Now You See It

Understanding and Using the Power of Exploratory Visualizations to Gain Insight into Your Audit Data

eprentise®

CRYSTALLIZE ANALYTICS®

Automated $ Audit®

Who Are We?

In 2007 eprentise was founded on its original product, FlexField

- Enables customers to make unprecedented changes to their financial chart of accounts while maintaining transactional history and data integrity.

eprentise®

In 2009 we introduced our Consolidation, Divestiture, and Reorganization products

- Transformational software which can copy, change, filter, or merge all elements of Oracle EBS financial systems to address ever-changing business needs, such as regulatory compliance and growth opportunities.

Transformation to Optimization

One-time usage to subscription model

In 2020 we began expanding to new markets with our C Collection analytics suite, and our Audit Automation software

CRYSTALLIZE ANALYTICS®

- C Collection analytics provides transparency and identifies potential problem areas with transactional data. This allows users to reduce costs, leverage opportunities across the enterprise, improve business processes, and increase the confidence level of the users in their data, processes, and operations.

- Automated Audit provides finance teams with drill-down data from a balance sheet report into the transaction-level detail. The software covers hundreds of data facets for the entire enterprise domain and builds in consistent audit processes and workflows across the organization.

ORACLE | Partner

C COLLECTION®

Automated $ Audit®

Learning Objectives

- Understand which datasets are best audited using exploratory visualizations
- Learn how to create three exploratory data visualizations (linear regressions, variances, and pattern identifications) to immediately begin using in your audits
- Understand how to link data visualization indicators with actual transactional or balance-related findings
- Learn how to make data visualizations an understandable part of your audit report

Agenda

- Explanatory and Exploratory Data Visualizations
- Types of Exploratory Data Visualization and the Data Best Used
- Three Types of Exploratory Data Visualizations
  - Linear Regressions
  - Variances
  - Other Pattern Identifications

INTERNATIONAL STANDARDS FOR THE PROFESSIONAL PRACTICE OF INTERNAL AUDITING (STANDARDS)

1210 – Proficiency

Internal auditors must possess the knowledge, skills, and other competencies needed to perform their individual responsibilities. The internal audit activity collectively must possess or obtain the knowledge, skills, and other competencies needed to perform its responsibilities.

Interpretation:

Proficiency is a collective term that refers to the knowledge, skills, and other competencies required of internal auditors to effectively carry out their professional responsibilities. It encompasses consideration of current activities, trends, and emerging issues, to enable relevant advice and recommendations. Internal auditors are encouraged to demonstrate their proficiency by obtaining appropriate professional certifications and qualifications, such as the Certified Internal Auditor designation and other designations offered by The Institute of Internal Auditors and other appropriate professional organizations.

1210.A1 – The chief audit executive must obtain competent advice and assistance if the internal auditors lack the knowledge, skills, or other competencies needed to perform all or part of the engagement.

1210.A2 – Internal auditors must have sufficient knowledge to evaluate the risk of fraud and the manner in which it is managed by the organization, but are not expected to have the expertise of a person whose primary responsibility is detecting and investigating fraud.

1210.A3 – Internal auditors must have sufficient knowledge of key information technology risks and controls and available technology-based audit techniques to perform their assigned work. However, not all internal auditors are expected to have the expertise of an internal auditor whose primary responsibility is information technology auditing.

1210.C1 – The chief audit executive must decline the consulting engagement or obtain competent advice and assistance if the internal auditors lack the knowledge, skills, or other competencies needed to perform all or part of the engagement.

