XBRL and SQL: A Teaching Case for Collecting Granular Firm Level Data

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Abstract: Most data analytics teaching cases focus on data transformation and data analytics. Recognizing that data collection is a crucial prerequisite for data analytics, we created a teaching case that introduces students to a fundamental database query language, SQL, commonly used for data collection. This case also introduces students to an underutilized resource of financial reporting: eXtensible Business Reporting Language (XBRL). We have students use SQL to gather standard XBRL tags from financial statement footnotes, but the method demonstrated can be applied to any standard XBRL tagged data. Thus, this case is ideal for any accounting class where financial statement data, data analytics, and data collection is discussed, including PhD seminars. The learning objectives for this case are: (1) to develop students' abilities in SQL programming; (2) to develop students' understanding of XBRL as a valuable data resource; and, (3) to develop students' understanding of effective data collection.

Keywords: SQL, eXtensible Business Reporting Language, XBRL, Data Analytics, Data Collection, Data Gathering, Alteryx, PowerBI

Data Availability: Data are available from XBRL US and public sources cited in the text.

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An important prerequisite for data analytics is the collection of relevant information. As noted in a recent article published on TechTarget: "Effective data collection provides the information that's needed to answer questions, analyze business performance or other outcomes, and predict future trends, actions and scenarios." (Stedman and McLaughlin 2022). One important source of data is the raw data collected and stored by organizations as structured data in databases. Since accountants, regardless of their line of service, need data in order to conduct their downstream processes (e.g., assurance, consulting, compliance, etc.) savvy accounting students looking to take their data analytics skills to the next level should understand how to collect the structured data they need.

This teaching case provides an introduction to a relevant programming language, SQL, which is commonly used for collecting data from structured databases. SQL can be invoked in a variety of data analytics programs including: Access, Alteryx, Excel, ERP systems, Python, R, RapidMiner, and SAS. Since SQL can be invoked in any of these data analytics tools, learning SQL programming will allow you to be flexible in obtaining the data necessary for your task. Your instructor will let you know which program(s) you will use for this teaching case.[1]

In addition, this teaching case introduces you to an important, yet underutilized source of granular financial statement data: eXtensible Business Reporting Language (XBRL).[2] Since 2012 most companies filing financial statements with the Securities Exchange Commission are

[1] Since most of the programs listed above are available free to students through educational licenses, you can further your understanding of how to use SQL programming language across multiple data analytics tools. A valuable tutorial resource for learning more about SQL programming beyond this case is https://www.w3schools.com/sql/

[2] For more information on the history of XBRL and the use of XBRL for accounting research, we refer interested readers to Hoitash, Hoitash, and Morris (2021).

required to report financial statement information both in human readable and machine readable formats. The latter is accomplished using XBRL, an XML-based markup language. XML-based markup languages allow users to query data using tags. XBRL associates the numeric information in financial statements with specific tags. These tags can be used to collect granular level data from the face financial statements (e.g., Balance Sheet, Income Statement, Cash Flow Statement, or Statement of Stockholders Equity) or from the detailed notes of the financial statement. The benefit of using a computer programming language like SQL becomes clear when you consider how long it would take you to hand collect the granular data for all firms in an industry across multiple years. Using a computer program to speed up the process of data collection allows you to spend more time analyzing the data.

Requirements

To collect relevant data you need to complete four steps: (1) Identify the structure of the data that you seek to collect. In this particular case, the structure is (a) identified by the tags which are attached to the granular level of data you want to collect and (b) identified by the structure of the data tables which house the data you seek to collect; (2) Identify the firms (industry) you want to collect data for and the relevant time period; (3) write an SQL program using the data analytics tool of your instructor's choice; (4) verify that the data collection was complete and accurate.

Data Structure

FASB's GAAP Financial Reporting Taxonomy

Since 2012 the Securities Exchange Commission (SEC) required most firms to report financial statement information both in human readable and machine readable formats. The

machine readable format can be accessed via SQL database queries. The SEC requires filers to 'tag' every number in the financial statement with a specific XBRL tag. The XBRL tags are largely unique to each data fact (number). In order to facilitate collection of XBRL tagged data, FASB publishes a standard XBRL taxonomy each year. This standard taxonomy contains the "standard tags" that companies must use to tag the financial statement data. For example, all companies who report Assets on their balance sheet should use the same "standard tag", Assets.

Complete the steps below to gain a better understanding of FASB's taxonomy:

1. Read the additional information about XBRL tags and FASB's XBRL taxonomy in Appendix A.
2. Explore the most recent GAAP Financial Reporting taxonomy on FASB's website. A sample link to the 2022 GAAP Financial Reporting taxonomy is https://fasb.org/Page/PageContent?PageId=/xbrl/2022financial.html.
3. Answer the following questions using the Network: Presentation mode (default view under the Network Browser):
    a. The standard tags associated with the balance sheet are organized under "10400 – Statement – Statement of Financial Position, Classified".
        i. Identify the standard tags associated with the summary level financial statement items presented on the Balance Sheet: Total Assets; Total Liabilities; Total Liabilities and Stockholders Equity.
        ii. For each tag identified above identify the following metadata: XBRL Type, Period type, Balance. How do these metadata align with your expectations based on financial statement reporting?

iii. Using the Relationships tab, do the calculations shown align with your expectations based on financial statement reporting?

b. Where are the standard tags for the Income Statement organized under the Network: Presentation mode?

i. Identify the standard tags associated with the following income statement line items: Revenues, Total; Cost of Goods and Services Sold; Operating Income (Loss), Total; Income Tax Expense Benefit; Net Income (Loss) Available to Common Stockholders, Basic; and Earnings Per Share, Basic, Total?

ii. For each tag identified above identify the following metadata: XBRL Type, Period type, Balance. How do these metadata align with your expectations based on financial statement reporting?

iii. Using the Relationships tab, do calculations shown align with your expectations based on financial statement reporting?

c. Where are the standard tags for the Statement of Cash Flows organized under the Network: Presentation mode?

i. Identify the standard tags associated with the following cash flow statement line items: Net Cash Provided by (Used in) Operating Activities, Continuing Operations; Net Cash Provided by (Used in) Investing Activities; Net Cash Provided by (Used in) Financing Activities; Income Taxes Paid (Hint: This information is required under the Supplemental Cash Flow disclosure).

ii. For each tag identified above identify the following metadata: XBRL Type, Period type, Balance. How do these metadata align with your expectations based on financial statement reporting?

iii. Using the Relationships tab, do calculations shown align with your expectations based on financial statement reporting?

Financial Statement Footnote Data: Income Tax Rate Reconciliation Table

While the last section introduced you to XBRL tags using the face financial statements, there is an extensive amount of information available in financial statement footnotes. For the remainder of this teaching case, you will focus on the information provided in the income tax rate reconciliation table financial statement footnote.

Media, political leaders, regulators, analysts, executives, taxpaying citizens, and academics have frequent conversations about firms' effective tax rates (the average rate of tax expense incurred by a company on their pretax income). These conversations often focus on why, or how, companies manage to have effective tax rates which are below the tax rate imposed by law (statutory tax rate). For example, the New York Times criticized FedEx for paying low taxes https://www.nytimes.com/2019/11/17/business/how-fedex-cut-its-tax-bill-to-0.html. FedEx's response to these criticism can be seen here https://www.marketwatch.com/story/fedex-ceo-to-new-york-times-after-tax-bill-expose-debate-me-bro-2019-11-17. In addition to media attention, firms' effective tax rates receive attention from numerous organizations focus on tax policy Tax Policy Center (www.taxpolicycenter.org) and the Tax Foundation (www.taxfoundation.org). For Example, the Institute on Taxation and Economic Policy (ITEP) focuses on providing a list of large companies who paid zero tax, or received a refund, despite

having positive pretax earnings https://itep.org/55-profitable-corporations-zero-corporate-tax/. This ITEP article was referenced by political leaders in support of further corporate tax reform.

The data needed to gain a better understanding of why companies' effective tax rates differ from the statutory tax is reported to investors on a firms' financial statements. Specifically, Regulation S-X Rule 4-08(h)(2) requires companies to disclose all major items which cause the company's effective tax rate to differ from the statutory tax rate in the financial statement footnotes.[3] Major items are defined as an item "where the amount of each such tax effect exceeds five percent of the amount computed by multiplying the income before tax by the applicable statutory Federal income tax rate."[4] This reconciliation is often presented as a Income Tax Rate Reconciliation Table.

1. Read Appendix B, which provides an example of the Income Tax Rate Reconciliation Tables and XBRL tags from the 2020 annual (10-K) financial statements filed by the FAANG (Facebook, Apple, Amazon, Netflix, and Google) companies.[5]
2. Identify a firm that you would like to investigate. Once your instructor has approved your firm, go to the Securities Exchange Commission Edgar website and use the firm name and ticker to identify the most recent financial statement filing. Examine your firm's Income Tax Rate Reconciliation table and answer the following questions about your firm.
    a. What is the most recent financial statement?
    b. What is the firm's effective tax rate for the three years identified?

[3] https://www.law.cornell.edu/cfr/text/17/210.4-08
[4] *ibid*.
[5] What is a FAANG Company? | FAANG Stock Meaning (valuethemarkets.com)

c. For each of the three years, is the firm's effective tax rate above or below the statutory tax rate?

d. Does the firm's effective tax rate remain fairly consistent year to year or does the effective tax rate vary significantly?

e. Does your firm report the income tax rate reconciliation table using dollar amounts or percentages?

f. What are the major reconciling items (line items) reported by your firm on the income tax rate reconciliation table?

   i. Which of these items result in increases to the firm's effective tax rate?

   ii. Which of these items result in decreases to the firm's effective tax rate?

   iii. Explain whether these three factors and their effect on the firm's effective tax rate make sense.

g. What is your firm's four digit standard industrial classification (SIC).

3. Return to FASB's GAAP Reporting taxonomy. What are the standard tags for each line item reported in the income tax rate reconciliation table when a filer uses:

   a. The dollar amount

   b. The percentage.

XBRL US Database structure

XBRL US's database provides access to "data from SEC interactive data filings in a relational model."[6] (XBRL US 2017 page 4). This section of the teaching case focuses on providing sufficient information regarding the datbase and relational model to complete this

[6] Students wishing to understand more about relational models can refer to Oracle's guide to relational databases https://www.oracle.com/database/what-is-a-relational-database/#:~:text=The%20relational%20model%20means%20that,data%20as%20a%20logical%20structure.

case.[7] Your task is to collect data from the tax footnotes for all firms within your industry, over a specified period of time using XBRL tags. To complete this task, you need information which identifies a specific filing, the firms, the industry, the tags, the numeric value, and the fiscal year. XBRL US's database contains this information across four tables, the accession table, the entity table, the sic_code table, and the fact table.

The accession table (public.accession) contains a primary key which identifies a specific filing. This primary key is a valuable reference field (column). Reference fields contain data which allow you to link (or join) rows of data across multiple tables. An easy way to think of a reference field is as if it is similar to a persons legal name (or identity). For example, say you have a friend Kecia Ward. If you refer to property owned by Kecia, you would say "That is Kecia's car" or "That is Kecia's house." Kecia may move and/or get a new car. In this case, your reference to the property she owns or previously owned could be associated with a time period. "That is Kecia's old car, but she has a new car now." A reference field operates similarly to a persons legal name. In the case of the accession table, the primary key (accession_id) is a unique number which identifies the filer (company) and the specific filing (which is time dependent).

The SQL query use the accession table as the primary table for linking together (joining) the other database tables where you collect relevant information from. The accession table is a useful primary table because it contains multiple reference fields, including an entity_id field, a standard_industrial_classification field, and the accession_id field. The accession table contains other useful fields, including a field which identifies whether a filing is the most current filing made by the registrant, details about the company (e.g., business address, zip code) and details

[7] XBRL US provides user guides for their database which provide detail about the available tables, fields within the tables, and reference fields.

about the filing (e.g., reporting period end date, whether the filing is a restatement, and filing type).

We will start with the link between the accession table and the entity table (public.entity). You link the accession table to the entity table using the entity_id field, a primary key assigned to a particular entity. The entity table contains information about the filer, including the entity's name (entity_name) and the entity's Central Index Key (CIK) code (entity_code). The CIK code is a number assigned by the Securities Exchange Commission (SEC) which allows users to search for SEC filings made by a company. A CIK code is useful because it allows you to find the filings made by a company even if the filer's name changes, is abbreviated, or is reported in an unexpected order.[8] As one such example, Facebook recently changed their entity name to Meta, but their CIK code remained 1326801. You will write the entity_id, entity_code, and entity_name to the dataset created from your SQL query.

