	0.009	−1.102	0.270	−0.029	0.008

In the regression summary, we can see that all spending categories except for membership dues have a significant correlation with Gross Receipts, as their P > |t| values are all less than 0.05. As such, we will be ignoring membership dues in our analysis of spending categories. The model explains 61.2% of the variation in Gross Receipts, which is sufficient for our analysis given the variability of human-derived data.

From observing the coefficients of each variable in the regression summary, we find that the highest coefficients of spending categories that translate to revenue are seen in the variables Other Expenses and Cost of Goods Sold. Conversely, the forms of expenditures that have the lowest regression coefficient are Salaries & Employment benefits and Fees & Payments. We will be delving into the specific analysis of pertinent spending categories and derive specific findings for each one using the premise of the regression table and other data techniques.

4.1. Salary Overspending

Let's begin by assessing intuitive correlations that might be indicative of inefficiency in an institution. To establish inefficiency, we must find the limiting factors that promote financial hardship for specific avenues of nonprofit expenses. One trend with implications towards inefficiency is *overspending on salaries* in small nonprofits. This concept is introduced with the graph of the total amount a nonprofit has expended on employee salaries and benefits versus its gross receipts, or the total value of revenue that the nonprofit received for a fiscal year, as shown in Figure 1.

When typically observing a spending-to-revenue correlation, the average amount expended increases with more revenue, but in this case, the increase in salary across percent changes in gross receipts is marginal at best. A trend in

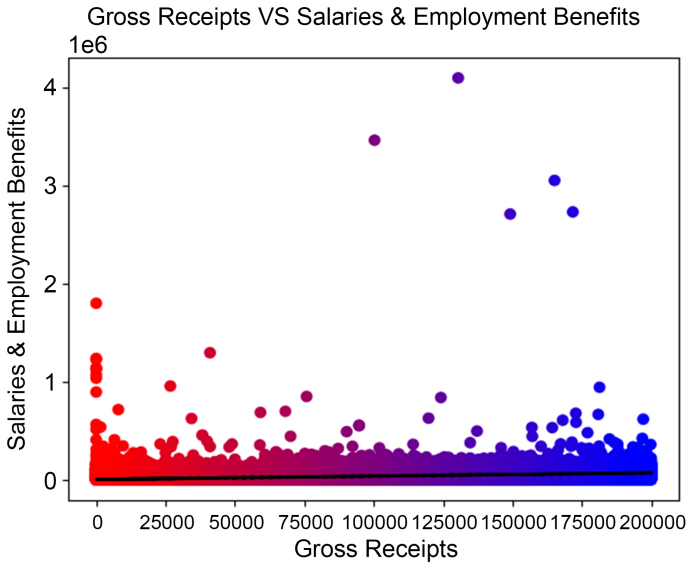

Figure 1. Scatter plot of gross receipts and total salaries displaying no significant correlation.

spending that isn't popularized amongst smaller nonprofits could be worth investigating for inefficiency. There are numerous cases where nonprofits can afford to disburse large sums of funds for salaries due to a method of long-term financial stability, whether it is corporate backing or a guarantee of future revenue. The resulting findings may not apply to every nonprofit that we investigate, but it will be a generalized approach to observing inefficiency and enhancing efficiency.

There are two new definitions for the simplicity of the reasoning used to derive our inefficiencies. The first is a *simple cost*, which is a general financial expense for a nonprofit that doesn't directly lead to other expenses that are necessarily incurred to sustain the purpose of the initial expense. The second is a *compound cost*, which is a cost that does directly lead to other expenses being incurred, typically to support the interests of the initial expense. Salaries function as a compound cost, which can be extremely taxing for nonprofits, as they attempt to disburse their funds in a method where one cost leads to another, eventually amounting to an unaffordable amount. The compound aspect of salaries is revealed in the financial reporting variable of other expenses, which consists of traveling fees, fines, depreciation, and most importantly, customer acquisition and marketing costs, as Figure 2 shows.

Unlike the gross receipts to salaries scatter plot we saw earlier; this plot reveals a strong correlation between salaries and other expenses. Upon this discovery, the rationale for this correlation is also logical. If a salary increase is synonymous with the employment of more people, then other costs will also increase. Salary expenses in nonprofits typically *generate two sources of revenue*. The first is *program service revenue*, the revenue generated from a specific service provided by the nonprofit. This service might include the revenue from medical fees for

Figure 2. Scatter plot of other expenses and total salaries displaying a significant positive correlation.

medical services. The second is *contributions and grants revenue*, the revenue generated from donations. There are no other revenue sources that correlate positively with increased salaries. These streams need significant customer bases to operate and, therefore, correlate with marketing expenses, which require an effective and expensive marketing campaign. It doesn't matter whether a customer base is gained before or after the hiring of a new employee, the nonprofit has still invested in marketing to ascertain that customer base. The correlation between salaries and these streams of derived revenue are shown in Figure 3 and Figure 4 (see appendix for additional revenue graphs).

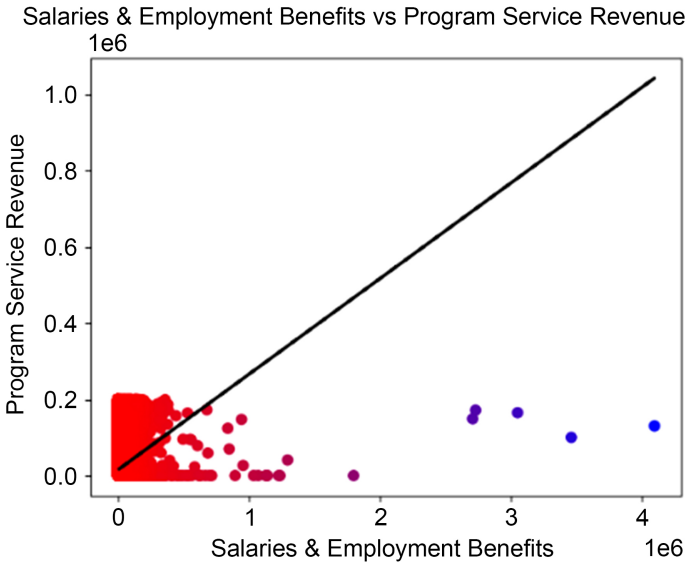

Figure 3. Scatter plot of total salaries and program service revenue displaying a positive correlation.