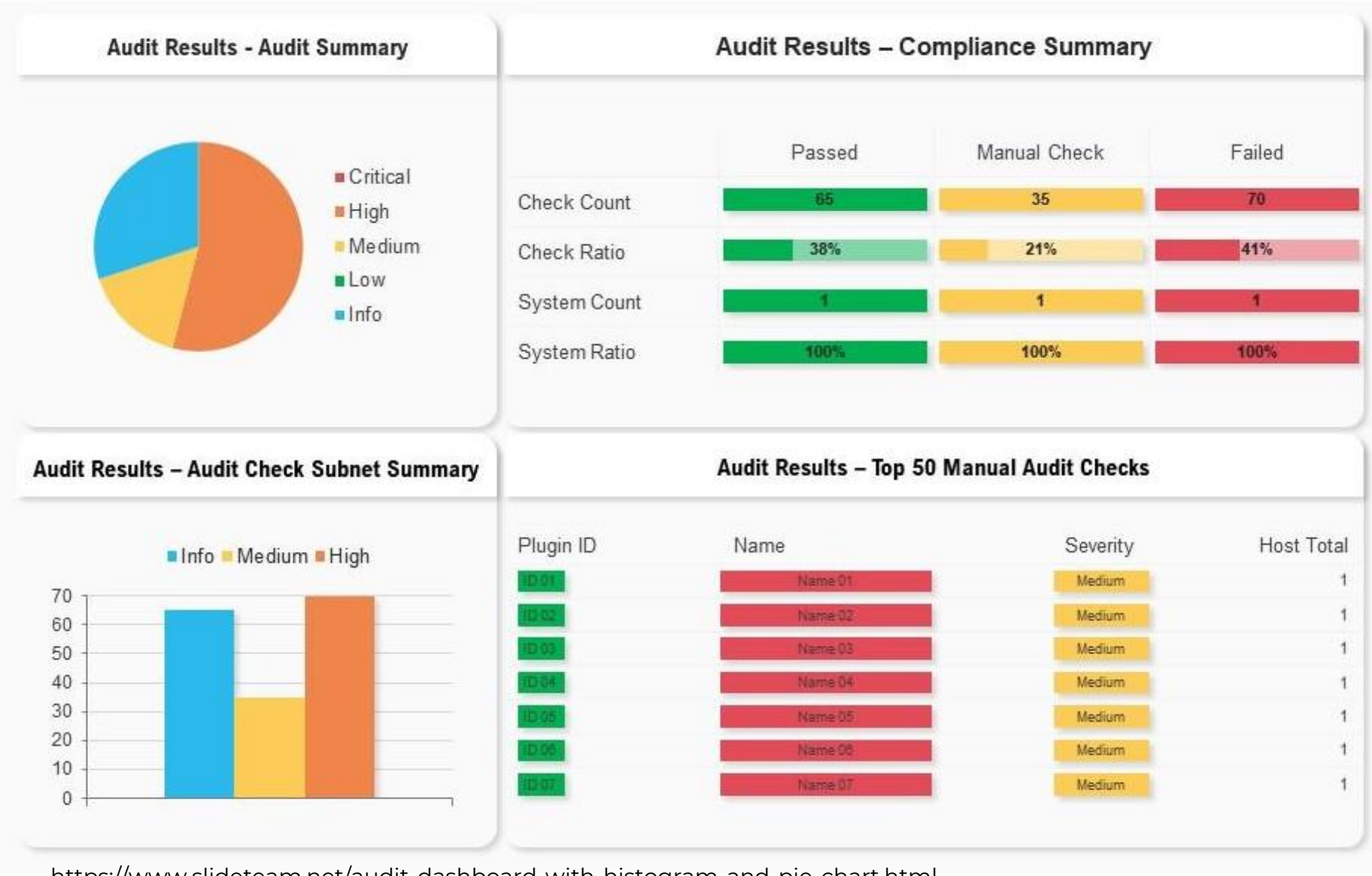
Data Visualization: A Working Definition

- What is a Data Visualization
  - "Data visualization is a way to represent information graphically, highlighting patterns and trends in data and helping the reader to achieve quick insights."
    https://www.gartner.com/en/marketing/glossary/data-visualization

Explanatory versus Exploratory Visuals

- Explanatory Visuals
  - Used to communicate the results of your analyses
- Exploratory Visuals
  - Used when you want or need to explore data to find insights. You use these types of visualizations to help better understand your underlying data

Explanatory Visual Example



https://www.slideteam.net/audit-dashboard-with-histogram-and-pie-chart.html

Simple Exploratory Visual Example

Power of Exploratory Data Visualizations

- Exploratory data visualizations can allow an auditor to quickly identify indicators of audit concern
- Frequently, these indicators are not easily identified using traditional audit methods
- Properly applied, exploratory data visualizations can give an auditor super intuition to changes and arising audit risks

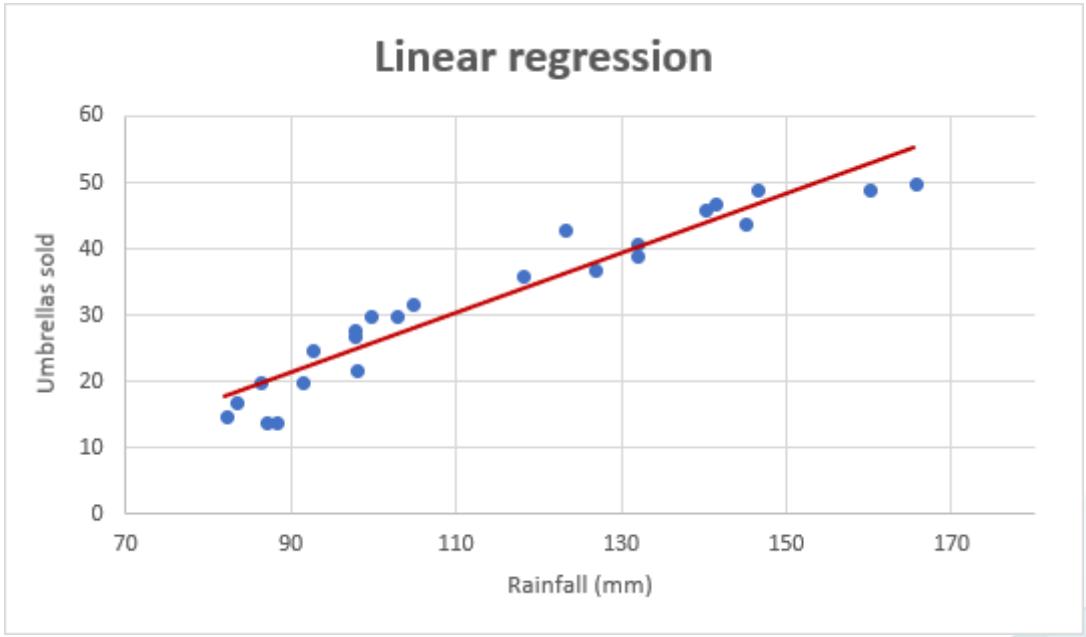
Three Exploratory Data Visualization Techniques to Begin Using Today