Now that we know where to get entity specific information, the next step is to collect information regarding the entity's industry. A common way to evaluate a firm's performance is to compare that firm's performance to the performance of firms within the same industry. The Standard Industrial Classification (SIC Code) is a four digit number assigned to an industry.[9] Depending on the research purpose, firms may be grouped based on their four digit SIC codes, or more broadly using the two-digit SIC code (the first two-digits of the four digit SIC code) or Fama French industry groups,[10] or the SIC code groups reported by McKimmon Center for

[8] https://www.sec.gov/edgar/searchedgar/cik.htm
[9] More detail about the SIC Code can be found at https://www.investopedia.com/terms/s/sic_code.asp and a full list of four digit SIC codes can be found at https://www.sec.gov/corpfin/division-of-corporation-finance-standard-industrial-classification-sic-code-list . Note, when a SIC code is shown as a three digit number, there is a leading zero, so the four digit SIC code of industry 100 is 0100.
[10] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_48_ind_port.html

Extension & Continuing Education at NC State University.[11] Industry information is contained in the sic_code table. The standard_industrial_classification reference field in the accession table can be linked (joined) with the sic_code_id field in the sic_code table. Once these two tables are linked, you can then write both the sic_code and the the description field to the dataset created by your SQL query. The description field provides you with the "text description of the industry classification" (XBRL US 2017 page 34) so that you don't have to cross reference a SIC code to a classification table. You should rename this description field to SIC_Description in your SQL query.

The last table that we want to collect information from, si the fact table. The fact table contains a record (row) for each numeric value and metadata reported for each XBRL tag. We link the fact table to the accession table using the accession_id reference field. The following fact table fields are written to the dataset created by the SQL query: accession_id, fiscal_year, unit_id, uom, element_local_name, and fact_value. Since these are the major fields written into our final dataset, let's go through each of these fields.

As we learned earlier, the accession_id is a unique numeric code assigned to each filing. Writing the accession_id out to the final dataset allows us to link each row of data in the dataset back to a specific filing.

As we saw in Appendix B, the income tax rate reconciliation is reported on a comparative basis. This allows a financial statement user to identify trends, outliers, etc. even when looking at only one filing. Since each unique filing contains multiple years worth of data, we need to be able to identify each XBRL tagged data fact to a specific fiscal period. We can do this using the

[11] https://mckimmoncenter.ncsu.edu/2digitsiccodes-2/

fiscal_year field from the fact table. Note, the comparative basis financial reporting requirement leads to duplicative data when you collect information across multiple years (or quarters). For example, Facebook's 2020 10-K reports data for the 2018, 2019, and 2020 fiscal year ends. By the 2020 10-K, the 2018 fiscal year end data will have been reported on three 10-Ks, the 2018 10-K, the 2019 10-K, and the 2020 10-K.[12] Thus, XBRL data collection results in duplicative values for the same fact for the same fiscal period. Returning to the accession table, you can use the is_most_current field to remove duplicate reporting or you can use a DISTINCT command in your SQL query.

The unit_id and uom fields are metadata fields that provide information about the unit of measure for the fact. Unit of measures identify how the value is reported. For example, the value may be reported in US dollars (USD), other currency, or decimals.

The element_local_name is the XBRL tag associated with the numeric fact. Your SQL query will use this field to limit the data to just those rows associated with standard tags from the income tax rate reconciliation table.

The fact_value is the numeric value. Unlike human readable financial statements, which are often reported on a scaled basis (e.g., hundreds, thousands, or millions), the fact_value has already been adjusted for the scaling and decimals.

Overall Program and SQL Program Instructions

Now that we know the tags associated with the information we seek to collect and the structure of the database from which we will be pulling the information, the next step is to write an SQL program to query the data. Your instructor will tell you which software program (e.g.,

[12] Financial restatements increase the number of facts reported for the same fiscal period and XBRL tag.

Access, Alteryx, Excel, Python, R, RapidMiner, SAS, etc.) you will use and will provide you with instructions on how to access the XBRL US database. Regardless of which program you use, the process will be similar.

1. You begin by connecting to XBRL US's database. Unless you are just doing a summary search using the XBRL US api, you will need to establish a connection using the appropriate driver, username, and password.
2. Once you have established a connection with XBRL US's database, you will need an SQL query which identifies the data that will be collected. We discuss each step below:
    a. SQL queries begin by telling the program what data is written into a final dataset. This command begins with the word SELECT.
    b. Immediately following the SELECT command, you will list the fields (columns) of data that you want to acquire.
        i. The select statement can collect all data if you use a wildcard *
            1. SELECT *
        ii. However, you only want a limited subset of the data. You can reference specific columns of data using the table name and column name. For example, the following SQL command tells the query to pull the accession_id column from the fact table:

```
SELECT
fact.accession_id
```

        iii. You include additional columns of data by placing a comma in between each column. For example, the following SQL command tells the query to pull both the accession_id and the fiscal_year from the fact table:

```
SELECT
```

```
fact.accession_id,
fact.fiscal_year
```

iv. You do not need a new select statement when switching tables. Instead follow the method of placing a comma after each column of data. Do not place a comma after the last column of data you want to pull.

c. Once you have completed the SELECT command, the next step is to tell the program where to get the data. This is accomplished with a FROM command. In XBRL US's database the fact table is referred to as the public.fact table. The following SQL command identifies the public.fact table as a data source:

```
SELECT
fact.accession_id,
fact.fiscal_year'
/*additional data desired here*/
FROM
public.fact
```

i. Use a comma to separate tables. Do not use a comma after the last table. (**Hint: Even though we do not want all data to be written into the final data file you have to combine multiple tables to limit the data).**

ii. The relevant tables in this step are the public.fact, public.accession, public.sic_code, and public.entity tables.

```
SELECT
fact.accession_id,
fact.fiscal_year,
/*additional data desired here*/
FROM
public.fact, public.accession, public.sic_code, public_entity
```

d. The next step tells the program how to join the data. In SQL data is joined using a WHERE statement and reference fields. The following SQL command includes a data join on the accession_id for both the fact and accession tables.

```
SELECT
fact.accession_id,
fact.fiscal_year,
/*additional data desired here*/
FROM
public.fact, public.accession, public.sic_code, public_entity
WHERE
fact.accession_id = accession.accession_id
```

i. To join multiple tables use an AND statement between each join statement. The following SQL joins multiple tables:

```
SELECT
fact.accession_id,
fact.fiscal_year,
/*additional data desired here*/
FROM
public.fact, public.accession, public.sic_code, public_entity
WHERE
fact.accession_id = accession.accession_id
AND
accession.standard_industrial_classification = sic_code.sic_code_id
AND
/*provide additional links here*/
```

e. The above commands instruct the program to write specific fields into a final data set, using data that was collected and joined across tables. Next we limit our sample to specific XBRL tags. Continuing under the WHERE statement, identify the column which contains the tag name. Then use an IN statement to limit the data to specific XBRL tags. Since tags are string data (not numeric) we need to use ***single quotes*** to ensure that SQL identifies an exact match for each tag (fact.element_local_name) we want to pull. Additionally, since we want the SQL program to pull multiple tags, we have a single condition which contains all the tags we are looking for inside ***parentheses***. Our SQL query now reads:

```
SELECT
```

```
fact.accession_id,
fact.fiscal_year,
/*additional data desired here*/
FROM
public.fact, public.accession, public.sic_code, public_entity
WHERE
fact.accession_id = accession.accession_id
AND
accession.standard_industrial_classification = sic_code.sic_code_id
AND
/*provide additional links here*/
fact.element_local_name IN
(‘EffectiveIncomeTaxRateReconciliationAtFederalStatutoryIncomeTaxRate',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Percent',
/*list additional tags here*/
/*last tag identified here*/)
```

f. Next limit the data to a specific industry using the sic_code_id. You identified your firm’s four digit SIC code. Your instructor will guide you on whether to use a four digit SIC Code, or, as we demonstrate below, to use a two digit SIC code by capturing all firms within a range of four digit SIC codes. This limitation is accomplished within the IN statement. The SQL query now reads:

```
SELECT
fact.accession_id,
fact.fiscal_year.
/*additional data desired here*/
FROM
public.fact, public.accession, public.sic_code, public_entity
WHERE
fact.accession_id = accession.accession_id
AND
accession.standard_industrial_classification = sic_code.sic_code_id
AND
/*provide additional links here*/
fact.element_local_name IN
(‘EffectiveIncomeTaxRateReconciliationAtFederalStatutoryIncomeTaxRate',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Percent',
/*list additional tags here*/
/*last tag identified here*/)
sic_code_id Between 0100 and 0199          /*Substitute your own SIC code here*/
```

g. You can also limit the data to a specific fiscal_year or years. Pulling a single year of data at a time speeds the processing time of the data request. You can then combine all years of data after pulling the data. An AND command further limits the data to specific years. The SQL query now reads:

```
SELECT
```

```
fact.accession_id,
fact.fiscal_year,
/*additional data desired here*/
FROM
public.fact, public.accession, public.sic_code, public_entity
WHERE
fact.accession_id = accession.accession_id
AND
accession.standard_industrial_classification = sic_code.sic_code_id
AND
/*provide additional links here*/
fact.element_local_name IN
(‘EffectiveIncomeTaxRateReconciliationAtFederalStatutoryIncomeTaxRate',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Percent',
/*list additional tags here*/
/*last tag identified here*/)
sic_code_id Between 0100 and 0199        /*Substitute your own SIC code here*/
AND
fiscal_year > 2020        /*Run your initial test with fiscal_year > 2020 to ensure
you get results; for your full, change to the year(s) identified by your instructor*/
```

h. The final step of the SQL query is to order the data by company (entity_id) and then by fiscal_year. As shown below, ordering is accomplished using an ORDER BY command.

```
SELECT
fact.accession_id,
fact.fiscal_year,
/*additional data desired here*/
FROM
public.fact, public.accession, public.sic_code, public_entity
WHERE
fact.accession_id = accession.accession_id
AND
accession.standard_industrial_classification = sic_code.sic_code_id
AND
/*provide additional links here*/
fact.element_local_name IN
(‘EffectiveIncomeTaxRateReconciliationAtFederalStatutoryIncomeTaxRate',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Percent',
/*list additional tags here*/
/*last tag identified here*/)
sic_code_id Between 0100 and 0199        /*Substitute your own SIC code here*/
AND
fiscal_year > 2020        /*Run your initial test with fiscal_year > 2020 to ensure
you get results; for your full, change to the year(s) identified by your instructor*/
ORDER BY
```

```
entity.entity_id,
fact.fiscal_year                /*For your full query run, turn this into a comment by
adding two dashes "--" to the beginning of the line*/
```

i. The above steps show how you can add comments to the SQL program /*(A-Z,[0-9]*/. Comments help users note changes and/or identify the purpose of a step.

3. The SQL query allows you to collect granular level data from financial statements. To use the data for analysis and visualization you have to export the data to Excel, text, CSV, or database files. Your instructor will specify the data export file type.

Verify the Data Collection

1. You need to verify the accuracy and completeness of the data collection. This can be done by spot checking observations, looking for duplicates, and/or checking your results with your instructor. While this last option is not always possible, think about the ways that you can look for both unwanted observations and missing observations after collecting data. Ensuring data quality is an iterative process, so you should expect to try multiple methods before becoming confident that your code pulled the data you were seeking. Effective data analysis relies on effective data collection.
    a. Describe the method(s) you used to ensure the quality of your data collection.
    b. What did you find during this review process that made you comfortable with your data collection methods?
    c. What did you find during your review process which made you uncomfortable with your data collection methods?
    d. How many rows of data did your final data set contain?
    e. How many distinct firms did your final data set contain?

f. Which firm had the longest series of information available? How many years of data were available for this firm?

g. Which firm had the shortest series of information available? How many years of data were available for this firm?

Optional

Data collection is a necessary precursor to data analysis. This optional step provides you with some initial data exploration opportunities by asking relevant questions.

Outlier analysis:

1. In your final data set, which firm had the highest ETR and in what year?
    a. What was the statutory tax rate for that year?
    b. What was the largest line item reported on their reconciliation that year?
    c. Did that line item increase or decrease the firm's effective tax rate?
    d. Look at the income tax rate reconciliation items for that firm for that year in the firm's 10-K. Did your program capture all reported line items for that income tax rate reconciliation? If not, what line items were missing?
        i. Can you discern why your program may not have pulled these line items?
        ii. What is a potential implication for investors or regulators of the answer to 1.d.i. above?
    e. Were there any economic, tax policy, and/or firm specific events which may have resulted in this high ETR for this firm?
2. In your final data set, which firm had the lowest ETR and in what year?
    a. What was the statutory tax rate for that year?

b. What was the largest line item reported on their reconciliation that year?

c. Did that line item increase or decrease the firm's effective tax rate?

d. Look at the income tax rate reconciliation items for that firm for that year in the firm's 10-K. Did your program capture all reported line items for that income tax rate reconciliation? If not, what line items were missing?

    i. Can you discern why your program may not have pulled these line items?

    ii. What is a potential implication for investors or regulators of the answer to 1.d.i. above?

e. Were there any economic, tax policy, and/or firm specific events which may have resulted in this low ETR for this firm?

3. Compare and contrast your answers to 1 and 2 above.

    a. Would there be any required changes to your SQL program? If so, what might these changes be?

    b. Would there be challenges to collecting additional data that may be found to be missing?

    c. What additional information or data sources might you like to collect if you were going to conduct a deep analysis of the income tax rate reconciliation table?

Data exploration:

4. What standard tag is most frequently used in your data set?

    a. How many firms use this tag?

    b. Is this frequency due to a lot of firms using the same tag, or due to a few firms using this tag in all reporting years?

