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# Data Dashboarding in Accounting using Tableau

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## Abstract

Data dashboarding, which involves organizing and visually displaying data in an easy to use interface to facilitate the processing of analyzing large, complex data sets, is an important tool in accounting decision making. This article discusses the role of data dashboarding in accounting and illustrates, using a worked example, how a data dashboard can be constructed in Tableau, a popular data visualization software.

**Keywords:** Dashboarding, Simulation, Tableau

## 1. Introduction and Background

Rapid advancements in information technology (IT) have significantly changed the nature of the work that accountants do (Pan et al., 2017; Nielsen 2018; AICPA, 2019; Seow et al., 2021). Specifically, one key aspect of accountants' work that has been significantly influenced by developments in IT relates to work involving data analytics, including in the area of data visualization and dashboarding (Janvrin et al. 2014; Pan et al. 2017). Data dashboarding involves organizing and visually displaying data in an easy to use interface to facilitate the processing of analyzing large, complex data sets (Janvrin et al. 2014).

The literature suggests that data dashboarding can play an important role in supporting decision making across a diverse range of tasks in the accounting setting, including in evaluating sales trends, performance management, management reporting, and detecting fraudulent transactions (Chaudhuri et al., 2011; Dilla et al., 2010; Yigitbasioglu & Velcu, 2012; Goh et al. 2021; The Institute of Internal Auditors 2022). Consistent with this stream of literature, Payne (2020) highlights that one of the key skills that accountants need to succeed in a digital economy is the ability to analyze and present data comfortably, including by employing the use of well-designed dashboards.

Therefore, it is important for accountants to develop skillsets in dashboarding to support decision making across a range of accounting settings and tasks. In this article, I introduce and illustrate, using a worked example, how accountants can create a dashboard that provides insights for accounting decision making. In particular, I extend the worked example introduced by Goh (2018) to illustrate how output obtained from a simulation model can be used to develop a dashboard to support accounting decision making. Using a dashboard to provide insights to the output obtained from a simulation model is appropriate and relevant given the wide range of analysis and considerations involved in accounting decision making that relies on simulation models (Ayres et al. 2017; Goh

2018). In the worked example, I create a dashboard using the Tableau Dashboard visualization software (“Tableau”). Tableau skills are among the most in-demand technology skillsets requested by employers (Hagen 2017; Kauflin 2017). It is a popular data visualization tool that is widely used, including in the accounting sector (Eaton and Baader 2018).

The remainder of this article is organized as follows. The second section provides a description of the simulation example used in the article and the third section illustrates how the data from the simulation example can be used to create a dashboard in Tableau. Finally, the fourth section concludes the article.

## 2. Simulation Example

Simulation is a mathematical technique for solving a problem by performing a large number of trial runs (called replications) and inferring a solution from the collective results of the trial runs. In simulation, uncertainty in a business situation is explicitly incorporated into a model via random variables.

The simulation example introduced in Goh’s (2018) study looks at Baker Limited, a fictitious company which provides a health insurance plan to its customers. In particular, it examines how the company could use a simulation model to determine the potential profitability of an insurance scheme, given underlying uncertainty in specific aspects of its operating environment.<sup>1</sup> As part of the replication step of the simulation, 1,000 separate values for overall profits from the health insurance plan were computed by the simulation model. In this article, I extend the example used in Goh’s (2018) study by creating a visual dashboard to provide insights from the 1,000 replicated company profit values.

## 3. Designing the Tableau Dashboard

I first prepare the data to be uploaded to Tableau by copying the replications of overall company profits obtained in cells A27:B1028 of Goh’s (2018) example, and pasting them in cells A1:B1002 of a new Excel worksheet. I then save this Excel worksheet before uploading it to a new Tableau workbook<sup>2</sup>, on which I will create the simulation dashboard. Exhibit 1 presents part of the data contained in the new Excel worksheet.

|    | A           | B               |
|----|-------------|-----------------|
| 1  | Replication | Company Profits |
| 2  |             | -920,278        |
| 3  | 1           | 246,399         |
| 4  | 2           | -46,293         |
| 5  | 3           | -169,417        |
| 6  | 4           | 4,249,788       |
| 7  | 5           | -481,950        |
| 8  | 6           | -5,941,108      |
| 9  | 7           | -4,091,733      |
| 10 | 8           | -654,773        |
| 11 | 9           | 3,421,631       |
| 12 | 10          | 5,957,735       |
| 13 | 11          | 2,286,401       |

*Table of Summary Statistics*

<sup>1</sup> Background details relating to the simulation example are provided in Appendix A. Refer to Goh’s (2018) article for a more detailed discussion of the simulation technique and the steps involved in developing the simulation model.