- Regression Analysis
- Variance Identification
- Other Pattern Identifications

Regression Analysis

What is Regression Analysis?

- Regression Analysis is a mathematical method to test whether what is expected to occur does in fact occur.



https://www.ablebits.com/office-addins-blog/linear-regression-analysis-excel/

In this scatter diagram, umbrellas sold is shown to be dependent on rainfall. The red line is the linear regression showing what the expected relationship is and the blue dots are what occurred.

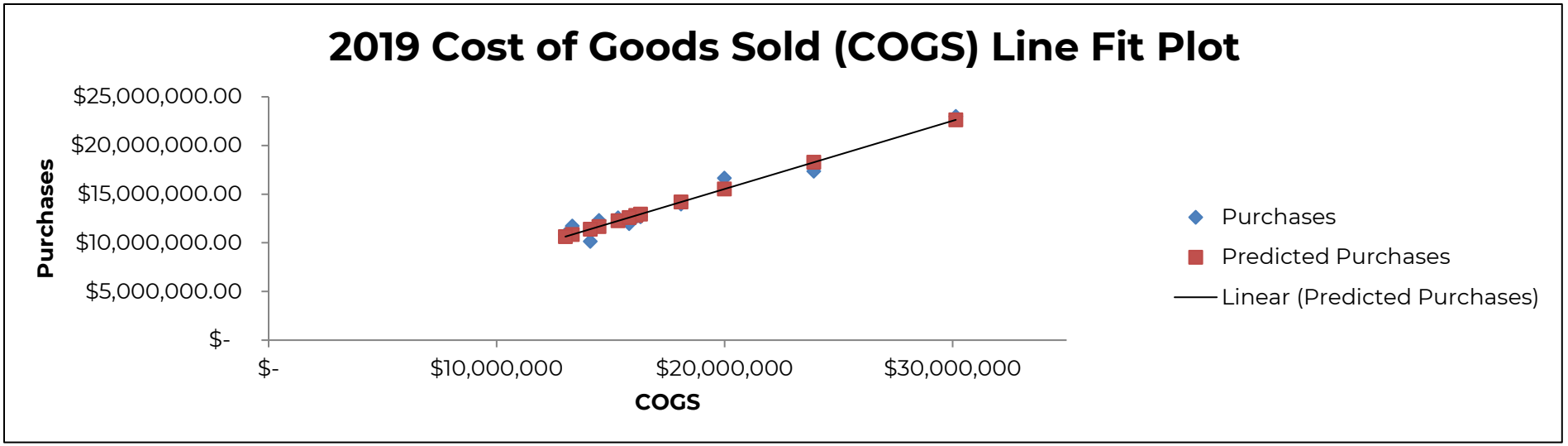
Examples That Might Be Tested by Regression

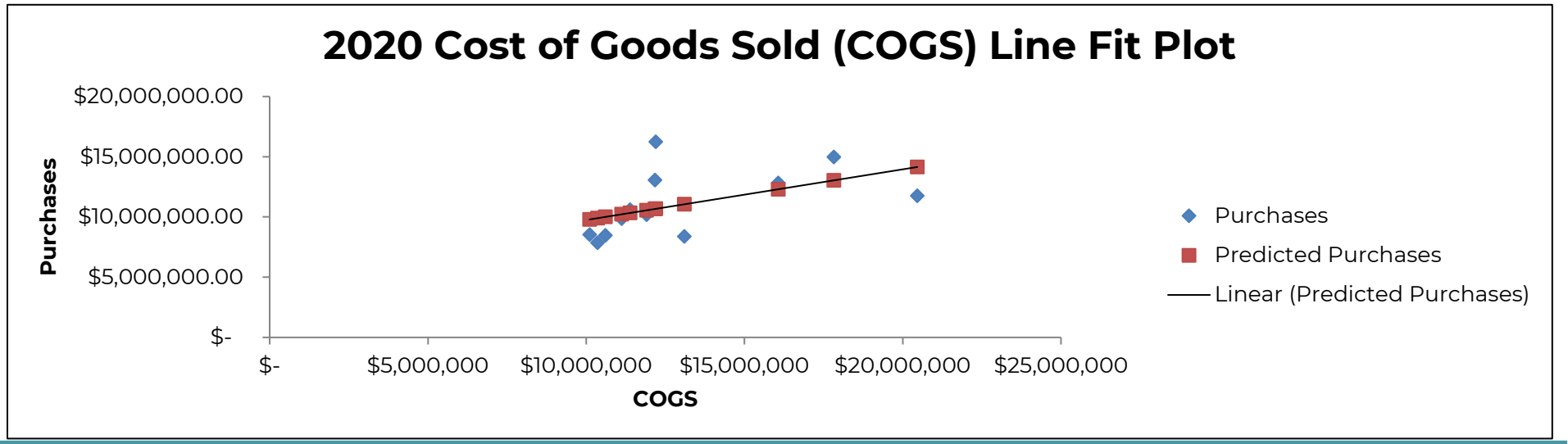
- Inventory purchases to cost of sales
- Commissions paid to sales
- Raw materials used to complete finished goods
- Credit memos to returned goods
- Marketing spend to sales