5. What standard tag is least frequently used in your data set?

6. Does the frequency (most vs. least) of tag use make sense? Why or why not?
7. Expand your analysis to the top three, bottom three tags in terms of frequency.
    a. Does there seem to be a connection between the use of these tags and a firms ETR?

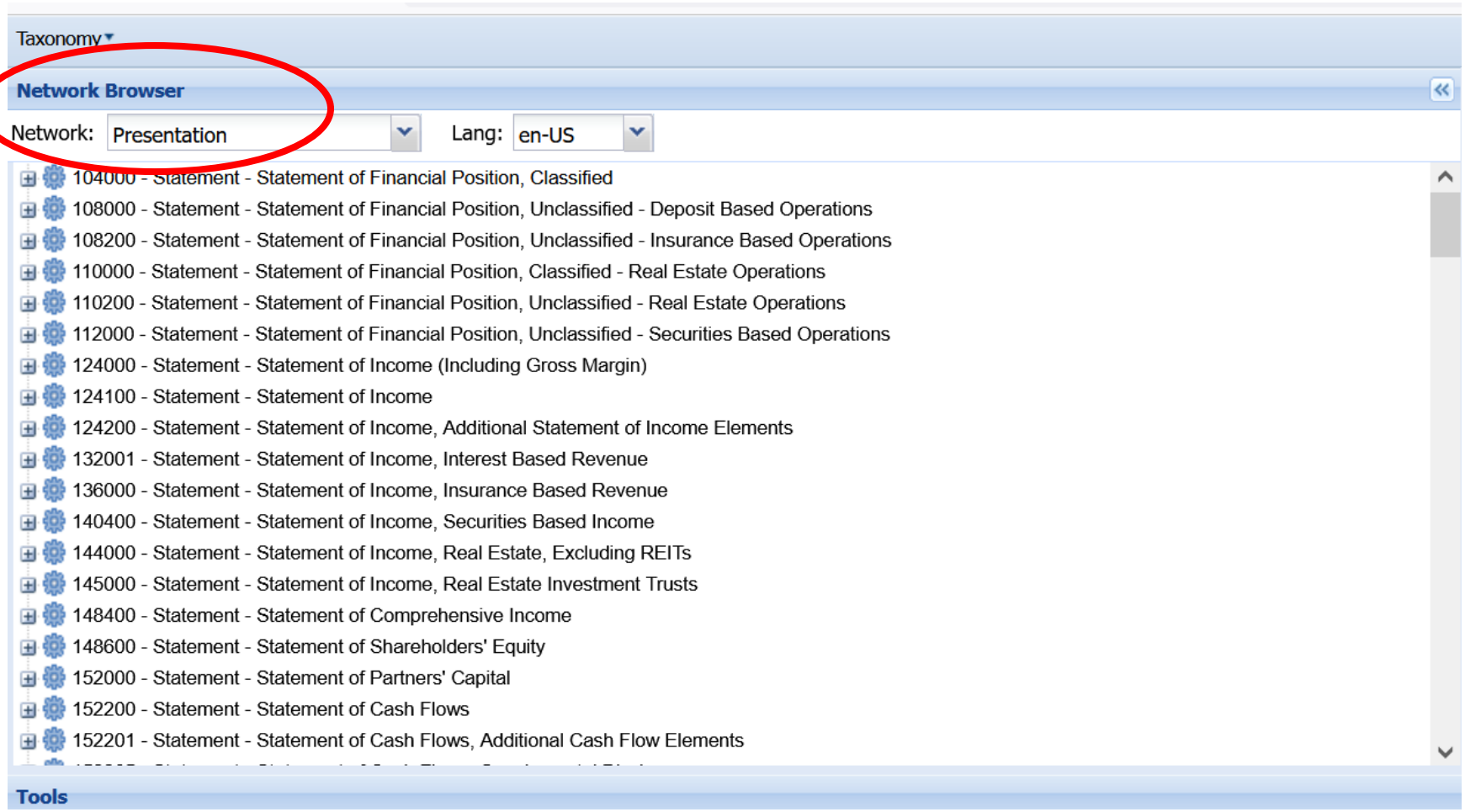
Trend analysis:

8. For all of the tags is there a discernable pattern (e.g., increasing, decreasing, or a spike in tag use) of tag use across the years of data collected?
    a. What economic, policy, or business factors might influence these discernable patterns?
9. What are firms' ETR trends across years in your industry?
10. Pick a common line item. Plot the value and/or change in that line item across time against the industry ETR across time.
    a. Repeat this analysis for a specific firm.

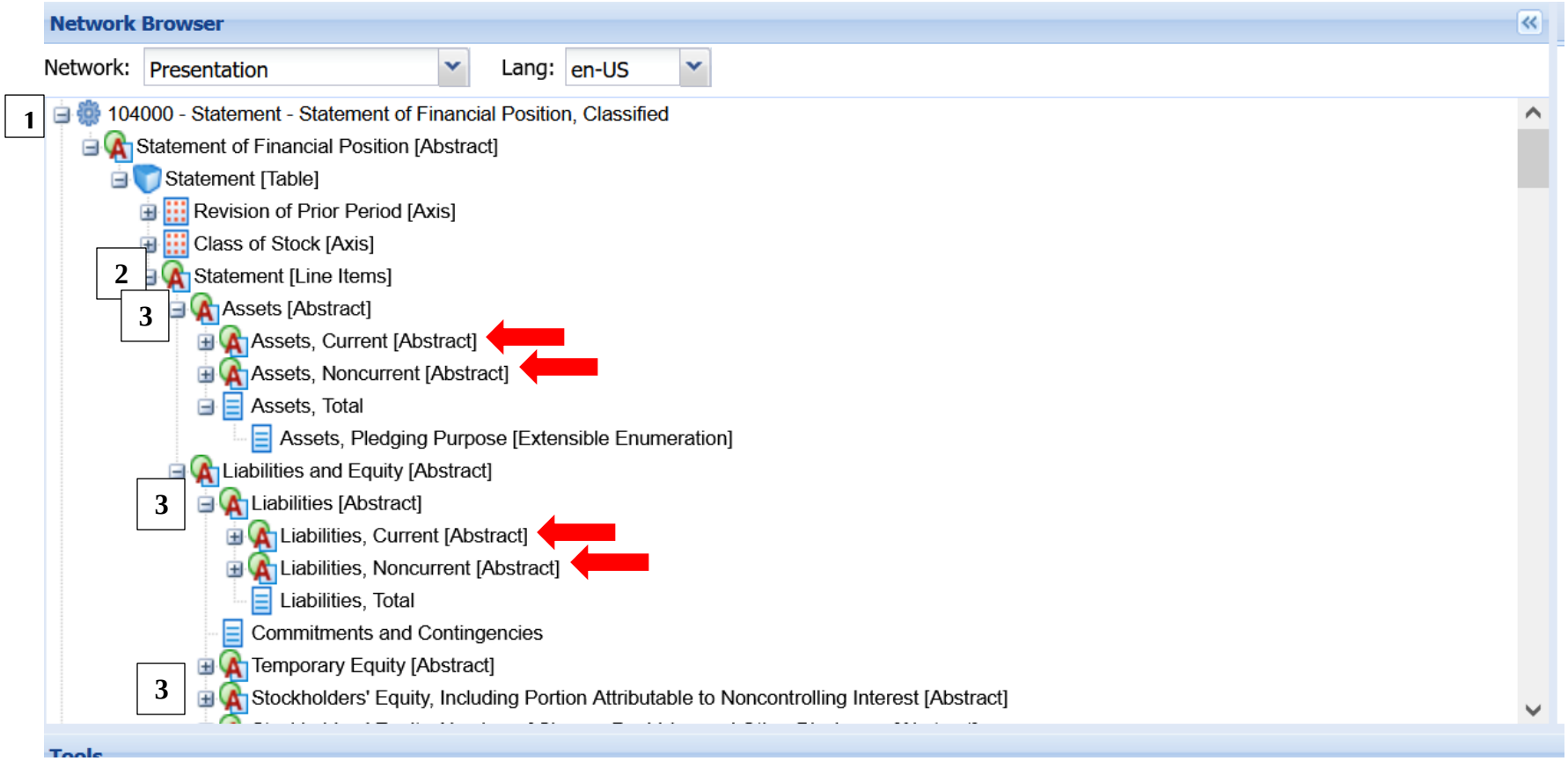
APPENDIX A

XBRL DATA AND FASB'S XBRL TAXONOMY

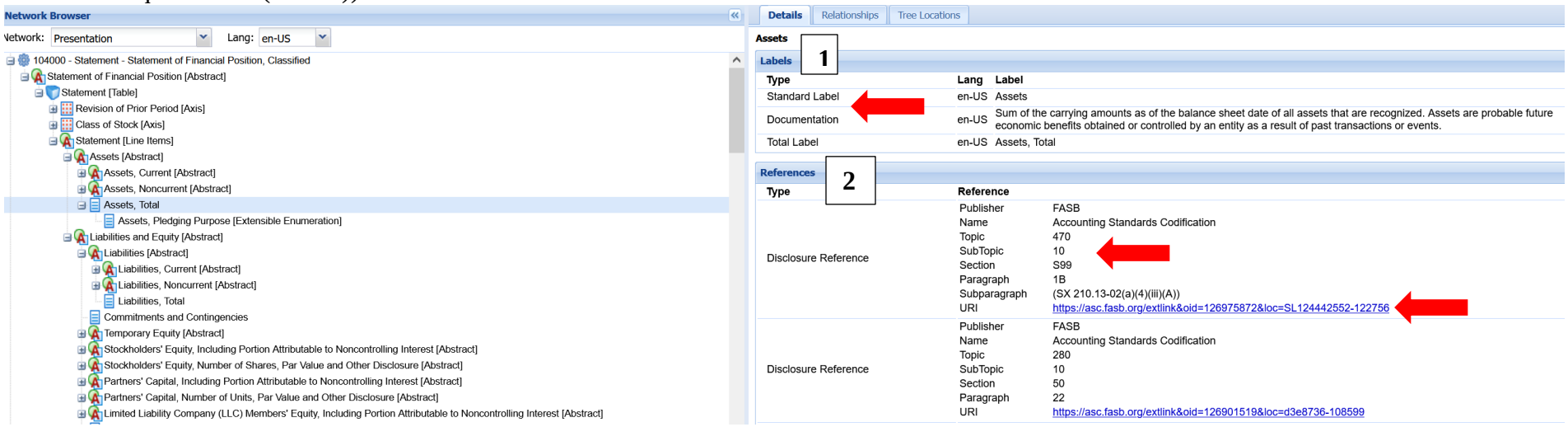
FASB's GAAP Financial Reporting taxonomy is organized by reporting topic. This is most easily seen in the Network Browser default view of Network: Presentation (see the circle in the picture below).



The taxonomy is further organized within each reporting topic by major areas. For example, the Balance Sheet is organized under 10400 – Statement – Statement of Financial Position (1). As you can see below, under the Statement [Line Items] heading (2) the taxonomy provides areas for Assets, Liabilities, and Stockholders Equity (3). Within the Assets and Liabilities areas are further broken out into the Current and NonCurrent areas (arrows below).



We use the Assets, Total line item to demonstrate that when you click on a specific line item the Details tab populates with information about that line item. As seen in the figure below the Details include the (1) Labels (which contains both the labels and documentation information (arrow)) and (2) the References (which include the disclosure references and links to those specific disclosure requirements (arrows)).



As seen in the figure below if you scroll down the Details tab, you will see the Properties (3) which contains both the (4) standard tag and metadata about that numeric fact (bracket). Metadata is data which provides information about the tagged data (Hoitash, Hoitash, and Morris 2021). In this case, the metadata tells us which taxonomy was being used (e.g., fasb/us-gaap/2022); the type of data reported by this standard tag (e.g., monetary, pure, decimal, etc.), the reporting period (e.g., instant, period); whether the tag is associated with an abstract (broader concept); whether the numeric data can be assigned a null value (Nillable); and whether the numeric fact has a debit or credit balance).