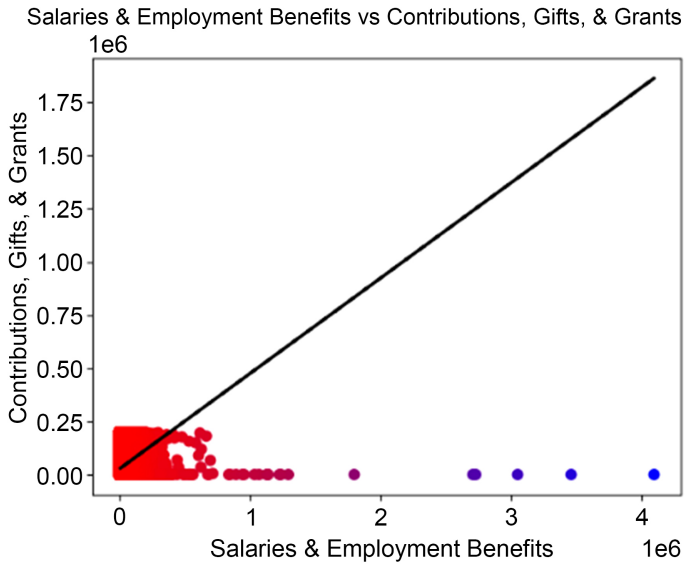

Figure 4. Scatter plot of total salaries and contribution revenue displaying a positive correlation.

Observing these relationships, we find that the revenue sources being drawn from salary-based endeavors require difficult-to-receive publicity and customer bases with high marketing costs. We can infer that marketing costs consist of a major portion of expenses since both revenue streams listed require nonprofits to attract donors and customers. Marketing costs are typically in the tens of thousands for most salary-based nonprofits, but a nonprofit can often avoid these costs when diversifying its interests into research or other non-customer-reliant revenue streams (Langner, 2022). It could be assumed that financial stability stems from low amounts of debt, sufficient profits from revenue streams, and a growing diversification in assets. However, if a nonprofit relies on the revenue generated from salaries, they are compromising these traits essential for financial prosperity. From this point, we define the ratio of *Salary Expenses* as the ratio between salary costs and salary pertinent expenses, which considers printing costs, other fees, renting and real estate, and the other expenses category as seen in Equation (1). We investigate the trend in finances when observing the correlation between the salary-to-expenses ratio and *investment income*, which is the income derived from any dividends, investment appreciation, or rent, where we see a strong negative correlation, as shown in Figure 5.

To summarize our view on the lack of financial stability instilled by overspending on salaries, we also conclude that spending on salaries forces nonprofits into *further debts* in the form of loans. With the burdening expenses already incurred, nonprofits must search for ways to finance the progress of their charity past its smaller stages, and the location of these funds lies in loans. This relationship is proven by the graph of limited liabilities and total salaries, as seen in Figure 6.

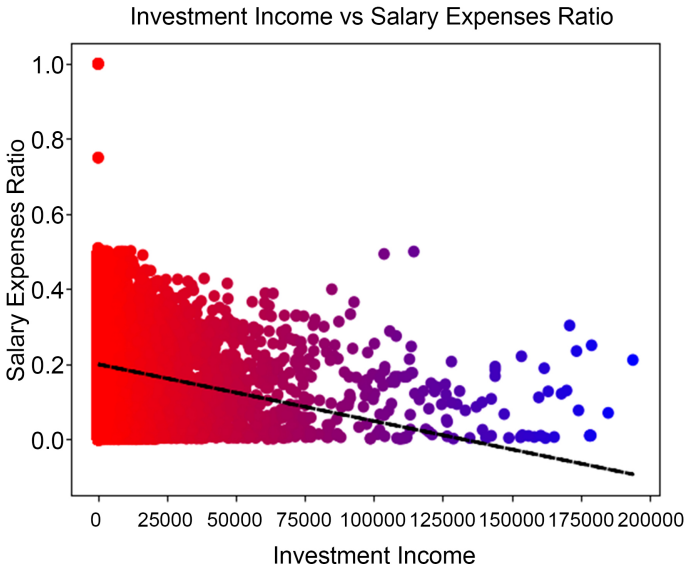

Figure 5. Scatter plot of investment income and total salaries showing a lack of ability to elicit investment Income the more that a nonprofit spends on salaries as a ratio of their salary pertinent expenses.

At this point, we have found that salaries create a burden of additional costs and often require loans to finance operations. These effects have shown to be detrimental since *salary-based revenue operations resulted in deficits most of the time*, and the lack of revenues generally leads to financial distress. This may seem intuitive as salaries are typically the most taxing cost per unit of expense for small nonprofits, and the largest gamble on sufficient revenue. We can display the correlation between increased spending on salaries and nonprofit deficit or surplus as seen in Figure 7 (calculated with Equation (3)).

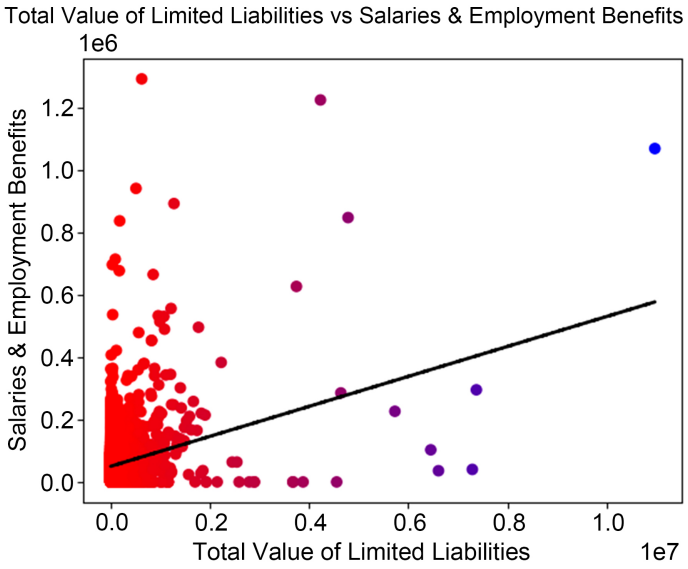

Figure 6. Scatter plot of total value of liabilities and total salaries signifying that loans are often needed in financing salary-based operations.

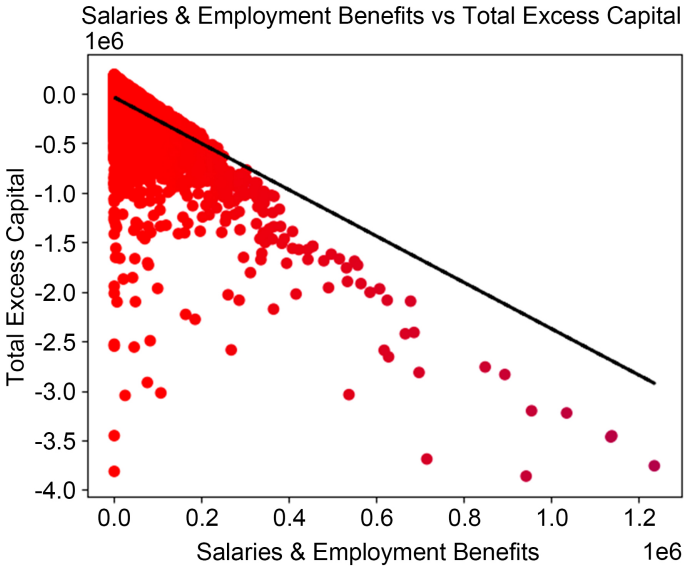

Figure 7. Scatter plot of total salaries and excess capital showing a strong negative correlation.