Inventory Purchases to Cost of Goods Sold – Linear Regression Example

	Base Year		Current Year	
	2019		2020	
	COGS (Y)	Purchases (X)	COGS (Y)	Purchases (X)
January	$ 19,990,514.69	$ 16,650,784.52	$ 16,064,740.21	$ 12,810,824.89
February	$ 18,084,414.84	$ 13,976,722.54	$ 13,098,365.32	$ 8,372,842.39
March	$ 16,103,220.39	$ 12,650,158.91	$ 12,167,967.59	$ 13,063,172.81
April	$ 14,482,269.00	$ 12,290,167.26	$ 11,122,776.49	$ 9,857,154.13
May	$ 16,312,647.51	$ 12,678,991.85	$ 11,908,662.13	$ 10,185,168.61
June	$ 23,912,283.29	$ 17,352,819.24	$ 17,823,022.79	$ 14,976,828.26
July	$ 13,311,477.08	$ 11,738,852.23	$ 10,105,176.22	$ 8,532,867.75
August	$ 13,010,816.14	$ 10,857,196.46	$ 10,357,158.95	$ 7,861,511.38
September	$ 14,102,367.91	$ 10,147,188.10	$ 10,604,415.07	$ 8,456,304.54
October	$ 15,324,067.06	$ 12,561,418.31	$ 11,382,339.85	$ 10,585,900.20
November	$ 30,142,373.62	$ 22,993,529.25	$ 20,454,824.63	$ 11,760,071.93
December	$ 15,806,283.27	$ 11,961,852.72	$ 12,199,603.62	$ 16,244,868.82
Total	$ 210,582,734.80	$ 165,859,681.39	$ 157,289,052.87	$ 132,707,515.70
Purchases % of COGS		78.8%		84.4%

Inventory Purchases to Cost of Goods Sold – Linear Regression Example





Steps to Linear Regression

1. **Develop a hypothesis**. For example, “Inventory Purchases should increase or decrease in direct relationship to cost of sales”
2. **Gather data** for both prior and current periods (e.g., cost of sales and inventory item purchases for the current year and the prior year)
3. **Test the hypothesis** for the prior (base) period(s) using the Excel® Data Analysis Add-In Regression Tool
4. **Conclude on the hypothesis**- is there actually a relationship between the values?
5. **Test the current period** and analyze the results
6. **Follow up on significant differences** between predicted values (predicted purchases) and actual values (actual purchases)
7. **Present the results** (Audit Findings)

Step 1. Develop a Hypothesis

- Inventory purchases should, over a period of time, be dependent on cost of sales
  - Inventory purchases are your dependent variable (Y) - *inventory purchases are ultimately determined by sales (cost of sales)*
  - Cost of sales are your independent variable (X) – sales (cost of sales) cause inventory purchases

Step 2. Gather Data

- Obtain a data file for cost of sales and inventory purchases for the base year (2019) and the current year (2020)