Details | Relationships | Tree Locations

Assets

Legacy reference	Name	Accounting Standards Codification
	Topic	942
	SubTopic	210
	Section	S99
	Paragraph	1
	Subparagraph	(SX 210.9-03(11))
	URI	https://asc.fasb.org/extlink&oid=126897435&loc=d3e534808-122878
Legacy reference	Publisher	FASB
	Name	Accounting Standards Codification
	Topic	944
	SubTopic	210
	Section	S99
	Paragraph	1
	Subparagraph	(SX 210.7-03(a)(12))
	URI	https://asc.fasb.org/extlink&oid=126734703&loc=d3e572229-122910
Taxonomy Implementation Note	elementCreationTaxonomyVersion	2008

Properties 3

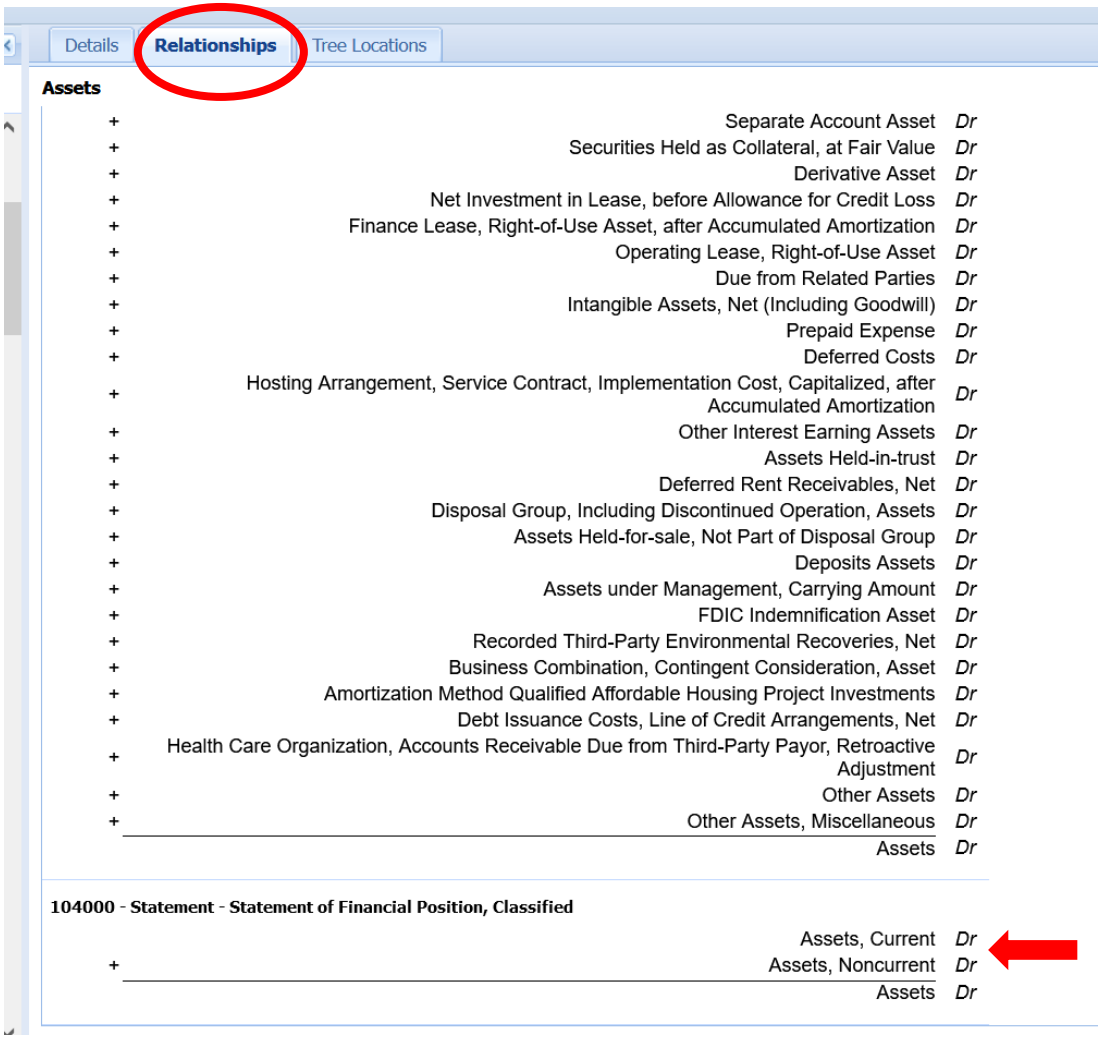
Property	Value
Name	Assets 4
Namespace	http://fasb.org/us-gaap/2022
Data Type	xbrli:monetaryItemType
XBRL Type	monetaryItemType
Substitution Group	xbrli:item
Period Type	instant
Abstract	false
Nillable	true
Balance	debit

Metadata

Custom Type Information

This concept does not have a custom type definition

Clicking on the Relationships tab (circle) allows you to see other data elements which are combined to obtain the summary level data. For example, as shown below, the total assets can be obtained by summing current and noncurrent assets (arrow).



Use this as a guide to answer the questions in *FASB's GAAP Financial Reporting Taxonomy* number 3 above.

APPENDIX B

INCOME TAX RATE RECONCILIATION TABLE AND XBRL TAGS

Firms are required to report a reconciliation between the U.S. statutory tax rate (the tax rate imposed by law) and the firm's effective tax rate (the average, or actual tax rate the company paid on their pretax income). This information is reported in the tax footnote income tax rate reconciliation table. For example, in 2021 the statutory tax rate was 21%. If a firm's effective tax rate (tax expense/pretax income) was 15%, the firm would have to report all of the factors that contribute to this difference. These factors may include: state and local income taxes, foreign income taxes, operating losses, credits, etc.

To facilitate the introduction of XBRL tags, we provide images of the Tax Rate Reconciliation tables from the 2020 financial statements (10-K) of the companies in the FAANG index (Facebook, Apple, Amazon, Netflix, and Google). These images should help you understand how XBRL tags can help individuals quickly gather important tax footnote data for a large portion of the companies.

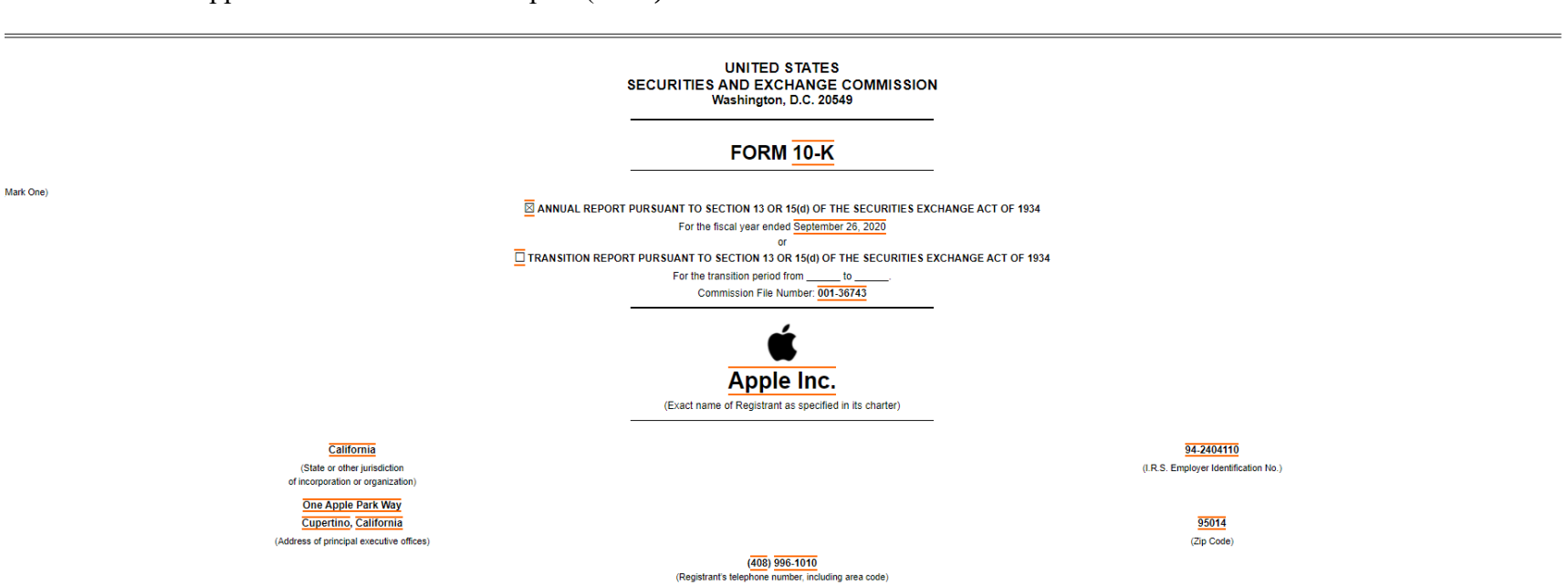
We can use FASB's GAAP Reporting Taxonomy to identify the relevant tags which can be used in an SQL query to collect the information from the income tax rate reconciliation table efficiently across a number of firms and firm years. Before we dive into the examples and the XBRL tags used in the Income Tax Rate Reconciliation table there are three important pieces of information which are relevant to this project.

1. Companies are required to use standard XBRL tags when one is available. Companies can use custom XBRL tags to report unique information or information where a standard tag is not available.

2. Federal Statutory tax rates for large corporations were 35% before 2018, and 21% after 2017. Companies may also have a blended statutory rate for 2017/2018 due to differences between the tax year and the financial reporting year.

3. Companies can report their reconciliations between the Federal Statutory Rate and their ETR in either dollars or percentages.

Let’s start with Apple’s Annual Financial Report (10-K) for their FYE 9/26/2020:



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

Mark One)

☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended September 26, 2020
or
☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____.
Commission File Number: 001-36743

Apple Inc.
(Exact name of Registrant as specified in its charter)

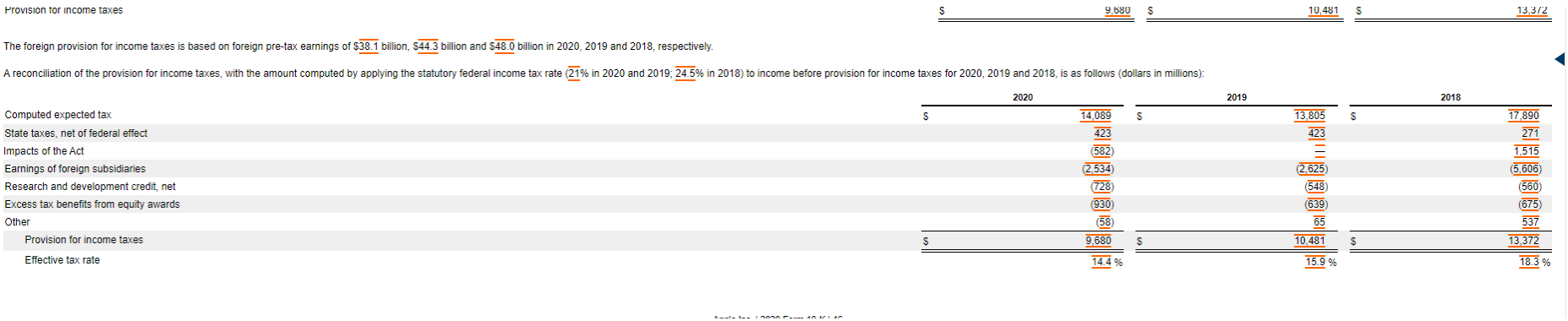
California		94-2404110
(State or other jurisdiction of incorporation or organization)		(I.R.S. Employer Identification No.)
One Apple Park Way Cupertino, California		95014
(Address of principal executive offices)		(Zip Code)

(408) 996-1010
(Registrant’s telephone number, including area code)

The first thing you notice is that certain words and numbers on this financial statement have orange bars above and below them. These orange bars indicate that the information is ‘tagged’ with an XBRL tag.

Go to SEC's EDGAR database https://www.sec.gov/edgar/searchedgar/companysearch.html and search for Apple Inc. Find the FYE 9/26/2020 10-K and open the iXBRL statement. This statement offers you an interactive view of the 10-K.

You can use the search bar (search term income taxes or reconciliation) for the iXBRL statement to jump down to the reconciliation table. Since this is the first reconciliation table you have seen, let's walk through it.



Provision for income taxes	$ 9,680	$ 10,481	$ 13,372

The foreign provision for income taxes is based on foreign pre-tax earnings of $38.1 billion, $44.3 billion and $48.0 billion in 2020, 2019 and 2018, respectively.