Salary spending often jeopardizes the financial security of a nonprofit. The *representative point* (calculated with Equation (4)) on this graph is USD 32214.42 spent on salaries with USD −111132.93 in total excess capital, signifying that nonprofit losses of over three times the salary spent are considered standard. Overall, efficiency is prominent among nonprofits that have a surplus on their balance sheet regardless of the classification of their expenses. However, surplus funds aren't what makes them efficient, as efficient nonprofits use this surplus to purchase interest-bearing assets for the company's future. These assets can provide them with funds upon liquidation during financially stressful times. This has proven to be the case in thousands of efficient nonprofits.

One example is a prominent educational facility for children in Montevallo, Alabama. Their major financial metrics (in USD) in 2020 were as follows: Gross receipts: 174,835, Gift Grants: 169,058, Service Revenue: 5777, Salaries: 88,829, Total Expenses: 129,210, Excess: 45,625, Asset BOY: 97,082, Asset EOY: 142,707, Liabilities BOY-EOY: 6036 to 19,772, Cash Savings and Investment: 160,512. In this company, we see *the exact amount of excess being invested into assets*, with the assets beginning to end of years increasing by the exact amount that was reported as excess. Although an educational institution requires numerous employees to function properly, they were able to keep a salary expense ratio that is modest in proportion to their gross receipts. By generating a positive net profit, they were able to leverage basic economic principles and purchase interest-bearing assets. From this efficient beginning, the institution is now very well situated and actively achieving its purpose.

Inevitably, spending significant funds on salaries impedes an organization's ability to thrive from the passive revenue off assets, which is shown in the graph of total salaries and the sale of assets, as seen in Figure 8.

Figure 8. Scatter plot of total salaries and excess capital showing anegative correlation.

To summarize, we first found that salaries serve as a compound cost, creating costs alongside salary expenses. We then saw a strong, positive correlation between salaries and customer-requiring revenue streams, but the opposite for other forms of revenue like the sale of assets and investment income. Next, we explored the debt incurred through overspending on salaries, which showed a strong correlation as institutions required large loans to finance salary-dependent operations. Finally, from additional investigations into financial deficits and revenue correlations, we deduced that spending heavily on salaries will likely jeopardize small-sized nonprofits in their financial security far more than aiding them.

These findings indicate that nonprofits overspending on salaries should find creative ways to accomplish their work without increasing their payrolls. This could mean contracting workers for specific time frames instead of employing them year-round, downsizing momentarily while the institution regains its financial credibility, or relying on community volunteers. Once adjusted, they could reinvest any excess revenue into assets that support the pertinent cause, such as real estate. (This of course is a general plan as we aren't examining a specific approach to addressing inefficiencies in the paper, but the overall strategy remains as mentioned.)

4.2. Event Overspending

The next example of inefficiency was made clearer with a deeper understanding of the underlying variables in the 990 EZ form. The most intriguing variable in the form may be *special events spending*. These events are generally designed to help a nonprofit raise funds for its cause while creating an exhibit to attract donors. However, these exhibitions aren't always successful, and with the limited ability of smaller nonprofits to set up at attractive venues, it becomes essential to evaluate the pros and cons of vast amounts of special event spending for nonprofits and reveal whether it is a form of spending that a smaller nonprofit should generally invest in. To show the general display of special event spending as a function of gross receipts, we see **Figure 9**.

When examining the income produced from special event expenditures, we aim to identify the related revenues connected to the various spending categories. Many broad categories of expenses, such as advertising, rent, salaries, and printing fees, will result in multiple sources of revenue being generated as these payments fall into a broader necessity for expansion. In the case of smaller nonprofits, special events spending does not positively correlate with any sources of revenue apart from *fundraising income* as shown in **Figure 10** (see appendix for additional revenue graphs).

Of course, the relationship between fundraising income and special event spending was expected, but what we hadn't anticipated is that special event spending will most likely not result in revenue generated in any other category of revenue. Fundraising income isn't a form of income that fills a capacity pre-

venting other revenue sources from becoming significant the way that others do, and thus it isn't the implementation of fundraising income as a revenue source that poses inefficiency. It is that nonprofits must rely solely on this revenue source for financial survival while young. There wouldn't be an issue so long as this system of spending on special events would result in a positive profit margin for nonprofits the more that they spent on special event spending. Unfortunately, this isn't the case, and to show the deficit that most special event-dependent nonprofits face, we see Figure 11.

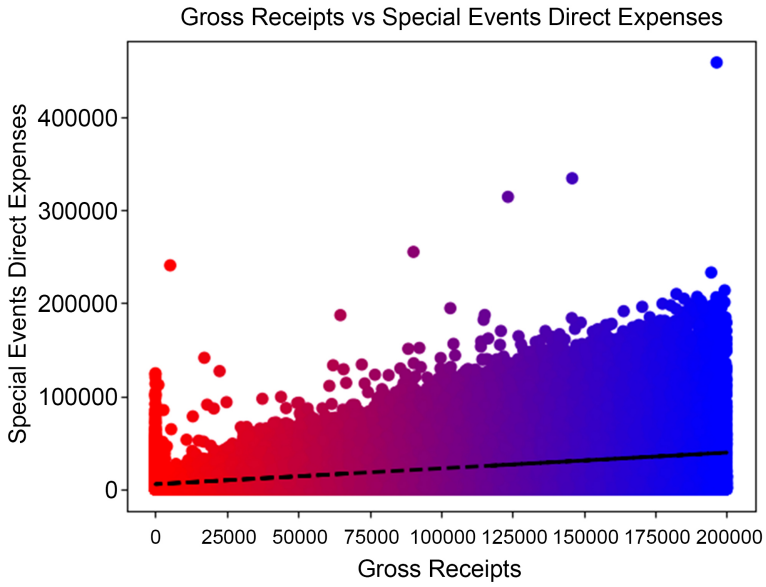

Figure 9. Scatter plot of gross receipts and special events expenses showing a positive correlation.