	Base Year		Current Year	
	2019		2020	
	COGS (Y)	Purchases (X)	COGS (Y)	Purchases (X)
January	$ 19,990,514.69	$ 16,650,784.52	$ 16,064,740.21	$ 12,810,824.89
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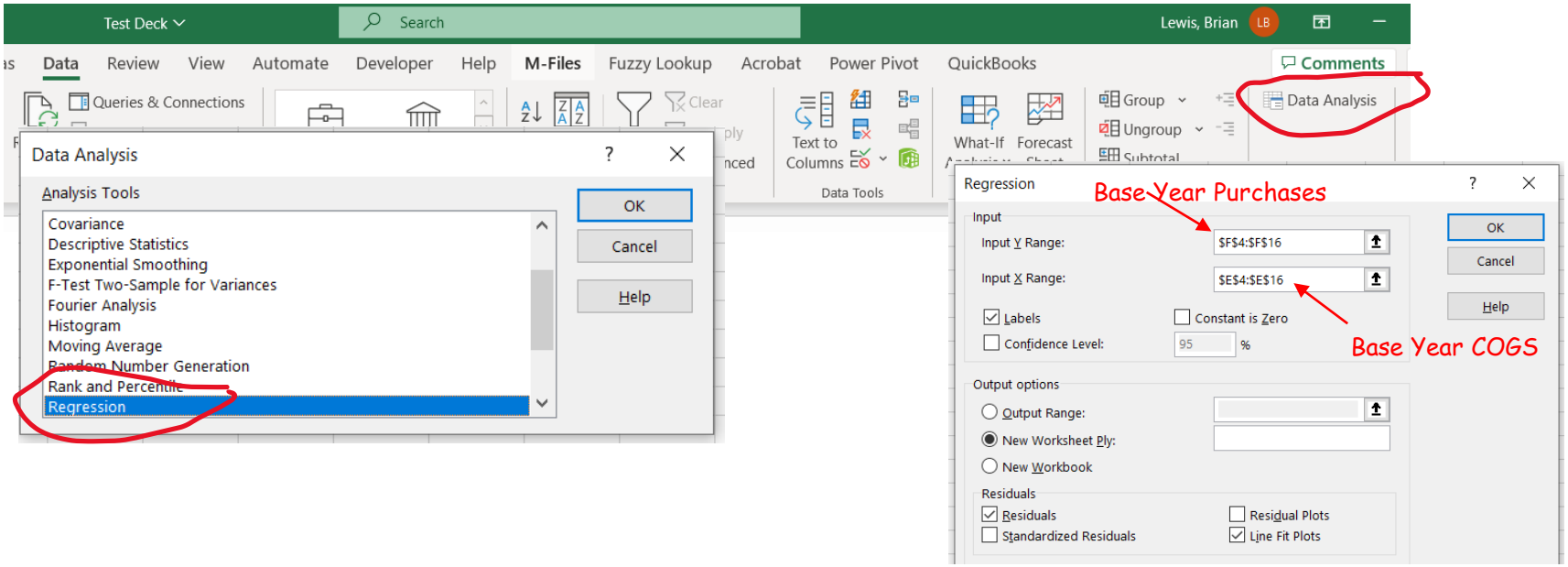
December	$ 15,806,283.27	$ 11,961,852.72	$ 12,199,603.62	$ 16,244,868.82

Step 3. Test the Hypothesis (Base Year)

- Select “Data Analysis” and “Regression” from the “Data” tab in Excel (you may need to add the Data Analysis Add-In) and input the X (COGS) & Y (Purchases) ranges



Step 4. Conclude on the Hypothesis (Base Year)

Regression Statistics	
Multiple R	0.979703059
R Square	0.959818084
Adjusted R Square	0.955799893
Standard Error	753555.5896
Observations	12

(A Value close to 1 indicates that there is a valid relationship)

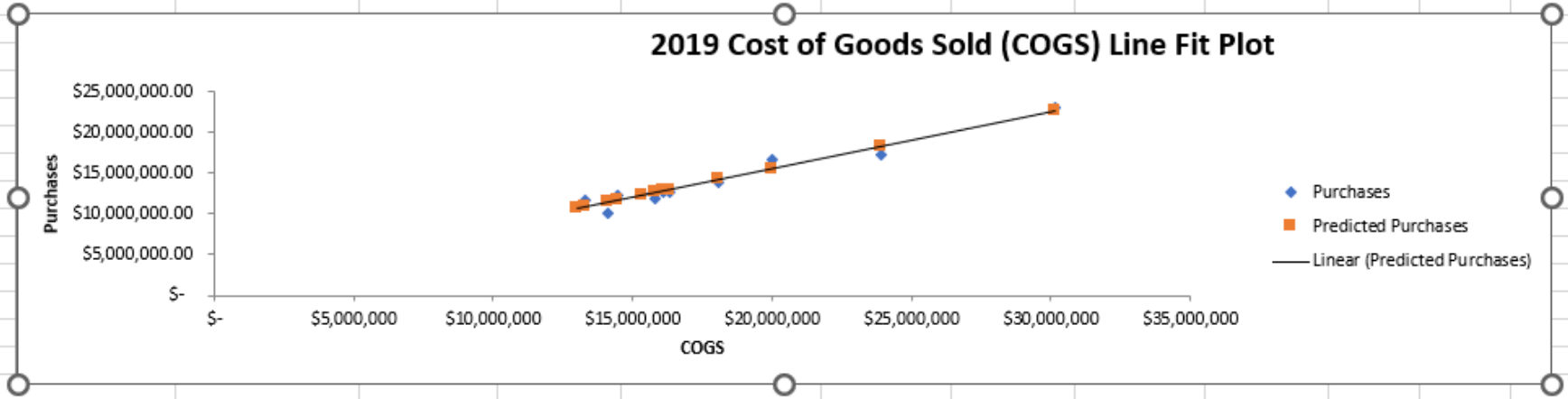
(A value close to 1 indicates that the data fit the relationship well)