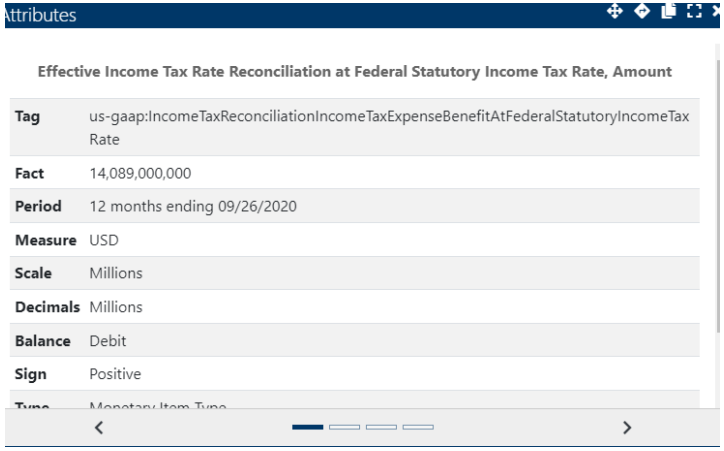
A reconciliation of the provision for income taxes, with the amount computed by applying the statutory federal income tax rate (21% in 2020 and 2019; 24.5% in 2018) to income before provision for income taxes for 2020, 2019 and 2018, is as follows (dollars in millions):

	2020	2019	2018
Computed expected tax	$ 14,089	$ 13,805	$ 17,890
State taxes, net of federal effect	423	423	271
Impacts of the Act	(582)	—	1,515
Earnings of foreign subsidiaries	(2,534)	(2,625)	(5,606)
Research and development credit, net	(728)	(548)	(560)
Excess tax benefits from equity awards	(930)	(639)	(675)
Other	(58)	65	537
Provision for income taxes	$ 9,680	$ 10,481	$ 13,372
Effective tax rate	14.4 %	15.9 %	18.3 %

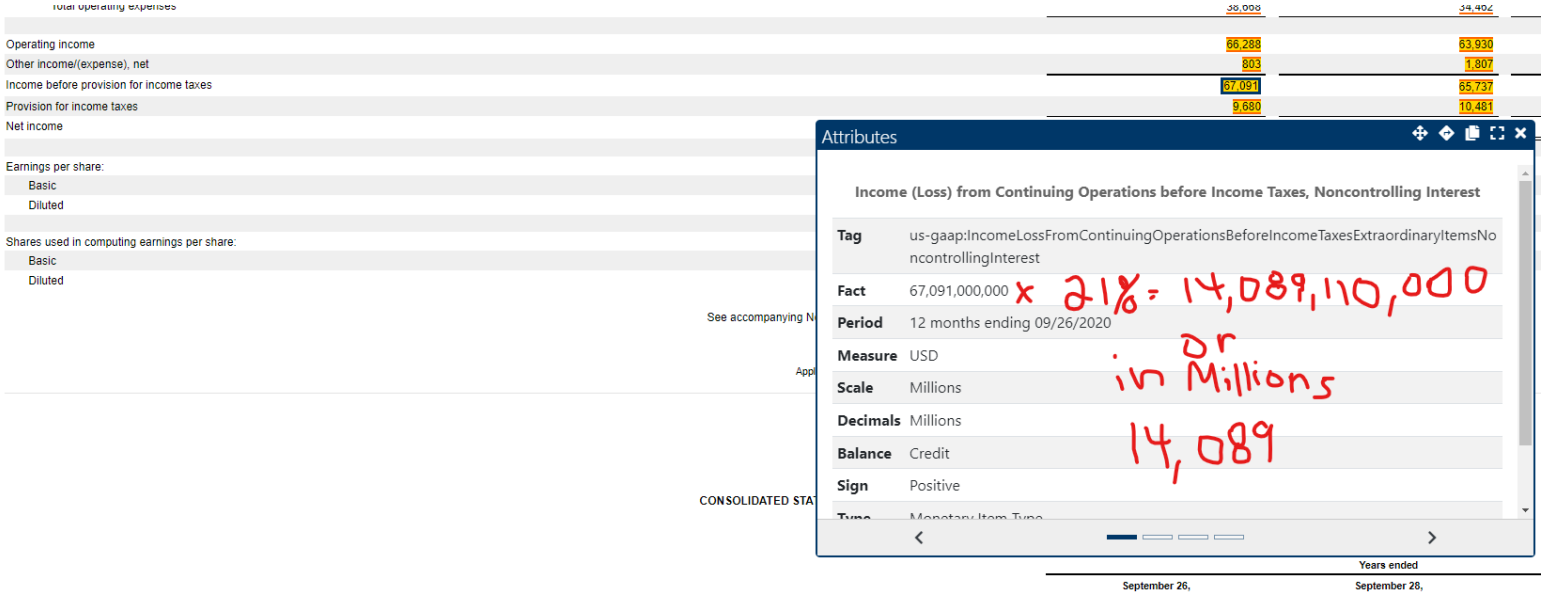
The first number we see is the Income Tax Expense computed as if Apple's tax rate matches the 2020 statutory tax rate of 21%.

If you click on this first number, $14,089 in the iXBRL filing, you will see the XBRL tag "IncomeTaxReconciliationIncomeTaxExpenseBenefitAtFederalStautoryIncomeTaxRate" which identifies this number. Because the XBRL tag is preceded by us-gaap we know that this tag is a standard tag for US-GAAP reporting purposes.

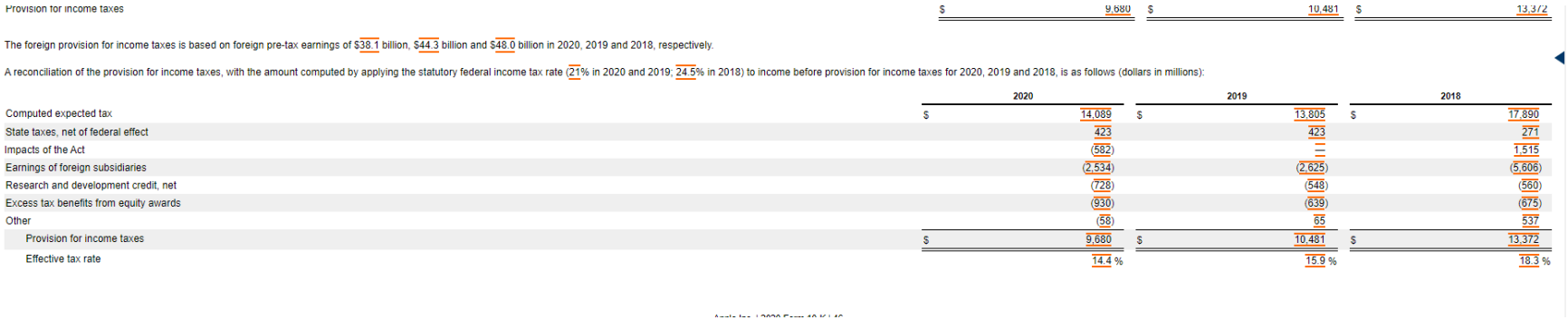
Note, while the financial statement shows the number in millions (14,089), the XBRL tag shows the number displayed in the callout shows the full fact value of 14,089,000,000, which means we don't need to convert this number to millions if we grab the tagged data. Additionally, the XBRL tagged information notes that this particular fact (or number is associated with the 12-month FYE of 9/26/2020. Thus, the tagged data allows us to gather facts by fiscal years (or quarters).



To make sure we understand where the first number comes from (that this number is the Income Tax Expense computed as if Apple's tax rate matches the 2020 statutory tax rate of 21%), we put a screenshot of the XBRL tag for pretax income (off of Apple's Income Statement) and multiplied Pretax income by 21%. We then converted it to millions, since Apple reports the income tax reconciliation table in millions of dollars.



The rest of the income tax reconciliation table provides line item details on why Apple's effective tax rate (14.4% for 2020, 15.9% for 2019, and 18.3% for 2018) was less than the U.S. Federal statutory tax rate for each year (21% in 2019 and 2020, and 24.5% blended rate for 2018).



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A reconciliation of the provision for income taxes, with the amount computed by applying the statutory federal income tax rate (21% in 2020 and 2019; 24.5% in 2018) to income before provision for income taxes for 2020, 2019 and 2018, is as follows (dollars in millions):

	2020	2019	2018
Computed expected tax	$ 14,089	$ 13,805	$ 17,890
State taxes, net of federal effect	423	423	271
Impacts of the Act	(582)	—	1,515
Earnings of foreign subsidiaries	(2,534)	(2,625)	(5,606)
Research and development credit, net	(728)	(548)	(560)
Excess tax benefits from equity awards	(930)	(639)	(675)
Other	(58)	65	537
Provision for income taxes	$ 9,680	$ 10,481	$ 13,372
Effective tax rate	14.4 %	15.9 %	18.3 %

Looking over this table, we can see that Apple's tax expense was increased because they pay state taxes in addition to federal income taxes in all years. We can also see, on the fourth line, that Apple enjoys a lower effective tax rate because they record earnings in foreign subsidiaries. Since these foreign subsidiaries are located in lower tax jurisdictions, such as Ireland, Apple reduces their effective tax rate below the statutory tax rate in all years. Continuing down the lines, Apple also enjoys tax breaks from Research and Development credits and nondeductible stock option compensation costs. There is typically an other line, which is a catchall category for differences that are not material enough to be reported on a separate line. Finally, the table reports the actual provision for income tax expense and the effective tax rate.

We skipped the line Impacts of the Act because it was positive in 2018 and negative in 2020. This line refers to adjustments that occurred as a result of the significant changes to corporate taxation passed in the Tax Cuts and Jobs act of 2017.

Now that we have covered the basics, we can look at a few more examples. Next up is Alphabet Inc. (Google's parent company). Alphabet Inc. filed their most recent 10-K for FYE 12/31/2020.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2020

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____.

Commission file number: 001-37580

Alphabet Inc.

(Exact name of registrant as specified in its charter)

Delaware		61-1767919
(State or other jurisdiction of incorporation or organization)		(I.R.S. Employer Identification No.)

1600 Amphitheatre Parkway
Mountain View, CA 94043
(Address of principal executive offices, including zip code)
(650) 253-0000
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Class A Common Stock, $0.001 par value	GOOGL	Nasdaq Stock Market LLC (Nasdaq Global Select Market)
Class C Capital Stock, $0.001 par value	GOOG	Nasdaq Stock Market LLC (Nasdaq Global Select Market)

Securities registered pursuant to Section 12(g) of the Act:

Title of each class

None

Skipping right down to the income tax rate reconciliation table, we can see that Alphabet Inc. elects to report their rate reconciliation in terms of percent. The first line tells us that the U.S. Federal statutory tax rate was 21% for the 2018, 2019, and 2020 years.

As an interesting aside, Apple chooses to report the comparative data from newest to oldest facts, while Alphabet Inc. chooses to report this information from oldest to newest facts. If you are using XBRL tags that contain not only the number, but the period to which the number is attached, then it doesn't matter which order (oldest to newest, or newest to oldest) the company chooses to report the data.

The reconciliation of federal statutory income tax rate to our effective income tax rate is as follows:

	Year Ended December 31,		
	2018	2019	2020
U.S. federal statutory tax rate	21.0 %	21.0 %	21.0 %
Foreign income taxed at different rates	(4.4)	(4.9)	(0.3)
Foreign-derived intangible income deduction	(0.5)	(0.7)	(3.0)
Stock-based compensation expense	(2.2)	(0.7)	(1.7)
Federal research credit	(2.4)	(2.5)	(2.3)
Impact of the Tax Cuts and Jobs Act	(1.3)	(0.6)	0.0
European Commission fines	3.1	1.0	0.0
Deferred tax asset valuation allowance	(2.0)	0.0	1.4
State and local income taxes	(0.4)	1.1	1.1
Other adjustments	1.1	(0.4)	0.0
Effective tax rate	12.0 %	13.3 %	16.2 %

Our effective tax rate for 2018 and 2019 was affected significantly by earnings realized in foreign jurisdictions with statutory tax rates lower than the federal statutory tax rate because substantially all of the income from foreign operations was earned by an Irish subsidiary. As of December 31, 2019, we have simplified our corporate legal entity structure and now license intellectual property from the U.S. that was previously licensed from Bermuda resulting in an increase in the portion of our income earned in the U.S.

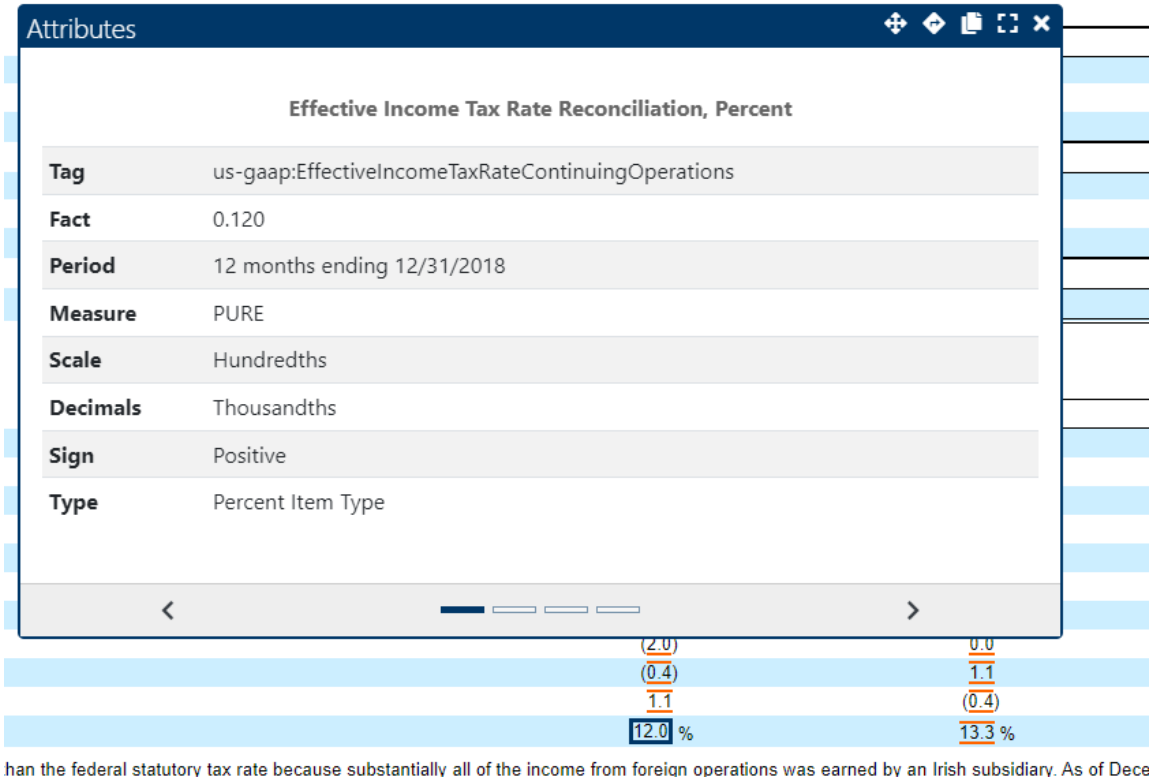
On July 27, 2015, the United States Tax Court, in an opinion in Altera Corp. v. Commissioner, invalidated the portion of the Treasury regulations issued under IRC Section 482 requiring related-party participants in a cost sharing arrangement to share stock-based compensation costs. The U.S. Tax Court issued the final decision on December 28, 2015. As a result of that decision, we recorded a tax benefit related to the anticipated reimbursement of cost share payment for previously shared stock-based compensation costs.