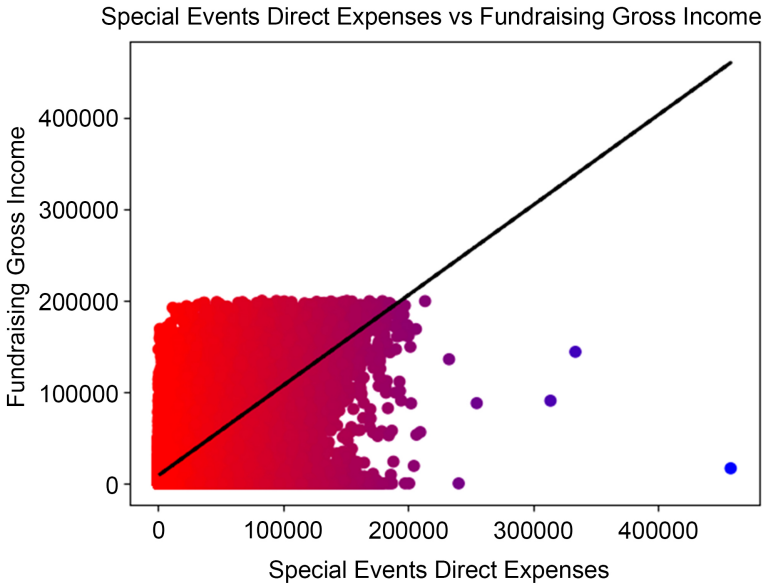

Figure 10. Scatter plot of special event expenses and fundraising income showing a positive correlation.

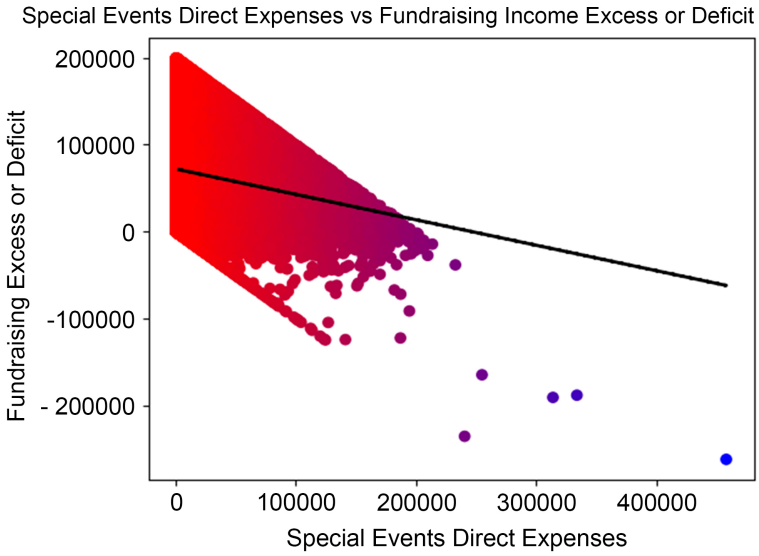

Figure 11. Scatter plot of special event expenses and fundraising excess showing a negative correlation.

The line of best fit shows a considerable negative correlation, describing a considerable drop in net profit off special events the more a nonprofit decides to spend on these events. We also notice that the organizations with greater net gains off of fundraising income are barely spending on special events at all and are likely preferring digital or cheaper physical location sites to generate fundraising revenue. This correlation completely undermines the perceived benefits of significant spending on special events directly, as there is no long-term monetary advantage in doing so. One general approach to alleviating this inefficiency for event spending institutions would be to create digital or virtual fundraisers to complement or replace existing campaigns, set up physical fundraisers at less expensive venues, start programs from saved revenue with lower start-up costs even if the plan will make marginal revenue, and invest excess savings into interest-bearing and mission-based assets.

4.3. Strategic Inventory Benefits

We have spent a considerable number of resources analyzing possible inefficiencies, but from the same pattern of induction used to define inefficiencies, we can find possible methods of enhancing the efficiency of nonprofits. When drafting a set of standard correlation plots of our financial metrics, one metric is innately controversial, in that overspending in such a category could mean several different scenarios. This metric of spending is the *cost of goods sold* (COGS), or the total cost required to create an inventory of products. These inventories can consist of various types of products, such as institutional merchandise, souvenirs, or any other cause-pertinent material goods. From this point on, all graphs will only contain data for nonprofits that spend significantly on the cost of goods sold metric, as shown in all data points in Figure 12.

The COGS metric allows us to relate our conceptions of standard corporate practices to the world of nonprofits, but after looking at the trends depicted in the nonprofit industry, we begin to understand the effect that the nonprofit and for-profit branding of companies have on their ability to sell inventory. Instinctively, it is precisely the gross sales from the sale of product inventory that are the resulting revenue from the cost of goods sold, and it is the only significant source of derived revenue, as shown in Figure 13. This is proven with additional correlation matrix revenue plots (see appendix for additional revenue graphs).

Figure 12. Scatter plot of gross receipts and cost of goods sold showing a positive correlation.

Figure 13. Scatter plot of costs of goods sold and gross inventory sales showing a positive correlation.

Spending in the COGS category while being conscious of the purpose of the spending and capitalizing on its opportunities has proven to be efficient through the benefits in finances that nonprofits receive because of this behavior. More specifically, we investigated the graph from the cost of goods sold versus the *net profit on inventory sold*, or the cost of goods sold subtracted from the gross sales of inventory, as seen in Figure 14.

The graphical downward trend we see is due to the limit of gross receipts in the 990 EZ form being capped at USD 200,000. The density of the points reflected by the line of best fits shows a strong positive relationship between profit on inventory and an increase in spending to make those products. This result is promising regarding the possibilities of financial prosperity through common spending methods. At this point, we suggest the generalization of this spending method, as it is a compatible system of revenue for any nonprofit needing to overcome financial hurdles, whether previously practiced or not. To illustrate the effects of *minor expenditures* on the cost of goods sold, we have partitioned the current correlation and re-evaluated the relative density of the graph as seen in Figure 15.