Based on these results, we can conclude that purchases have a direct relationship to sales (cost of sales)

ANOVA

	df	SS	MS	F
Regression	1	1.3564E+14	1.3564E+14	238.86
Residual	10	5.67846E+12	5.6785E+11	
Total	11	1.41319E+14		

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1536695.814	824095.1545	1.86470677	0.091802809	-299502.617	3372894.25	-299502.617	3372894.25
COGS	0.700054217	0.045295236	15.4553607	2.62213E-08	0.59913014	0.80097829	0.59913014	0.80097829



Step 5. Test the Current Period

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.499726665
R Square	0.249726739
Adjusted R Square	0.174699413
Standard Error	2493137.807
Observations	12

(A Value significantly lower than 1 indicates a significant change in the relationship between costs of sale and purchases)

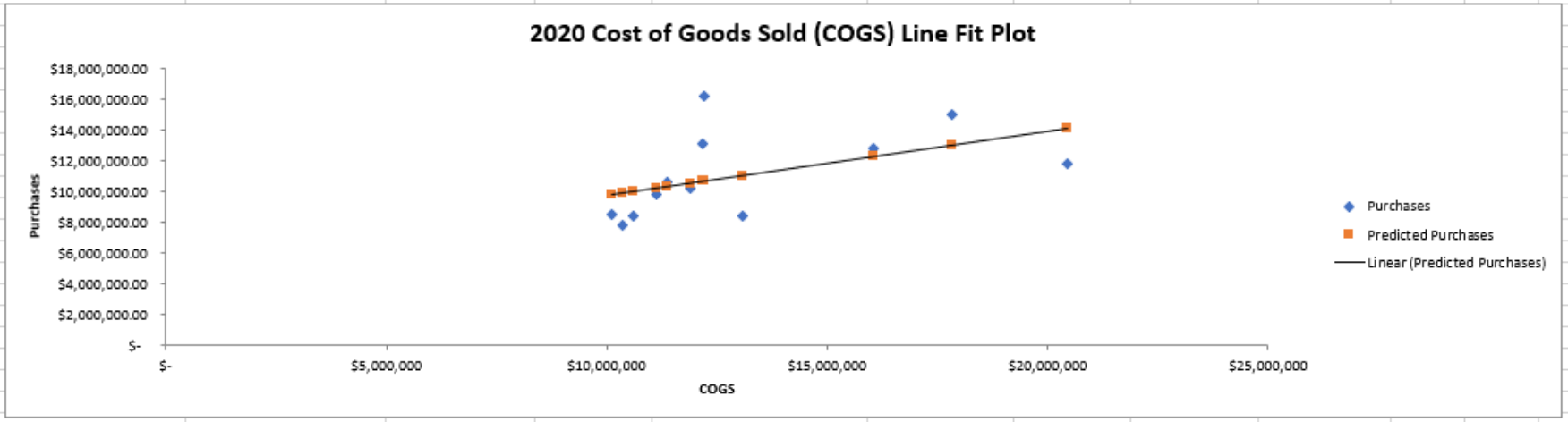
(A value significantly lower than 1 indicates that the data does not fit the relationship well)

ANOVA

	df	*SS*	*MS*
Regression	1	2.06889E+13	2.06889E+13
Residual	10	6.21574E+13	6.21574E+12
Total	11	8.28463E+13	

	Coefficients	*Standard Error*	*t Stat*					
Intercept	5567491.838	3094841.327	1.798958734					
COGS	0.418958678	0.229640456	1.824411449	0.098067604	-0.092712145	0.930629501	-0.092712145	0.930629501

Based on these results, we can conclude that something significant has changed.



Step 6. Follow Up on Significant Differences

- The relationship of inventory item purchases to cost of sales has changed significantly between 2019 and 2020 indicating potential problems
  - Inventory build up above that needed to cover customer sales?
  - Incorrect sales projection/estimations?
  - Errors in reorder points in the supply chain management system?

Step 7. Present the Results

- **Condition:** What is the problem or issue? What is happening? (A regression result is an indicator of a condition-if it is determined that this is a condition rising to the level of an audit finding, then the regression visual should be included in the audit report as an explanatory visual)
- **Cause:** Why did the condition happen? (From a regression, a variance analysis (see next section) should be conducted to allow drill-down and determination of the periods/transactions of concern and why the problem arose)
- **Criteria:** How do we know this is a problem? What should be?
- **Effect:** Why does this condition matter? What is the impact?
- **Recommendation:** How do we solve the condition?
- **Consequence:** What is the risk or negative outcome because of the finding?
- **Corrective action:** What should management do?