On June 7, 2019, the United States Court of Appeals for the Ninth Circuit overturned the 2015 Tax Court decision in Altera Corp. v. Commissioner, and upheld the portion of the Treasury regulations issued under IRC Section 482 requiring related-party participants in a cost sharing arrangement to share stock-based compensation costs. As a result of the Ninth Circuit court decision, our cumulative net tax benefit of $418 million related to previously shared stock-based compensation costs was reversed in the year ended December 31, 2019.

In 2020, there was an increase in valuation allowance for net deferred tax assets that are not likely to be realized relating to certain of our Other Bets.

We can see some similar reconciling items, such as state taxes (third from bottom), foreign income taxes (second line), credits (fifth line from the top), Impacts from the Tax Cuts and Jobs Act (sixth line from the top), and stock based compensation (fourth line from the top). However, we also see some new items, including Foreign Derived Intangible Income Deduction (FDII), European Commission fines, and a Deferred tax asset valuation allowance. Companies are required to disclose all material individual line items, and since both the threshold and differences are unique to companies you will have elements that cross all companies and elements that are unique to companies. These differences can make it a bit more difficult to compare across companies, which is why companies which specialize in data aggregation, like Compustat, focus on standardizing the data.

Since the purpose of the table is to help financial statement users reconcile the statutory tax rate to the effective tax rate, we see that the effective tax rate is once again the last line of the table. If I click on the effective tax rate fact, I can see the standard tag used to report the firm's Effective Tax Rate. Note, percentages are identified as "PURE" measures, while dollars are denoted in terms of their scale (e.g., hundreds, thousands, millions, etc.).



Our next example comes from Amazon's financial statement for the FYE 12/31/2020.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

1e)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

:al year ended December 31, 2020

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

nsition period from to .

Commission File No. 000-22513

AMAZON.COM, INC.
(Exact name of registrant as specified in its charter)

Delaware	91-1646860
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

410 Terry Avenue North
Seattle, Washington 98109-5210
(206) 266-1000
(Address and telephone number, including area code, of registrant's principal executive offices)

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common Stock, par value $.01 per share	AMZN	Nasdaq Global Select Market

Securities registered pursuant to Section 12(g) of the Act:
None

te by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ No ☐

te by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act. Yes ☐ No ☐

te by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☐ No ☐

te by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☐ No ☐

te by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

erated filer	☐	Accelerated filer	
rated filer	☐	Smaller reporting company	
		Emerging growth company	

Jumping down to Amazon's Tax Rate Reconciliation Table, we can see that Amazon elects to report their reconciliation in millions of dollars, similar to Apple.

The items accounting for differences between income taxes computed at the federal statutory rate and the provision recorded for income taxes are as follows (in millions):

	Year Ended December 31,		
	2018	2019	2020
Income taxes computed at the federal statutory rate	$ 2,365	$ 2,935	$ 5,078
Effect of:			
Tax impact of foreign earnings and losses	162	453	(538)
State taxes, net of federal benefits	263	221	343
Tax credits	(419)	(466)	(639)
Stock-based compensation (1)	(1,086)	(850)	(1,107)
Foreign income deduction (FDII)	(43)	(72)	(372)
2017 Impact of U.S. Tax Act	(157)	—	—
Other, net	112	153	98
Total	$ 1,197	$ 2,374	$ 2,863

(1) Includes non-deductible stock-based compensation and excess tax benefits from stock-based compensation. Our tax provision includes $1.6 billion, $1.4 billion, and $1.8 billion of excess tax benefits from stock-based compensation for 2018, 2019, and 2020.

Our provision for income taxes in 2019 was higher than in 2018 primarily due to an increase in U.S. pre-tax income, a decline in excess tax benefits from stock-based compensation, and the one-time provisional tax benefit of the U.S. Tax Act recognized in 2018.

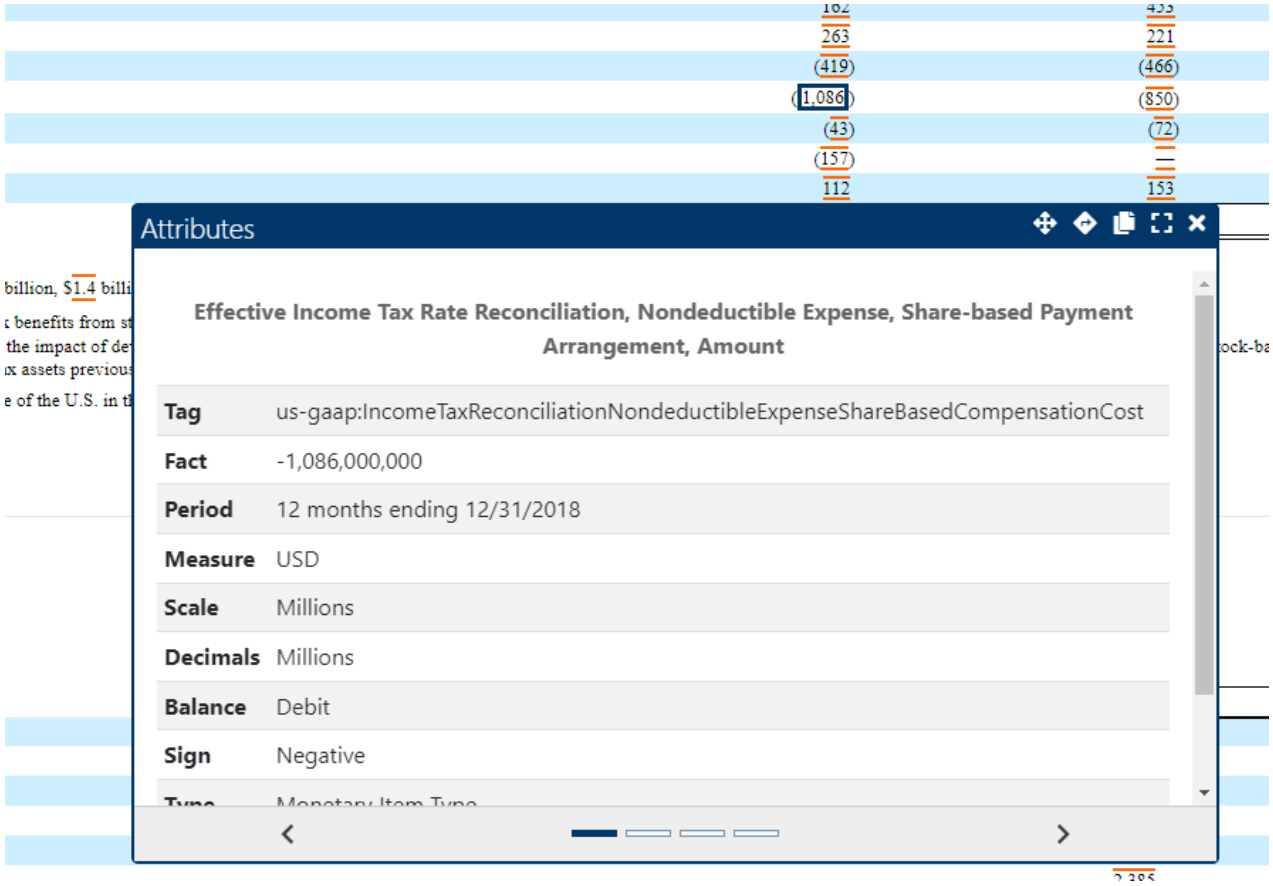
Our provision for income taxes in 2020 was higher than in 2019 primarily due to an increase in pretax income. This was partially offset by the impact of developments in our ongoing global tax controversies on taxes related to our foreign earnings and losses, an increase in excess tax benefits from stock-based compensation, and an increase in our foreign income deduction under FDII. In addition, our Luxembourg operations generated earnings in 2020 and utilized deferred tax assets previously subject to valuation allowances.

We intend to invest substantially all of our foreign subsidiary earnings, as well as our capital in our foreign subsidiaries, indefinitely outside of the U.S. in those jurisdictions in which we would incur significant, additional costs upon repatriation of such amounts.

We again see that Amazon is reporting major differences from State taxes, Foreign earnings, Credits, Stock-based compensation, FDII, and the Tax Cuts and Jobs Act (TCJA).

While all of these items are the same across the firms, they have used slightly different labels. This can cause issues if you were to try to scrape the data directly off of the financial statements, since you would have to go back and double check that the company is reporting a similar data fact.

However, XBRL standardizes the ‘tag’ used, even if the label is different. Since we have seen stock-based compensation in all three reconciliation tables, and it seems to be a large reconciliation item we can click on that fact to find the associated XBRL tag “IncomeTaxReconciliationNondeductibleExpensesShareBasedCompensationCost”. Even though all three companies had slightly different labels for this fact, Apple and Amazon used this same standard XBRL tag. Thus, learning how to collect data using the XBRL tags can help you quickly, efficiently, and effectively (in terms of accuracy) gather the data you need for your model from financial statements.



Alphabet also reports this same data element, but what I said above indicates that Alphabet uses a different tag then Amazon and Apple. That is true. We want to point out that Alphabet also uses a standard tag to tag their stock-based compensation.

How can both of these simultaneously be correct? Recall, Amazon and Apple report their reconciliations in dollars, while Alphabet, and as we see next, Facebook report their reconciliations in terms of percent. Thus, the same fact is assigned a unique tag depending on how the company chooses to report the data (e.g., dollars or percent). The tags are close because they describe the same fact, but they are also slightly different to denote the reality that the data was presented in a different format. We provide the reconciliation table for Facebook and the XBRL tag for the Stock-based compensation below.

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2020
or

OF THE SECURITIES EXCHANGE ACT OF 1934
d from to

Commission File Number: 001-35551

Facebook, Inc.
(Exact name of registrant as specified in its charter)

Delaware		20-1665019
(State or other jurisdiction of incorporation or organization)		(I.R.S. Employer Identification Number)

1601 Willow Road, Menlo Park, California 94025
(Address of principal executive offices and Zip Code)
(650) 543-4800
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act

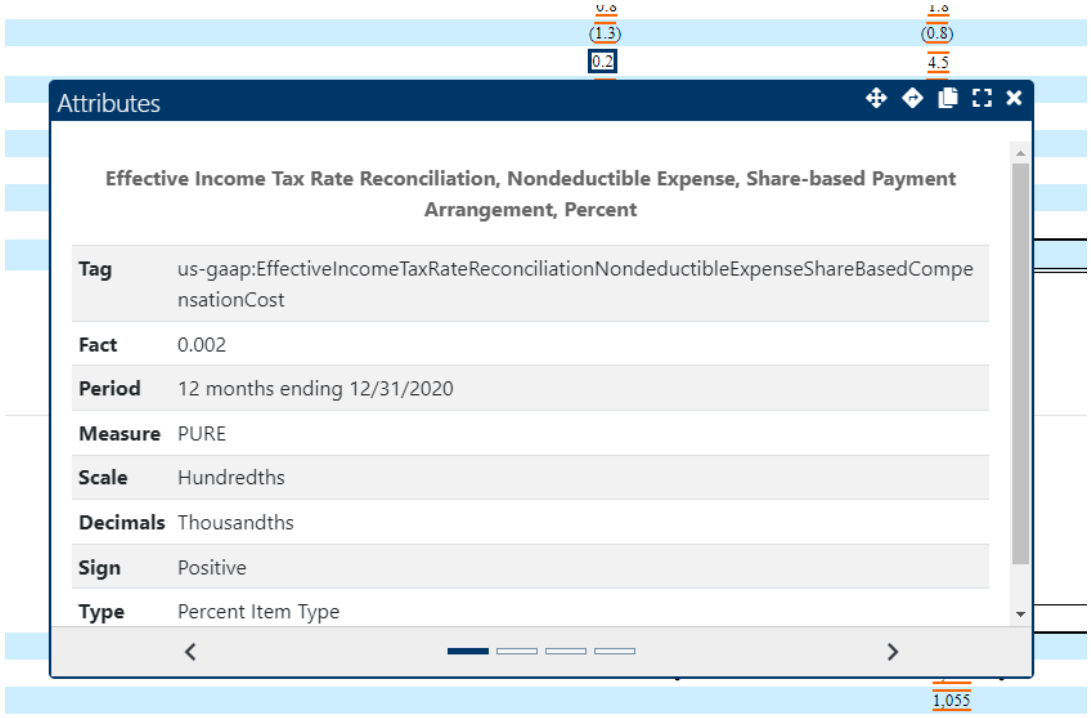
Title of each class	Trading symbol(s)	Name of each exchange on which registered
Class A Common Stock, $0.000006 par value	FB	The Nasdaq Stock Market LLC

Securities registered pursuant to Section 12(g) of the Act: None

05 of the Securities Act. Yes ☐ No ☒
r Section 15(d) of the Act. Yes ☐ No ☒
Section 13 or 15(d) of the Securities Exchange Act of 1934 (Exchange Act) during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

A reconciliation of the U.S. federal statutory income tax rates to our effective tax rate is as follows (in percentages):

	Year Ended December 31,		
	2020	2019	2018
U.S. federal statutory income tax rate	21.0 %	21.0 %	21.0 %
State income taxes, net of federal benefit	0.8	1.8	0.7
Research and development tax credits	(1.3)	(0.8)	(1.0)
Share-based compensation	0.2	4.5	0.3
Excess tax benefits related to share-based compensation	(1.6)	(0.7)	(2.6)
Foreign-derived intangible income deduction	(1.9)	—	—
Effect of non-U.S. operations	(2.4)	(5.8)	(5.9)
Non-deductible FTC settlement accrual	—	4.5	—
Research and development capitalization	(3.0)	—	—
Other	0.4	1.0	0.3
Effective tax rate	12.2 %	25.5 %	12.8 %



Because of these minor differences your SQL query will need to capture the data using XBRL tags for both information reported in dollars and information reported in percent.