The correlation we see from this graph demonstrates that, generally, investments of less than USD 20,000 are correlated with significant profits. This is magnificent if the implication is that short-term inventory campaigns can alleviate financial distress with probable annual profits, but to ensure this ideal is applicable and one that nonprofits can benefit from, we must factor in all possible costs of production and sale, as we cannot overlook proportional forms of expenses. There are also marginal revenue benefits in other streams of revenue that must

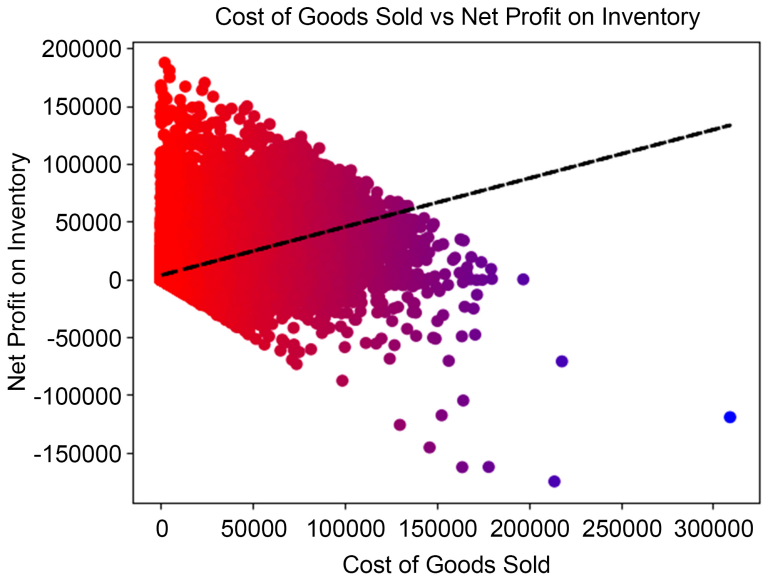

Figure 14. Scatter plot of costs of goods sold and gross inventory sales showing a positive correlation (Inventory is reported as an expense on balance sheets upon a sale of goods, supporting our parameter in Equation (2)).

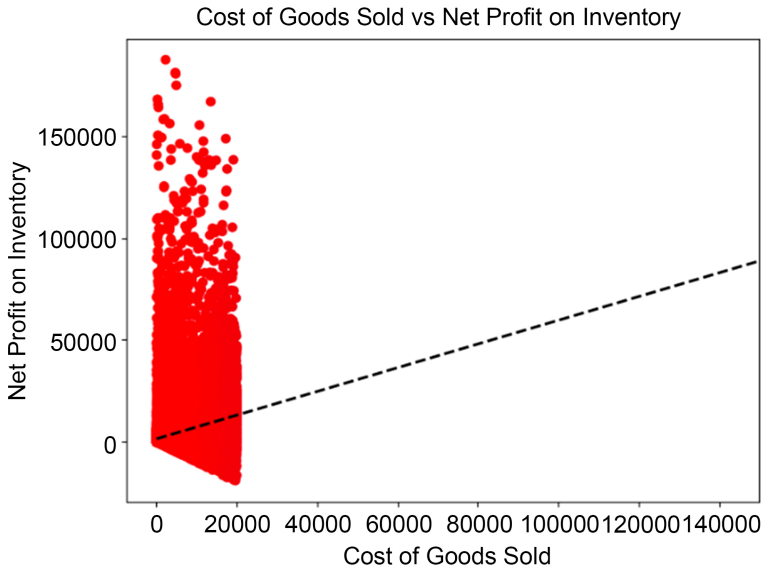

Figure 15. Scatter plot of costs of goods sold and net profit on inventory showing a positive correlation.

be accounted for. To encapsulate the totality of expenses and revenues under these circumstances, we create a graph of the cost of goods sold versus the total expenses subtracted from the total revenue, or the *net profit*, seen in Figure 16.

Keep in mind that the cap of revenue is at USD 200,000 and is responsible for the disproportionate magnitude of nonprofits below the regression line. Despite the innate pessimism of profit that this graph has due to its y-value upper limit, we see a strong showing of greater profit the more that nonprofits spend on the cost of goods sold. With this trend established, the implications of the spending become a viable source of recurring revenue to establish long-term financial growth and prosperity. This is because of excess revenue on the finances of nonprofits, more specifically it enables them to take loans and buy assets that will oversee the unlimited potential and progress of the nonprofit and act as a helping hand in times of distress. An increase in excess revenue creates growth opportunities but can also provide opportunities to purchase assets that can anchor the nonprofit in a downturn. The correlation between excess revenue and the capacity to purchase and benefit from assets is intuitive but is explicitly shown in Figure 17.

Regarding the additional financial benefits of embarking on a merchandise campaign and extracting a surplus in revenue, it can serve to justify and repay loans that allow for further development of the institution. With a reliable means of generating revenue at ratios solely dependent on the magnitude of expenditure, meeting monthly payments is increasingly likely, which will increase credit score and justify future loans. The miniature campaigns showcased in this efficiency holistically improve the financial well-being of nonprofits, which in turn allows them to focus on their true purpose: their intended social impact directed towards benefiting society.

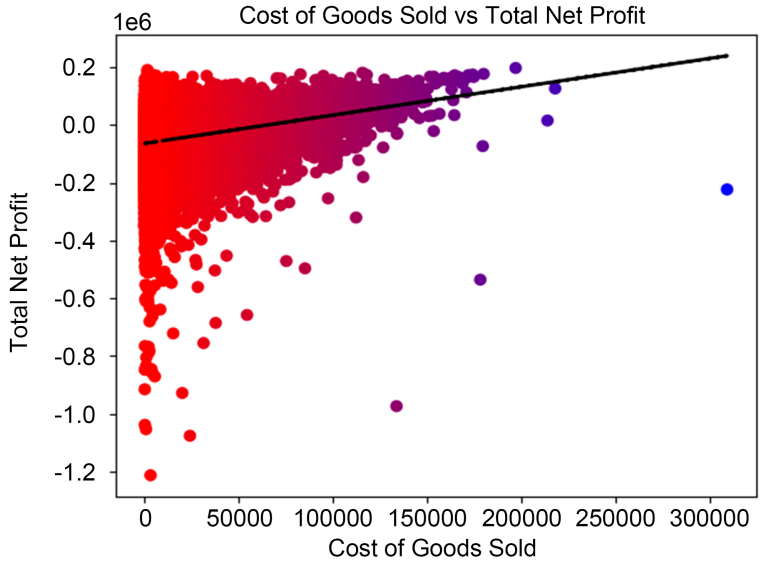

Figure 16. Scatter plot of costs of goods sold and total net profit showing a positive correlation.

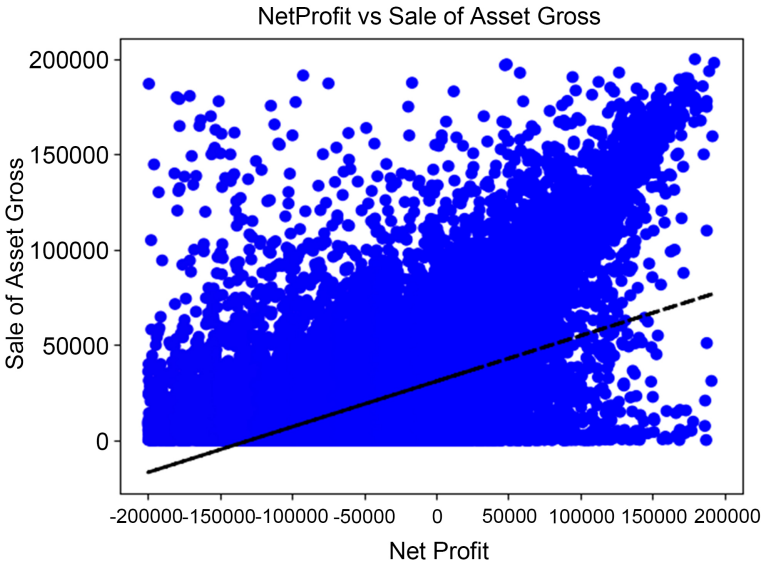

Figure 17. Scatter plot of total net profit and gross sales of assets showing a positive correlation.