Variance Identification

Variance Identification

- Macro level tools such as regression analysis allow an auditor to identify changes to a data population, but drilling down into the underlying data to discrete periods is the starting point to understanding what caused the changes (variance)
- Variance identification is determining what was expected to occur (usually based on prior year information) and what actually occurred

Variance Identification Example

- Using the information obtained from the regression example, a prediction can be made of purchases in the current year compared to actual purchases

	Coefficients
Intercept	1536695.814
COGS	0.700054217

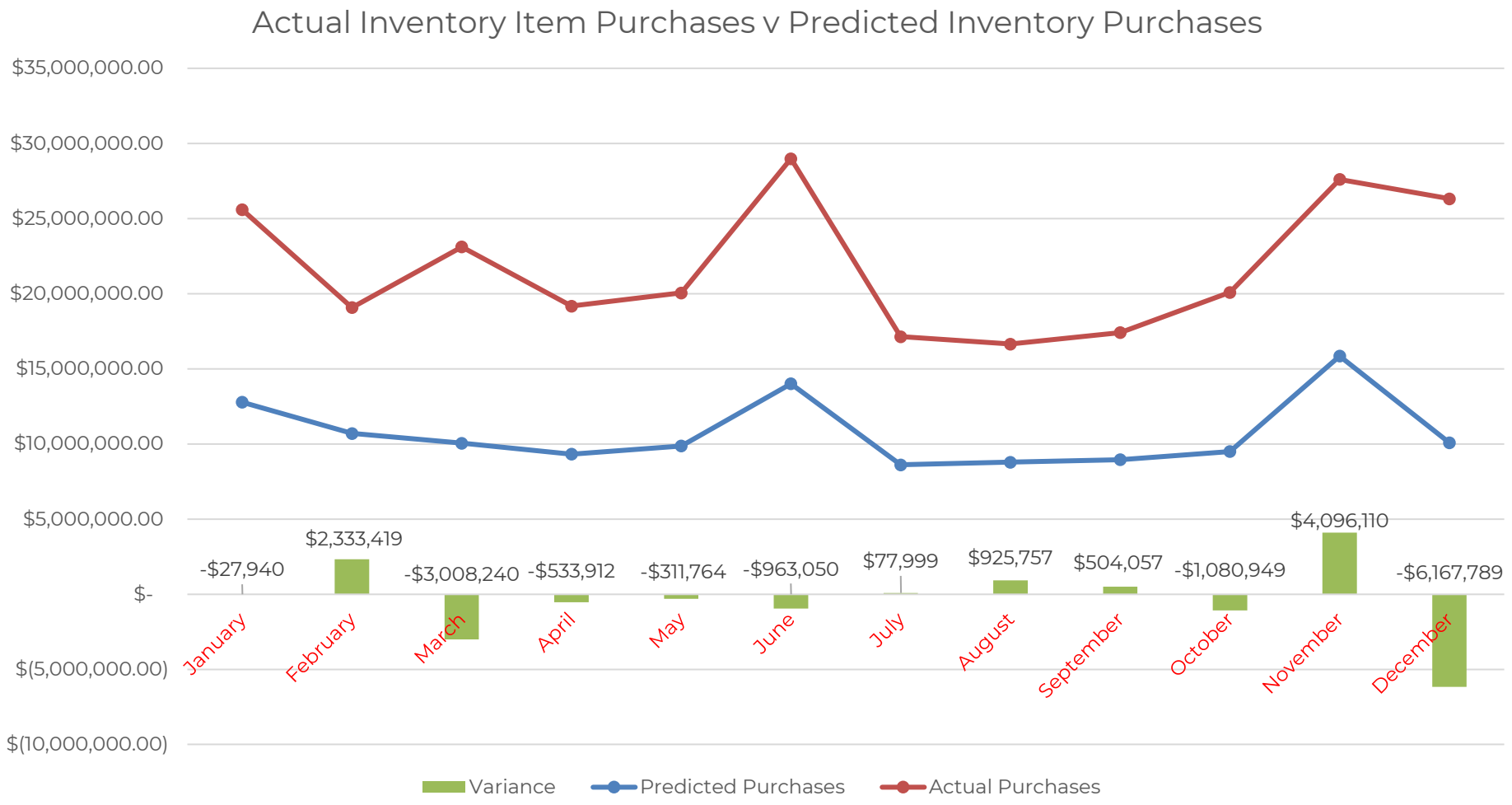
- The linear equation (y=mx+b) for predicting purchases from COGS is

Purchases = COGS(.700054217)+1536695.814

Variance Identification Example

	Base Year Rate	2020	
Month	Predicted Purchases	Actual Purchases	Variance
January	$ 12,782,884.95	$ 12,810,824.89	$ (27,939.94)
February	$ 10,706,261.70	$ 8,372,842.39	$ 2,333,419.31
March	$ 10,054,932.84	$ 13,063,172.81	$ (3,008,239.96)
April	$ 9,323,242.41	$ 9,857,154.13	$ (533,911.72)
May	$ 9,873,404.96	$ 10,185,168.61	$ (311,763.65)
June	$ 14,013,778.09	$ 14,976,828.26	$ (963,050.18)
July	$ 8,610,867.04	$ 8,532,867.75	$ 77,999.29
August	$ 8,787,268.61	$ 7,861,511.38	$ 925,757.24
September	$ 8,960,361.31	$ 8,456,304.54	$ 504,056.77
October	$ 9,504,950.83	$ 10,585,900.20	$ (1,080,949.36)
November	$ 15,856,182.07	$ 11,760,071.93	$ 4,096,110.14
December	$ 10,077,079.78	$ 16,244,868.82	$ (6,167,789.04)
Predicted Purchases = COGS(0.700054217455249) + 1536695.81416027			