To complete FAANG, we provided Netflix's 10-K income tax reconciliation table for their FYE12/31/2020 below:

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2020
OR

N 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from to

Commission File Number: 001-35727

Netflix, Inc.

(Exact name of registrant as specified in its charter)

Delaware	77-0467272
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

100 Winchester Circle, Los Gatos, California 95032
(Address and zip code of principal executive offices)
(408) 540-3700
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common stock, par value $0.001 per share	NFLX	NASDAQ Global Select Market

Securities registered pursuant to Section 12(g) of the Act: None

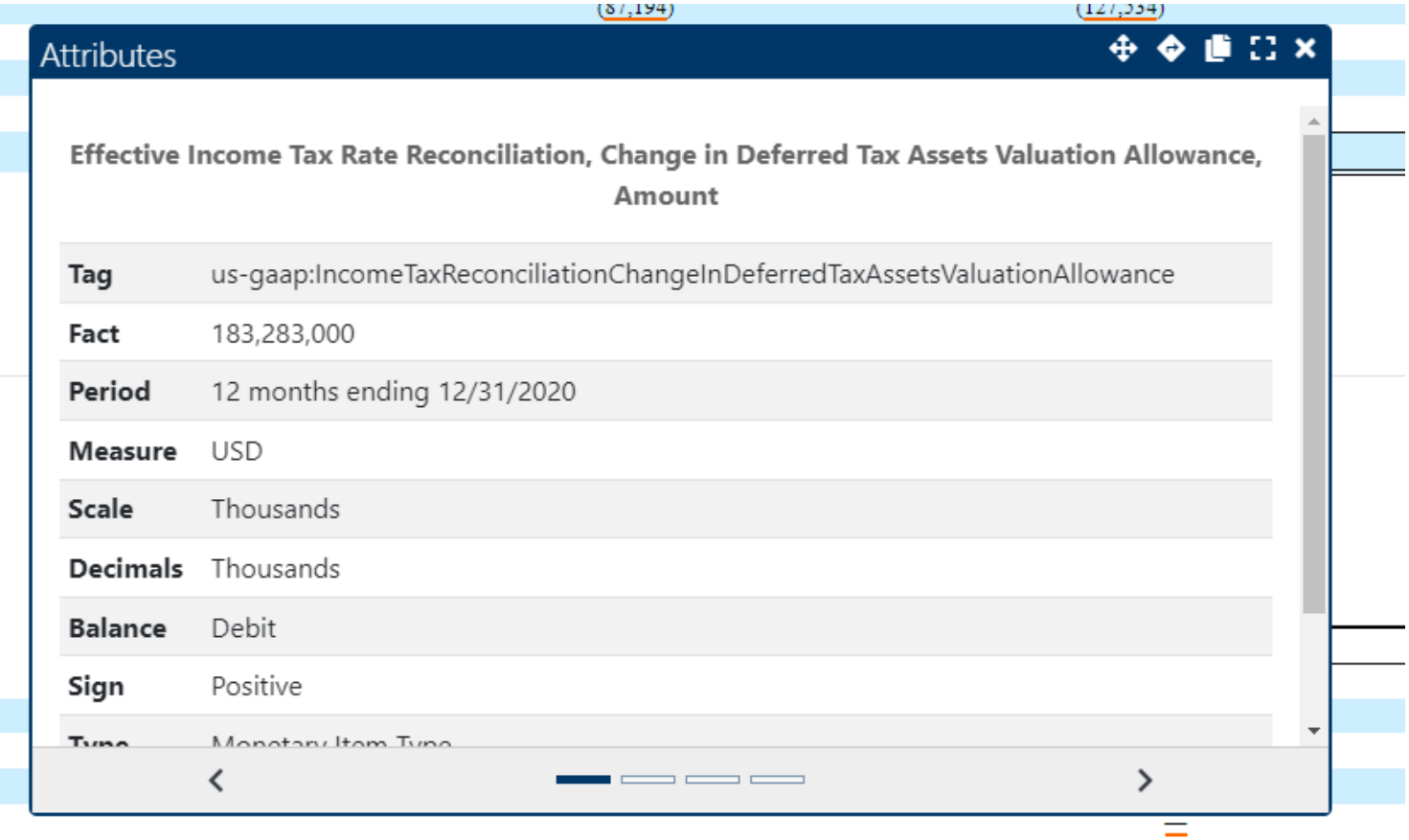
Rule 405 of the Securities Act. Yes ☑ No ☐

As of December 31, 2020, the Company had a California research and development ("R&D") credit carryforward of $250 million which can be carried forward indefinitely. On June 29, 2020, California enacted legislative changes that impose an annual cap of $5 million on the amount of business incentive tax credits we can utilize in California effective for tax years 2020 through 2022. As a result, we evaluated the Company's ability to realize the California R&D credit, the Company considered all available positive and negative evidence, including operating results, ongoing tax planning, and forecasts of future taxable income and determined it is more likely than not that the pre-2020 credits and a portion of the current year R&D credit would not be realized. In the twelve months ended December 31, 2020, the Company has recorded a valuation allowance of $250 million. The Company will monitor its business strategies, weighing positive and negative evidence in assessing its realization of this asset in the future and in the event there is a need to release the valuation allowance, a tax benefit will be recorded.

A reconciliation of the provision for income taxes, with the amount computed by applying the statutory Federal income tax rate to income before income taxes is as follows:

	Year Ended December 31,		
	2020	2019	2018
		(in thousands)	
Expected tax expense at U.S. Federal statutory rates	$ 671,864	$ 433,059	$ 257,556
State income taxes, net of Federal income tax effect	65,808	47,909	33,611
Foreign earnings at other than U.S. rates	12,212	56,969	63,519
Federal and California R&D tax credits	(113,882)	(134,523)	(140,749)
Valuation allowance on California R&D tax credits	183,283	—	—
Excess tax benefits on stock-based compensation	(339,436)	(148,693)	(191,323)
Impact of the Tax Cuts and Jobs Act of 2017			
Rate Change / Transition Tax	—	—	(71,516)
Tax effects of the Tax Cuts and Jobs Act	(87,194)	(127,534)	43,099
Global corporate structure simplification	—	35,939	—
Nondeductible Officers Compensation	30,351	24,111	14,377
Other	14,948	8,078	6,642
Provision for income taxes	$ 437,954	$ 195,315	$ 15,216
Effective Tax Rate	14 %	9 %	1 %

This time we focus on the Valuation allowance on California R&D credits (fifth line down).



Credits are valuable because they allow companies reduce their tax liabilities dollar for dollar. Thus they can be major difference items. However, it is possible that the company may not have sufficient income tax revenue to offset eligible credits (many states do not allow you to receive refunds for credits). When a company records a tax benefit, but has an expectation that it is more likely than not that the company will not be able to use the full value of the credit, the company is required to write-down the tax benefit to a recoverable value. This write-down is called a valuation allowance. It is tagged as a deferred tax asset valuation allowance, because the original tax benefit is recorded as a deferred tax asset (the company expects to pay lower taxes in the future) and the write-down offsets this deferred tax asset.

CASE LEARNING OBJECTIVES AND IMPLEMENTATION GUIDANCE

Data Collection

The Association for Advancement of Collegiate Schools of Business (AACSB) standard A5 calls for the incorporation of data analytics throughout the accounting curriculum, specifically by providing learning experiences which integrate real-world business strategies and exposing students to emerging technology. Recent teaching cases published in academic journals and provided by accounting firms meet these calls. However, most of the teaching cases available focus on data transformation and/or data analytics (Cheng, Eagan, and Yurko 2021; Cheng, Sapkota, and Yurko 2021; Cheng and Varadharajan 2021; Cooper, Key, and Mathis 2021; Fisher, Hughes, and Janvrin 2021; LaPlante and Vernon 2021; Lee, Hansen and Brink 2020; and Sledgianowski, Petra, Palaez, and Zhu 2021).

While data transformation and/or data analytics are both real-world business strategies, data collection is an important prerequisite for data transformation and data analytics. Structured data is often housed within a database across disparate tables. Since it is unlikely that a database exists to answer every important question, the next step in data analytics education is to teach students how to access data directly. In this case, we contribute to the small but important subset of teaching cases which focus on teaching students fundamental data collection skills. In this smaller subset, Borthic and Smeal (2020) and Tojiboyev, Appelbaum, Kogan, and Vasarhelyi (2021) use Access to teach some fundamental data collection skills. Borthic and Smeal's (2020) focuses on a tax topic while Tojiboyev et al. (2021) focus their case around an auditing context. Our case extends these cases in two important ways. First, we introduce students to SQL programming using emerging technologies, including Alteryx and RapidMiner. Second, we

focus on the rich financial statement data made available via XBRL reporting.[13] As such, our case is ideal for any class which seeks to introduce these emerging technologies, SQL, and financial reporting.

The learning objectives of this case focus strictly on data collection. Specifically, this case seeks to: (1) to develop students' abilities in SQL programming; (2) to develop students' understanding of XBRL as a valuable data resource; and, (3) to develop students' understanding of effective data collection.

Pilot Results

This case was implemented as a joint project between two graduate-level courses in a southern public university. One of these graduate-level courses was a multijurisdictional tax class and the other graduate-level course was a foundations of data analytics class. All of the students in the multijurisdictional tax class were taking the foundations of data analytics class. However, more than half of the students piloting the case were enrolled only in the foundations of data analytics class. A second abbreviate pilot of the teaching case was provided to a PhD seminar at a southern public university. Students who piloted the case were unfamiliar with SQL and XBRL at the time they used the case. Students liked the case and provided valuable feedback which was used to revise the teaching case.

While we revised the case based on the initial pilot, we would appreciate informal feedback from any instructor willing to adopt our teaching case for use in their classes.

[13] Fekade Tadesse and Vincent (2021) recently developed a teaching case which introduces the concepts of XBRL from the perspective of financial statement preparation. Fekade Tadesse and Vincent's (2021) case could be used to complement our case to help students gain a deeper appreciation of how XBRL preparation decisions, such as extension taxonomies, impact data collection efforts by financial statement users.

Implementation Guidance

In order to gain access to the data for this case, as it is written, you need access to XBRL US by following the instructions on https://xbrl.us/join-us/membership/xusmembers/ . As of the writing of this case, the academic license is $500. To ensure that their servers are not overwhelmed, we ask that instructors teach students how to use a small data pull during normal business hours and then have students pull the full data file after 7 PM eastern.[14]

Access to XBRL US's database and the SQL query can be run in several different data analytics tools including: Access, Alteryx, Excel, ERP systems, Python, R, RapidMiner, and SAS. Select the tool(s) that best suit the needs of your course and your program. We provide instructions on how to access XBRL US's database and run the SQL query for both Alteryx and RapidMiner. Alteryx provides free educator and student licenses through their educational program: SparkEd https://www.alteryx.com/sparked . Rapid Miner also provides free educator and student licenses at RapidMiner Educational License Program - RapidMiner.

Instructors requiring students to complete the Optional portion of the case, which focuses on data analysis can incorporate additional tools for data visualization including PowerBI or Tableau. PowerBI provides free licenses to students. Although most of the programs do not run on Mac operating system (the lone exception is Tableau), Mac users can install VMwear, such as bootcamp, and run the programs in a windows emulation environment.

We designed the case to provide significant flexibility so that instructors can tailor the case to the needs of their course, their students, and their programs. To facilitate this flexibility, we

[14] The Securities Exchange Commission provides free access to XBRL financial statements and footnote data via https://www.sec.gov/dera/data/financial-statement-and-notes-data-set.html. Instructors can use this data to create their own database which can then be queried by students using an SQL program. The creation of a database is beyond the scope of this teaching case.

provide instructions on how to access the data and run the SQL query in both Alteryx and RapidMiner. XBRL US's api also demonstrates the query using Python code. Since data collection is a necessary precursor to data analytics, instructors could have students replicate the process in multiple tools to build students confidence.