At this point, it becomes suspicious as to why nonprofits can make profits off of the sale of material goods at such young stages, but it may be due to the social reaction to nonprofit-created products compared to enterprise products. When a consumer purchases a nonprofit product, they are endorsing their social cause while receiving the standard benefits of a product, which is an additional value that is instrumental in the advantage nonprofit merchandise has over corporations. Regarding the apparent lack of excess costs from the sale of inventory, this is due to the profound effects that ripple out of the sale of products. For example, if a nonprofit sells a t-shirt with its name and logo on it, they receive three

benefits in return. The first is the monetary value of selling the t-shirt, which is implicit with any transaction and a benefit that many corporations receive. The next is the marketing value of the t-shirt, as the nonprofit's logo and name will be broadcast to observers that encounter the purchaser. The last is the spread of awareness for the nonprofit's cause, and with a surrounding community of people more invested in the pertinent cause, it becomes incrementally easier to elicit contributions from sympathetic donors. Overall, a firm establishment in the system of inventory sales enables financial freedom and greater cause recognition among donors in any target community.

5. Discussion

Decreasing inefficiency within nonprofits doesn't just secure its financial footing, it frees up capital for a nonprofit to spend on furthering worthy causes. For the contributions of benevolent donors to be truly valued for their social impact, nonprofits must maintain financial vigilance beyond their inception to ensure the intended influence of their organization. If a nonprofit overspends on supporting its cause without considering its financial sustainability, the overall impact will be limited due to insufficient support. Our established trends aim to empower nonprofits by helping them navigate financial challenges and achieve success, preventing premature failure and enabling them to reach their impact goals.

The findings regarding nonprofit efficacy that were revealed through the investigation of categorical correlations suggest the employment of specific financial maneuvers to direct nonprofits toward success. Before explicitly stating these suggested policies, it is important to acknowledge the general applicability of our findings. In the process of formulating correlations, we examined hundreds of thousands of data points with seemingly wide standard deviations with staggering outliers (statistical data can be seen in Table 1). This implies that financial advice prescribed by correlations is likely unwarranted regarding contextual financial distress, such as losses due to natural disasters, failed investments, fraudulence, etc. Acknowledging this limitation, the course of action procured by the results of our analysis advises four separate managerial conducts.

The first is to deviate from growth methods that require a significant portion of fund reserves to be devoted to salaries and to rely as much as possible on more affordable labor sources, such as volunteers, freelancers, or student interns for any work that needs human resources. The second is to mitigate expenditures that are related to nonprofit events or costly campaign venues as alluring and extravagant venues are expensive. Instead, it is more advisable to set up fundraisers at cheaper venues, such as online venues, public venues, or smaller venues. The third is to integrate an inventory of marketable goods into campaign endeavors, as this method of revenue proves to be extremely promising in terms of net profit. Nonprofits of any kind or size should be involving themselves with the selling of merchandise as even small-scale investments result in visible profits. The last conduct is to use the preceding methods to establish net

profits, and to allocate any spare funds towards investment into appreciating assets that support the nonprofit's cause, which will help alleviate financial burden in the future and can be liquidated to aid any contemporary financial stress.

One policy that becomes increasingly valuable the more one delves into 990 form correlations is for the IRS to require audits for nonprofit outliers on financial metrics. From observing numerous scatter plots, we see cases of nonprofits that are spending many multiples more than they are making in revenue, taking out massive loans, and somehow surviving to report their data for the next year. These nonprofits may very well have some reason why this is a feasible method of sustenance, but for most of these cases, it is likely the product of suspicious activities. To eliminate the loss of funds towards a feeble or nonexistent cause, the IRS should avidly advocate for a policy that requires audits for these quantitatively suspicious organizations based on surpassing reasonable thresholds of these simple ratios.

Now, when assessing the trends observed in the correlation matrix plot outputs, they encompass both efficiency and *fraudulence* topics, serving multiple purposes. Evaluating efficiency using charts benefits nonprofits by identifying inefficiencies, which can then inform them about the gaps between their current diligence, planning, and their optimal course of action. Fraud assessment is also inferred directly from outliers in various trends. Although not all nonprofit fraud is captured within these chart outliers, it is easily verifiable that the percentage of fraud among outlier nonprofits is significantly higher than in a representative set.

Consider, for instance, our "Gross Receipts versus Salaries and Employment Benefits" graph, which displays numerous outliers. By targeting the nonprofit with the *highest non-infinite salary-to-revenue ratio*, we identify a prominent nonprofit medical organization in the Dallas, TX area. A limited investigation of this organization raises considerable suspicion for vigilant inspectors. The company's reported data for the 2016 fiscal year is as follows: Gross Receipts: $6; Salaries and other Company Employment Benefits: $1,070,525; Sum of Limited Liabilities End of Year: $10,971,072. On paper, this corporation appears entirely illegitimate, and an online investigation confirms our suspicions, revealing multiple allegations of *fraudulent concealment* and other dubious financial activities.

Moreover, some of the most reputable nonprofit research platforms have assigned this charity their highest rating in their respective holistic metrics, surpassing reputable charities like the American Red Cross. But using the tools outlined in this paper, we can see much more clearly how unlikely it is that this organization is operating effectively or legally. These may even provide prosecutors with the ability to investigate the financial fraud that has been obscured up to now.

5.1. Limitations

The largest shortcoming of the data available at the time of this paper is the ab-

sence of a comprehensive database tying specific nonprofits to specific occurrences of fraud. Such a database would allow us to form the algorithm into an AI model which could be trained on this database using financial coefficients from 990 forms. Nevertheless, without this database, we are still able to make significant strides in nonprofit fraud investigation assisted by our correlation matrices.

5.2. Future Approach

If an individual or entity wanted to expand on the authentication and discovery of financial trends that empower nonprofits to succeed, they could begin comparing more variables to discover new trends, and once a holistic database of trends has been established, they could begin by synthesizing an algorithm with the parameters being financial categorical data and the output being a generic efficiency. This algorithm would function by feeding 990 data and outputting the efficacy of nonprofits, and when enacted accurately, such an algorithm would be the quintessence of nonprofit efficacy research. Additionally, to verify the effectiveness of the data-derived suggestions, one could conduct industry-wide experiments. For example, ask nonprofits that don't currently have a merchandise campaign to buy and sell an inventory of products related to their cause and observe the real benefits or detriments that such practices have in the nonprofit sector.