<sup>2</sup> Do so by first navigating to “Data” → “New Data Source” → “Excel File” to upload the saved Excel workbook in Tableau. Next, in the “Data Source” tab in Tableau, double-click on the relevant Excel worksheet to upload the data to Tableau.

The first component of our dashboard consists of a table to display summary statistics relating to the replications obtained. Exhibit 2 presents this summary statistics table, which is created by applying the following steps in Tableau:

1. Create a new worksheet and rename it “Summary Statistics.”
2. From the “Data” tab of the new worksheet, drag and drop the “Measure Values” data field into “Text” in the “Marks” area.
3. Edit the measure values in the “Measure Values” area to compute the average, standard deviation, minimum, and maximum of Company Profits.
4. Finally, from the “Data” tab of the worksheet, drag and drop the “Measure Names” data field into the “Rows” shelf.

The screenshot shows the Tableau interface for creating a summary statistics table. The 'Columns' shelf contains 'Measure Names' and the 'Rows' shelf is empty. The 'Marks' card is set to 'Automatic' and contains two fields: 'Measure Values' and 'Measure Names'. The 'Measure Values' field is edited to show four calculated fields: 'AVG(Company Profits)', 'STDEV(Company Profits)', 'MIN(Company Profits)', and 'MAX(Company Profits)'. The resulting view is a table titled 'Summary Statistics' with the following data:

| Summary Statistics          |             |
|-----------------------------|-------------|
| Avg. Company Profits        | 502,467     |
| Std. dev. of Company Prof.. | 3,272,664   |
| Min. Company Profits        | -11,049,461 |
| Max. Company Profits        | 9,168,704   |

### ***Probability Display***

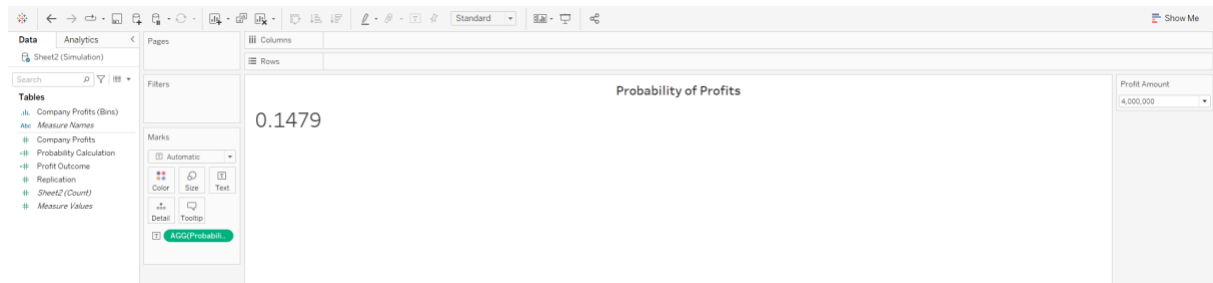
The second component of our dashboard consists of a display to indicate the probability that the minimum profits from the health insurance plan would be equivalent to certain test values. Exhibit 3 presents this display, which is created by applying the following steps in Tableau:

1. Create a new worksheet and rename it “Probability of Profits.”
2. Create a parameter named “Profit Amount” with the following list of values: 2,000,000, 4,000,000, and 6,000,000.<sup>3</sup>
3. Create a calculated field named “Profit Outcome” using the following formula: IF [Company Profits]> [Profit Amount] THEN 1 END.<sup>4</sup>
4. Create a calculated field named “Probability Calculation” using the following formula: SUM([Profit Outcome])/1001.

<sup>3</sup> In Tableau, a parameter is a workbook variable such as a number, date, or string that can replace a constant value in a calculation, filter, or reference line. The list of values that I create in this parameter allows me to examine the probability that the health insurance plan will generate profits of at least \$2,000,000, \$4,000,000, and \$6,000,000.

<sup>4</sup> In Tableau, a calculated field allows the creation of new data from data that already exists in the data source. The values of this data is determined by a calculation.