Variance Identification Example

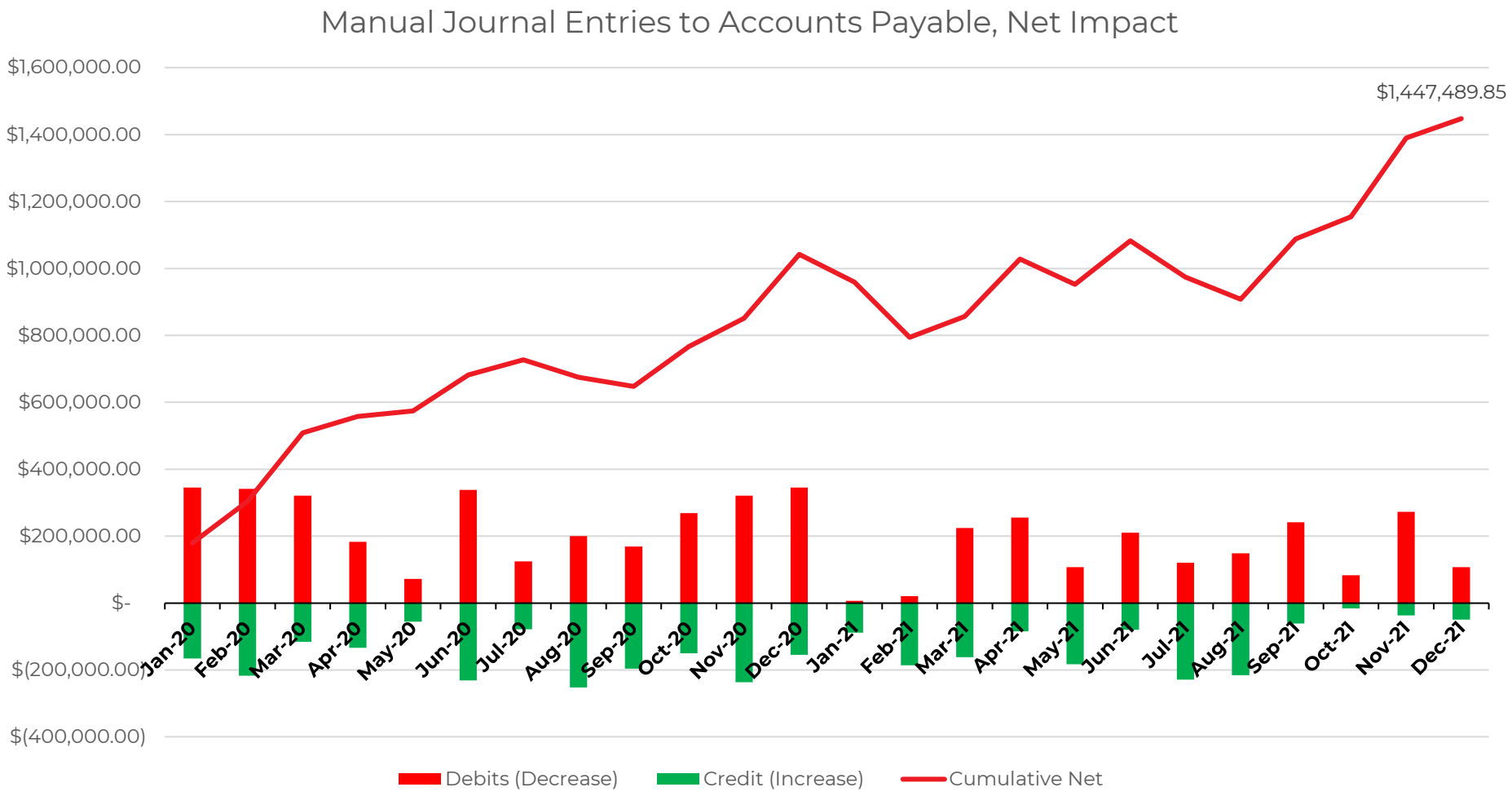


Other Pattern Identifications

Pattern Identification

- Business processes (order to cash, procure to pay, manufacturing) generally follow predictable patterns
- Pattern identification is a way to visual represent these predictable patterns and identify unusual divergence from the pattern

Manual Journal Entries – Net Impact



Conclusion

- Exploratory data visualizations are a powerful and effective tool to audit the large data sets
- Questions?

Thank you!

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