If an individual or entity wanted to expand on the ability to detect inefficiency or fraud, they would first require a database of most instances of reported fraud in a specific country. With this information, one would organize the data such that it returns one if there was reported fraud in an organization during a certain period, and 0 if not. This data will likely only be available through government institutions, such as the Federal Bureau of Investigation. Once obtained, one would need to train all correlations and financial variable coefficients on this database to create a holistic AI model capable of interpreting data as likely fraudulent or not likely fraudulent and even able to predict instances of fraud. The implications of such a model are enormous as it would tell financial prosecutors exactly who to inspect and prevent further fraud in the industry before it even happens.

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time of immense research, allowing me to focus on the task at hand. Their feedback on my data as I was conducting my research gave me valuable ideas that catalyzed further discoveries. I could not have completed this paper without their support.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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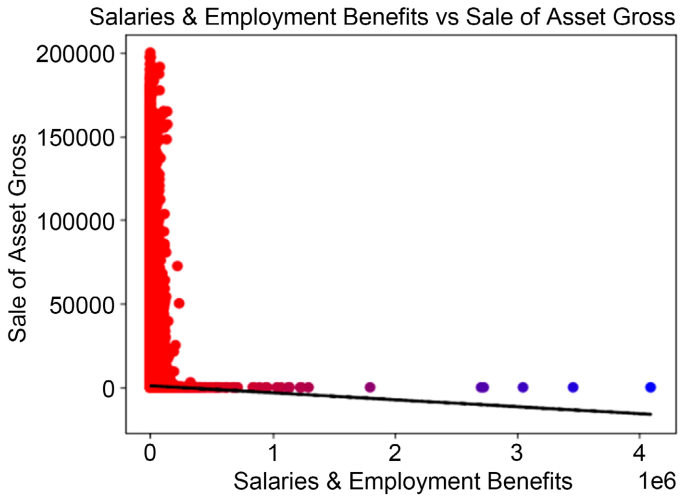
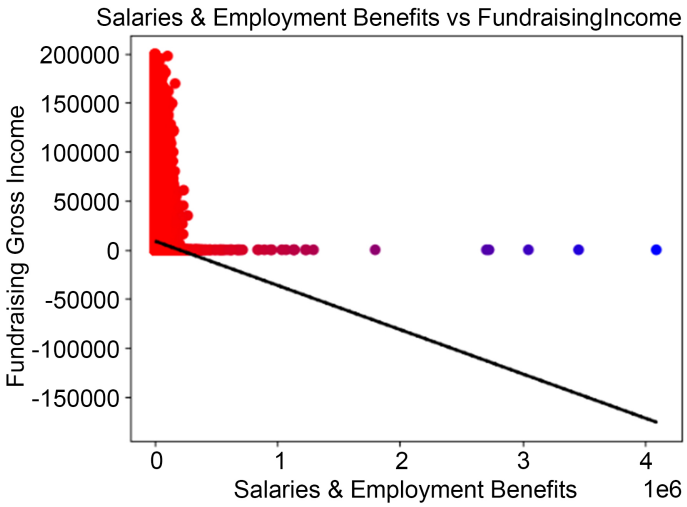
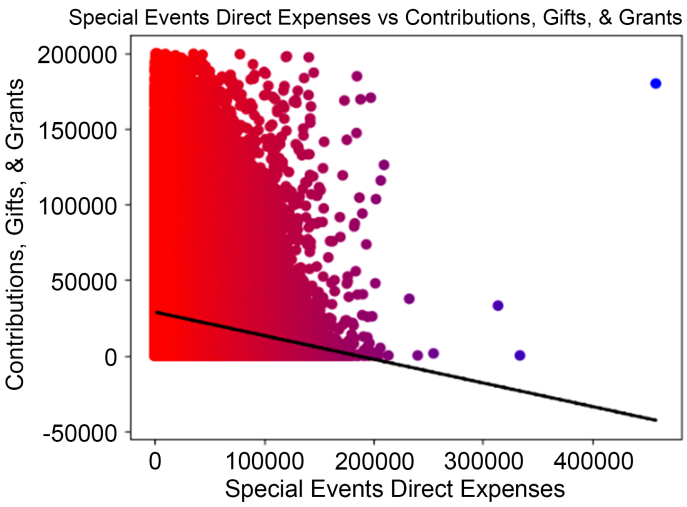
Appendix