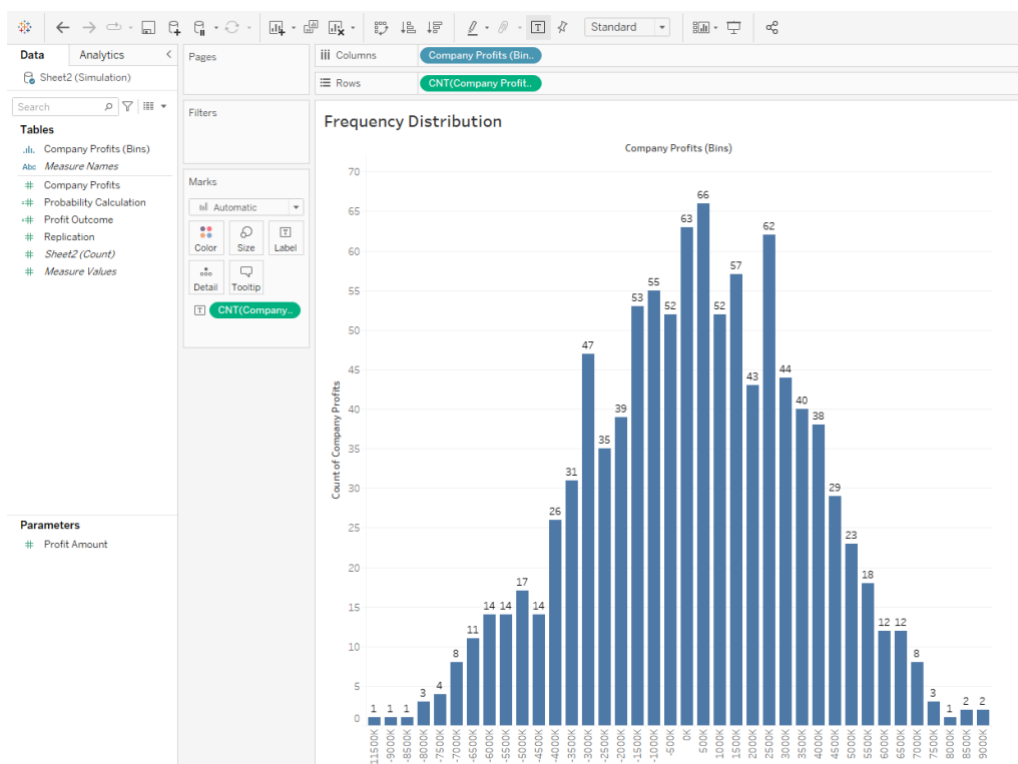
- From the “Data” tab of the new worksheet, drag and drop the “Probability Calculation” data field into “Text” in the “Marks” area.
- Finally “Show” the Profit Amount parameter. Making selections on the parameter allow you to examine the probability that the health insurance plan will generate profits of at least the selected amount. For example, Exhibit 3 indicates that there is a probability of 0.1479 that the health insurance plan will generate profits of at least \$4,000,000.



### Frequency Distribution Histogram

The third component of our dashboard consists of a histogram to display the frequency distribution of our replications. Exhibit 4 presents this frequency distribution histogram, which is created by applying the following steps in Tableau:

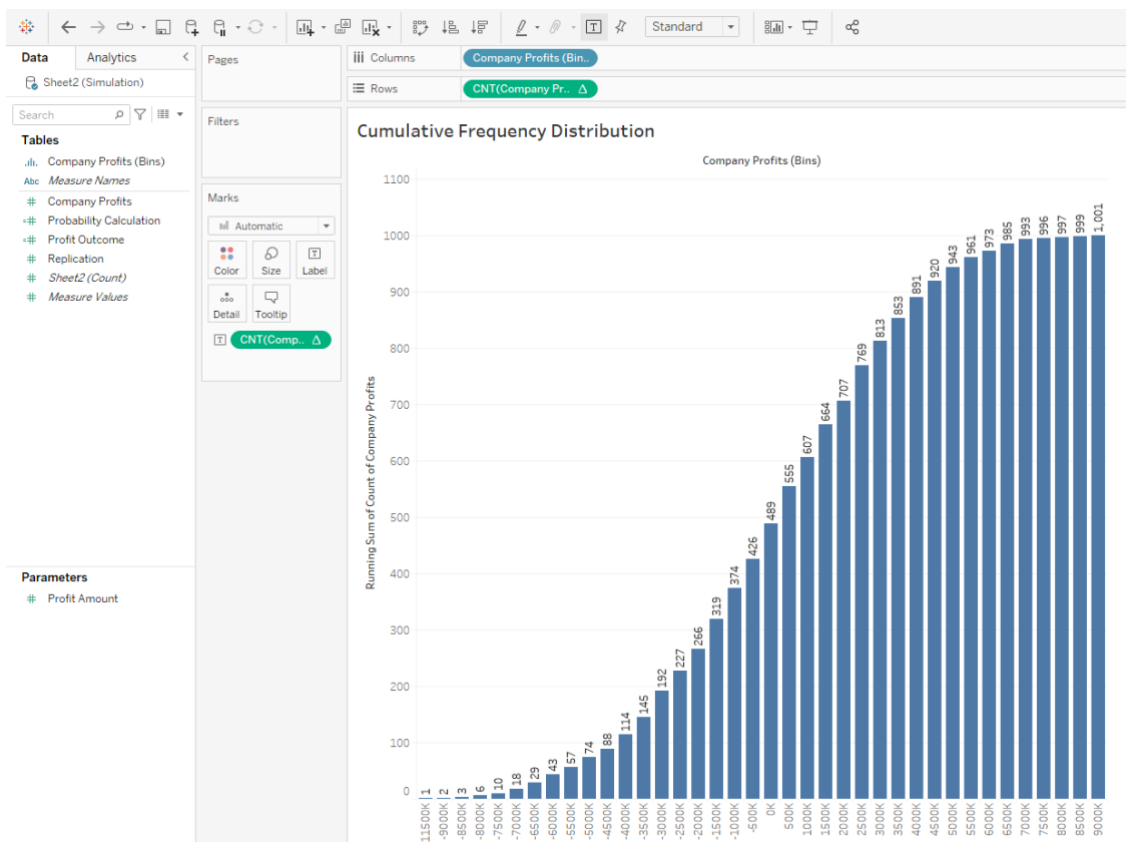
- Create a new worksheet and rename it “Frequency Distribution.”
- Using the Company Profits field, create bins, with bin sizes of 500,000. Name this new field Company Profits (Bins).
- From the “Data” tab of the new worksheet, drag and drop the “Company Profits (Bins)” field into the Columns shelf.
- From the “Data” tab of the new worksheet, drag and drop the “Company Profits” field into the Rows shelf. Set the aggregation measure to “Count.”
- From the “Data” tab of the new worksheet, drag and drop the “Company Profits” field into the “Label” in the “Marks” area. Set the aggregation measure to “Count.”



### Cumulative Frequency Distribution Histogram

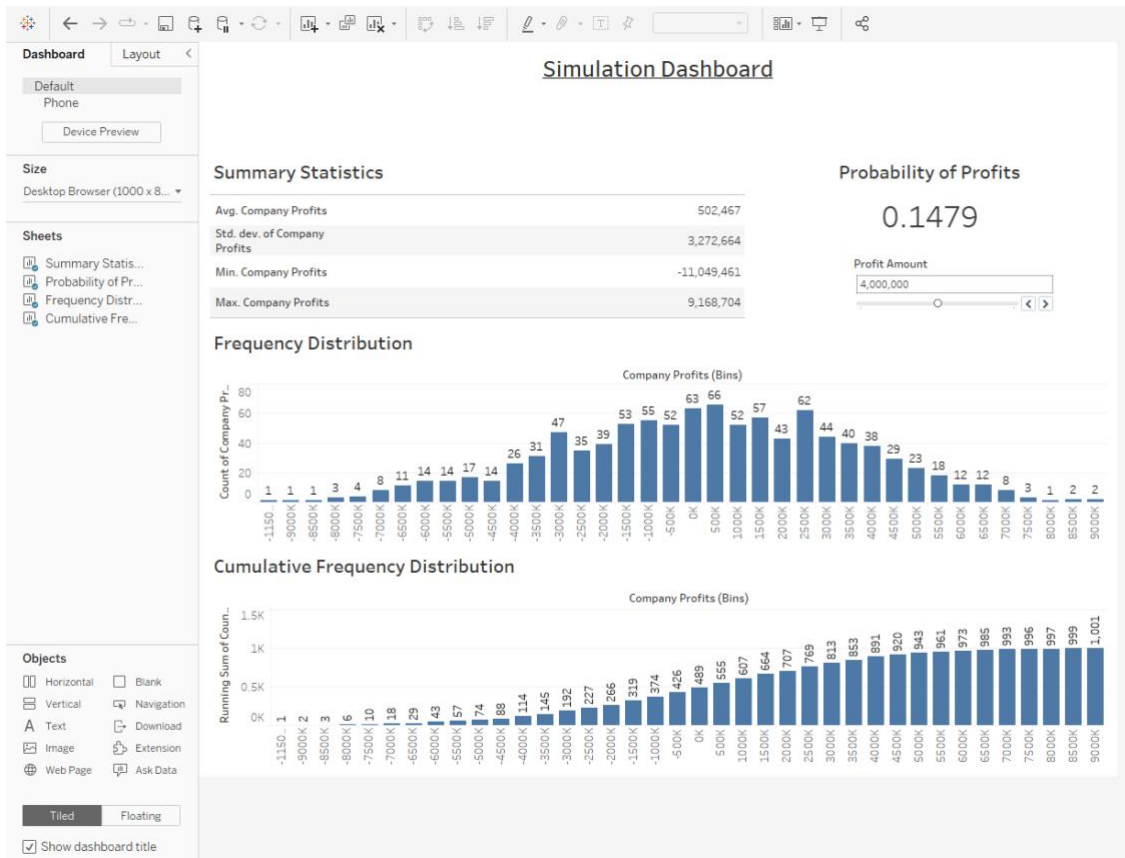
The fourth component of our dashboard consists of a histogram to display the cumulative frequency distribution of our replications. Exhibit 5 presents this cumulative frequency distribution histogram, which is created by applying the following steps in Tableau:

1. Replicate the “Frequency Distribution” worksheet. Rename this worksheet “Cumulative Frequency Distribution.”
2. Add a “Running Total” table calculation to the “CNT Company Profits” fields in the Rows shelf and “Label” in the “Marks” area.



### Consolidated Dashboard

Finally, I create the simulation dashboard by putting the four components together on a Tableau dashboard, which I name “Simulation Dashboard.” This dashboard is presented in Exhibit 6. The dashboard provides several key insights related to the simulation replications to decision makers in a single view. First, the summary statistics table provides an overview of the key statistical characteristics of the potential profits from the health insurance plan. Second, the Profitability of Profits display allows the decision maker to make assessments of the likelihood of key outcomes relating to overall profits from the health insurance plan. Third, the frequency distribution and cumulative frequency distribution histograms provide the decision maker with a visual display of the replications. Overall, these components of the dashboards provide important information which the decision maker can rely on in making assessments about the potential profitability of the health insurance plan.



#### 4. Conclusion

Data dashboarding, which involves organizing and visually displaying data in an easy to use interface to facilitate the processing of analyzing large, complex data sets, is an important skill which accountants can apply to provide insights to aid accounting decision making. In this article, I use a worked example to illustrate how accountants can use Tableau to develop a dashboard that provides insights from the output obtained from a simulation model to aid accounting decision making.

The discussions in this article are relevant to accounting practitioners. In particular, it illustrates how, against the backdrop of rapid technological advances, data dashboarding has emerged as one of the key skills that accountants should possess. Further, it also demonstrates and provides details about how a data dashboard can be created using Tableau, a popular data visualization tool, to provide insights to support accounting decision making.

#### Appendix A

It is now 31 December 2016. As of December 2016, Baker has 15,222 customers who each pay \$200 per month in premiums. Average insurance claim per customer in the month was \$185. Although Baker does not expect to raise premiums in 2017, it expects the number of customers signed on to the health insurance plan to increase by an average of 2% per month, and for average claims per customer to increase by an average of 1% per month. Figure 1 summarizes these expected trends related to the insurance plan in 2017:

|   | A                          | B        | C           | D    |
|---|----------------------------|----------|-------------|------|
| 1 |                            | 2016     | 2017        |      |
| 2 |                            | December | Assumptions | Rate |
| 3 | No of customers            | 15,222   | Increasing  | 2%   |
| 4 | Average claim per customer | \$185    | Increasing  | 1%   |
| 5 | Premiums per customer      | \$200    | Constant    |      |

Any claims made by customers of the health insurance plan are paid out by Baker from premiums collected from other customers on the plan. Should premiums collected from customers be insufficient to pay claims, Baker would then have to pay these outstanding claims from its own cash account.

Baker needs to determine how likely it is that premiums collected will be able to cover claims made on this health insurance plan (i.e. that this insurance plan will be profitable) in 2017. If the insurance plan is likely to be profitable, Baker would not need to accrue any money to pay for customer claims (because they can be paid from profits). However, if the plan is not likely to be profitable, Baker would then have to determine how much money to accrue in order to pay for outstanding customer claims (from its own cash account).

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