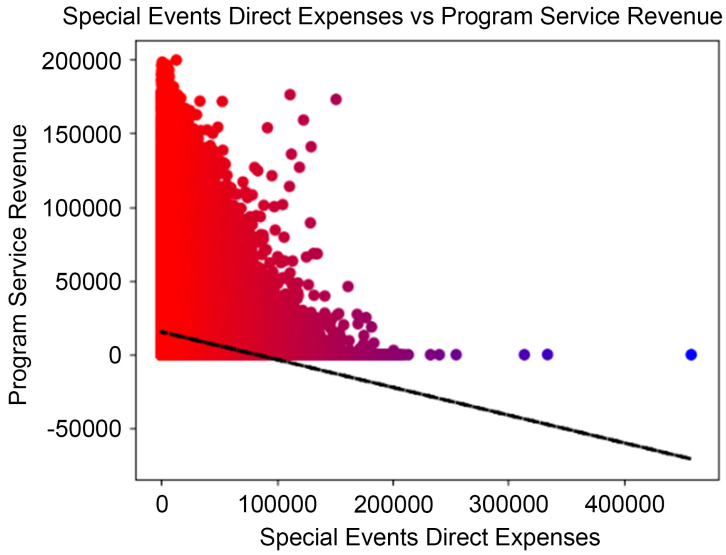
1. Revenue Streams: Salary Spending

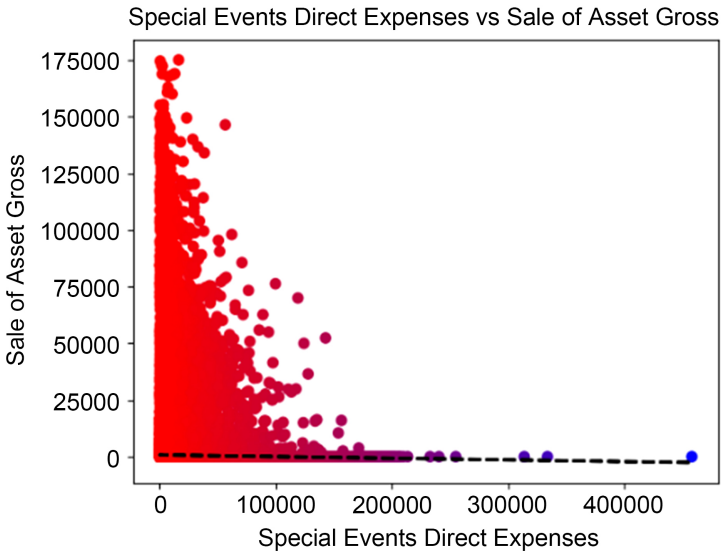


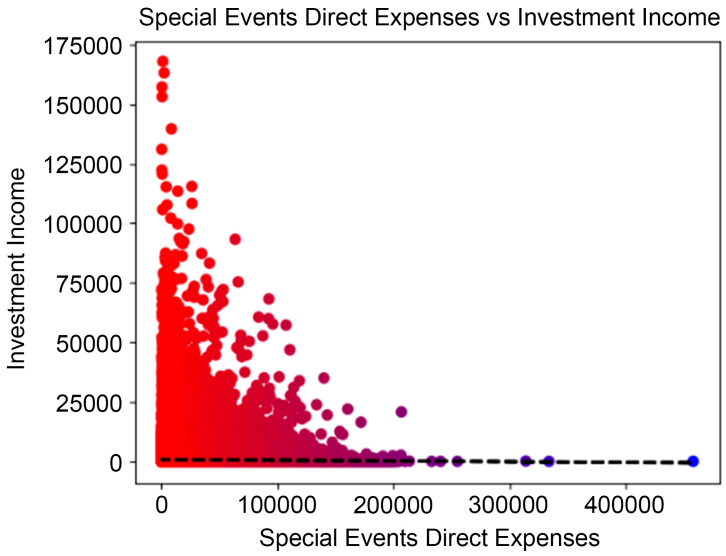


2. Revenue Streams: Special Event Direct Spending

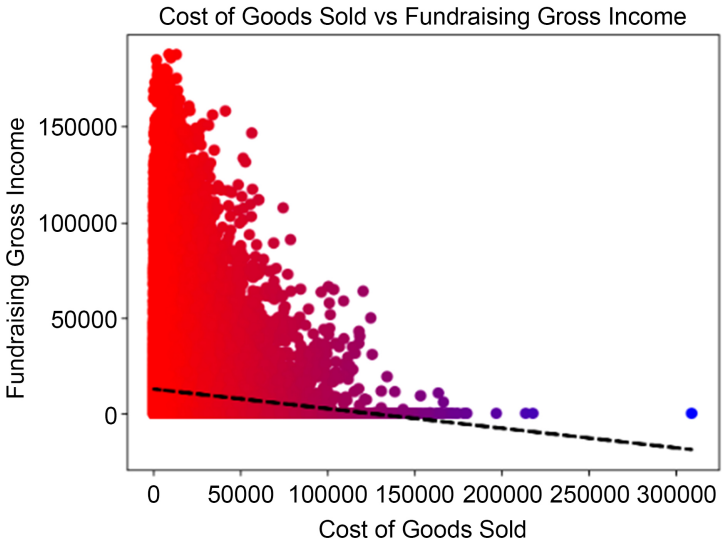


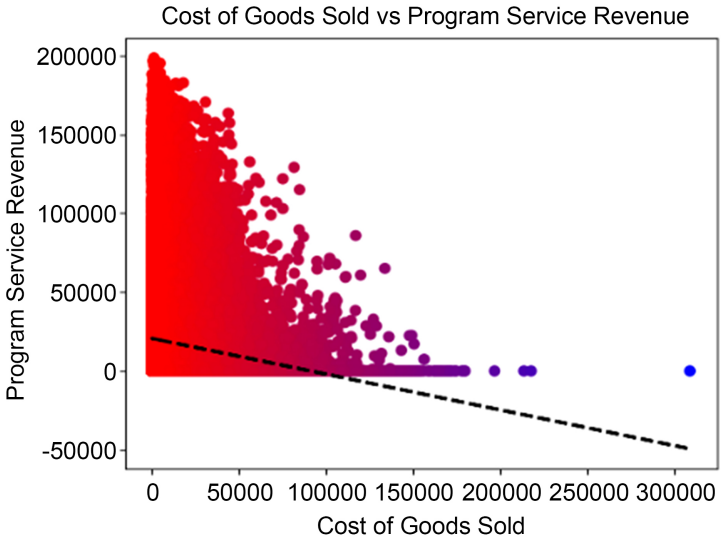

Special Events Direct Expenses vs Program Service Revenue
Program Service Revenue
200000
150000
100000
50000
0
-50000
0
100000
200000
300000
400000
Special Events Direct Expenses

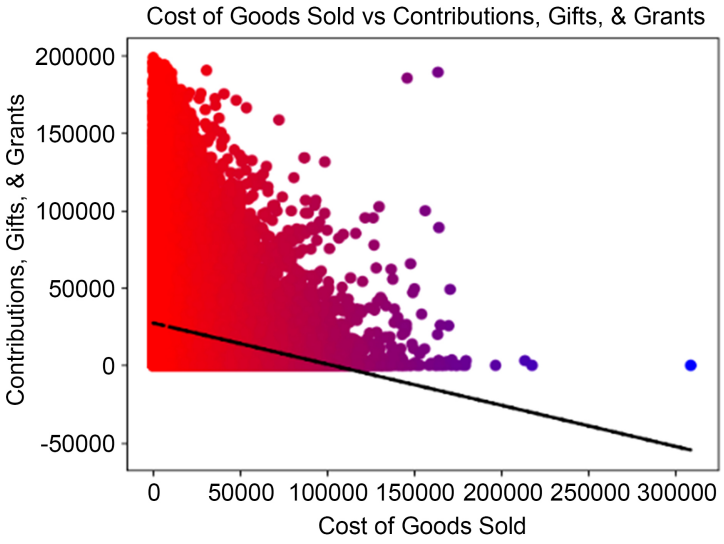

Special Events Direct Expenses vs Sale of Asset Gross
Sale of Asset Gross
175000
150000
125000
100000
75000
50000
25000
0
0
100000
200000
300000
400000
Special Events Direct Expenses


Special Events Direct Expenses vs Investment Income
Investment Income
175000
150000
125000
100000
75000
50000
25000
0
0
100000
200000
300000
400000
Special Events Direct Expenses

3. Revenue Streams: Cost of Goods Sold






Cost of Goods Sold vs Contributions, Gifts, & Grants
Contributions, Gifts, & Grants
200000
150000
100000
50000
0
-50000
0
50000
100000
150000
200000
250000
300000
Cost of Goods Sold