Beyond facilitating flexibility via data analytics tools, this case provides significant flexibility to instructors to decide which data students should access. The case introduces students to FASB's GAAP Reporting Taxonomy using the face financial statements before introducing students to the standard XBRL tags used in the income tax rate reconciliation table. Instructors and students can use FASB's GAAP Reporting Taxonomy to identify the standard tags associated with any functional area organized by FASB. Thus, instructors can revise the instructions to have students collect any XBRL tagged information from either the face financial statements or the financial statement footnotes.

Finally, this case affords flexibility in terms of whether to use classroom time, or have students complete this teaching case asynchronously. To facilitate the latter, we provide custom tutorial videos which demonstrate the required steps in Alteryx and RapidMiner. This final flexibility provides a data analytics resource for instructors teaching online courses.

We suggest that all instructors begin the case by providing students with the case material. Instructors taking the asynchronous approach can focus classroom time on a discussion of XBRL tags, and or a discussion of a specific research objective. The case and teaching notes provide resources to facilitate such a discussion. These resources can be grouped into three main categories: (1) XBRL tags and XBRL filings (FASB's GAAP Reporting Taxonomy and Inline XBRL filings (iXBRL) available via the Security Exchange Commission's Edgar system); (2) Information regarding SQL (https://www.w3schools.com/sql/); and (3) information about a

research objective related to tax footnotes (academic papers including Drake et al. 2020, Hoitash et al. 2021, and Schwab et al. 2020 and popular press articles regarding firms effective tax rates). While this last category of resources relates to the income tax footnote, there are a plethora of resources available to instructors who want to focus on other important areas of the financial statements.

In our pilot, we introduced the SQL code during a live session of class. The introduction of the SQL code required 45 minutes of in-class instructional time. Students were able to test their code using a sample industry and limited time period. The students were then instructed to complete the full data query (2012 through 2021) for their industry (2 digit-SIC code) during non-peak hours. In the multijurisdictional tax class, another 45 minutes of class time was devoted to discussing the income tax rate reconciliation footnote, the students results from the SQL query, and data analytics conducted using the data obtained through the SQL query. Students were provided one-week worth of working time to run the query and conduct data analytics on the results.

References:

Borthick, F. and L. Smeal. 2020. Data Analytics in Tax Research: Analyzing Worker Agreements and Compensation Data to Distinguish Between Independent Contractors and Employees Using IRS Factors. *Issues in Accounting Education* 35 (3): 1-23.

Cheng, C., J. T. Eagan, and A. J. N. Yurko. 2021. ChicagoLand Popcorn ® - Examining Online Retailer Nexus Following Wayfair Using Data Visualization and Robotics Process Automation. *Journal of Emerging Technologies in Accounting* Online Early June 22, 2021.

Cheng, C., P. Sapkota, and A. J. N. Yurko. 2021. A Case Study of Effective Tax Rates Using Data Analytics. *Issues in Accounting Education* 36 (1): 65-89.

Cheng, C. and A. Varadharajan. 2021. Using Data Analytics to Evaluate Policy Implications of Migration Patterns: Application for Analytics, AIS, and Tax Classes. *Issues in Accounting Education* 36 (2): 111-128.

Cooper, L. A., K. G. Key, and M. E. Mathis. 2021. S Corporations and IRC Section 199A: Incorporating Excel Into Tax-Planning Scenarios. *Issues in Accounting Education* 36 (3): 91-102.

Fekade Tadesse, A. and N. Vincent. 2021. Combining Data Analytics with XBRL: The Viewdrive Case. *Issues in Accounting Education* Online Early August 20, 2021.

Fisher, I., M. Hughes, and D. J. Janvrin. 2021. Put Your Best Text Forward: Introducing Textual Analysis into the Accounting Classroom. *Issues in Accounting Education* Online Early June 3, 2021.

Hoitash, R., U. Hoitash, and L. Morris. 2021. eXtensible Business Reporting Language (XBRL): A Review and Implications for Future Research. *Auditing: A Journal of Practice & Theory* 40 (2): 107-132.

Holmes, A. F. and A. Douglass. 2021. Artifical Intelligence: Reshaping the Accounting Profession and the Disruption to Accounting Education. *Journal of Emerging Technologies in Accounting* Online Early March 8, 2021.

Laplante, S. K. and M. E. Vernon. 2021. Incorporating Data Analytics in a Technical Tax Setting: A Case Using Excel and Tableau to Examine a Firm's Schedule M-3 and Tax Risk. *Issues in Accounting Education* 36 (2): 129-139.

Lee, L. S., V. Hansen, and W. Brink. 2020. Tax Retirement Savings Decisions Using an Excel Spreadsheet Approach. *Issues in Accounting Education* 35 (3): 39-55.

Sledgianowski, D., S. T. Petra. A. Pelaez. and J. Zhu. 2021. Using Tableau to Analyze the Effects of Tax Code Changes: A Teaching Case for Tax and AIS Courses. . *Issues in Accounting Education* 36 (3): 117-133.

Tapis, G. P. and C. S. Hines. 2021. Accounting-Specific Data Analytics: A Framework for Addressing AACSB Standard A5 and Industry Demand. *Journal of Emerging Technologies in Accounting* Online Early March 17, 2021.

Tojiboyev, N. D. Appelbaum, A. Kogan, and M. Vasarhelyi. 2021. Basics of SQL for Audit Data Retrieval and Analysis. *Journal of Emerging Technologies in Accounting* Online Early June 22, 2021.

TEACHING NOTES

Students insights will vary as FASB updates their taxonomy and as additional years of financial statement data become available. However, the process of using SQL to query an XBRL database will remain fairly consistent over time. In this teaching note we provide sample answers using FASB's 2022 GAAP Reporting Taxonomy. XBRL US provides python code to see the results of a limited query at: https://xbrl.us/xbrl-api-community . If you wish to have students use the full SQL program demonstrated in this case, you must subscribe to the Educational License available through XBRL US.[15]

Data Structure

FASB's GAAP Financial Reporting Taxonomy

You can help your students understand XBRL and/or standard tags. Hoitash, Hoitash, and Morris' (2021) review paper provides background information on XBRL which extends beyond this teaching case. Students provided with the opportunity to do the *Optional* section will likely stumble upon the fact that firm specific tags (often called extended tags or custom tags) can result in missing information. Instructors not assigning the *Optional* section may wish to discuss the ability of firms to use custom tags when no standard tag is available. Custom tags allow firms to convey unique information to financial statement users.

1. No response required.
2. Instructors will have to update this URL as new taxonomies are released.

[15] At the time this case was written, the cost of an educational license was $500 per year. You can use other XBRL data providers, such as Calcbench and/or Idaciti, but these databases do not require SQL programming. Alternatively, you could create a database using the publicly available financial statement and notes data set provided by the Securities Exchange Commission https://www.sec.gov/dera/data/financial-statement-and-notes-data-set.html but this requires your time and storage space for a database which can be queried using SQL.

3. Answers are based on the 2022 GAAP Financial Reporting Taxonomy:
    a. Balance sheet: 10400 – Statement – Statement of Financial Position, Classified.
        i. The (standard tags) are: Total Assets (Assets); Total Liabilities (Liabilities); Total Liabilities and Stockholders Equity (LiabilitiesAndStockholdersEquity).
            1. The standard tag convention uses the Camel Case convention which removes spaces and punctuation to facilitate computer processing, but denotes words by using a single upper case letter to facilitate human comprehension. This convention can lead to long standard tags which cause problems for programs (e.g., SAS) which have character limitations for column (field) headings.
        ii. ASSETS: XBRL Type (Monetary), Period type (Instant), Balance (Debit).
        LIABILITIES: XBRL Type (Monetary), Period type (Instant), Balance (Credit).
        LiabilitiesAndStockholdersEquity: XBRL Type (Monetary), Period type (Instant), Balance (Credit).
        The metadata for all three align with Financial Reporting Conventions. This question can help students tie the financial reporting conventions to XBRL tagging conventions.
        iii. There are two calculations provided for Assets. The first is an accumulation of all possible standard tag line items which might be reported in the Asset section of the balance sheet. The second is an accumulation of current and noncurrent assets. The same two calculations

are shown for Liabilities. The LiabilitiesAndStockholdersEquity however, have numerous calculations, which differ based on the organizational form (e.g., LLC, Partnership, C-Corporation, etc.). This question, like the last question can be used by instructors wishing to help students tie the financial reporting learned to XBRL tagging conventions to facilitate a better understanding of both.

b. 124100 – Statement – Statement of Income

   i. The (standard tags) are: Revenues, Total (Revenues);
   Cost of Goods and Services Sold (CostOfGoodsAndServicesSold);
   Operating Income (Loss), Total (OperatingIncomeLoss);
   Income Tax Expense Benefit (IncomeTaxExpenseBenefit);
   Net Income (Loss) Available to Common Stockholders, Basic (NetIncomeLossAvailableToCommonStockholdersBasic); and
   Earnings Per Share, Basic, Total (EarningsPerShareBasic)

   ii. The XBRL Type (Monetary) and Period type (Durpation) are the same for Revenues, CostOfGoodsAndServicesSold, OperatingIncomeLoss, IncomeTaxExpenseBenefit, and NetIncomeLossAvailableToCommonStockholdersBasic. The Balances are (Credit) for Revenues, OperatingIncomeLoss, and NetIncomeLossAvailableToCommonStockholdersBasic. The Balances are (Debit) for CostOfGoodsAndServicesSold and IncomeTaxExpenseBenefit. The metadata for EarningsPerShareBasic is:

XBRL Type (Decimal), Period type (duration), and there is no Balance. All metadata aligns with financial statement reporting conventions.

iii. FASB's GAAP Reporting Taxonomy provides the numerous calculations for these standard tags.

c. 152200 – Statement – Statement of Cash Flows

i. The (standard tags) are:

Net Cash Provided by (Used in) Operating Activities, Continuing Operations (NetCashProvidedByUsedInOperatingActivitiesContinuingOperations);

Net Cash Provided by (Used in) Investing Activities (NetCashProviedByUsedInInvestingActivities);

Net Cash Provided by (Used in) Financing Activities (NetCashProvidedByUsedInFinancingActivities);

Income Taxes Paid is found in 152205 –Statement – Statement of Cash Flows, Supplemental Disclosures (IncomeTaxesPaid).

ii. FASB's GAAP Reporting Taxonomy provides the metadata for these standard tags. All metadata aligns with financial reporting convention.

iii. FASB's GAAP Reporting Taxonomy provides the numerous calculations for these standard tags.

Financial Statement Footnote Data: Income Tax Rate Reconciliation Table

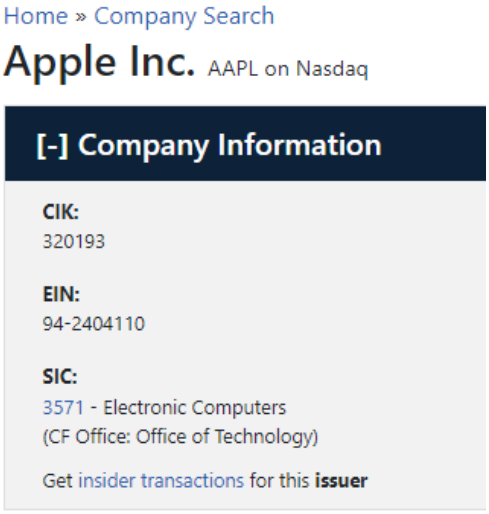
1. Appendix B provides an introduction to XBRL reporting in the financial statement footnote using a group of firms that are typically well known to students. Instructors can consider walking through these XBRL statements in class using the new Inline XBRL

format (iXBRL) available on Edgar. The iXBRL statements allow you to quickly search for facts, identify comparisons across years, and see the tags used along with the metadata.

2. Students are required to receive approval for their firm selection. Instructors seeking additional guidance on firm selection can refer to Cheng, Sapkota, and Yurko's (2022) teaching case which focuses on firms that were reported on ITEP lists or loss firms as highlighted in recent research by Drake et al. (2020) and Schwab et al. (2020). For the purpose of this teaching note, we will focus on the FAANG companies in Appendix B.
    a. Apple's 2020 financial statement with a period ending 9/26/2020.
    b. 2020 14.4%; 2019 15.9%; 2018 18.3%
    c. For each of the three years Apple's effective tax rate is below the statutory tax rate of 21%.
    d. Apple's effective tax rate decreases from 2018 through 2020.
    e. Apple reports the income tax rate reconciliation table using dollar amounts.
    f. The largest reconciling item reported by Apple is labeled "Earnings of foreign subsidiaries". The second largest item is labeled "Excess tax benefits from equity awards". The third largest item is labeled "Research and development credit, net".
        i. None of these items result in increases to Apple's effective tax rate.
        ii. All of these items result in decreases to Apple's effective tax rate.
        iii. Students will need to do research to answer this question. In Apple's case, there are numerous popular press articles discussing how Apple uses foreign subsidiaries to reduce their effective tax rates. For one such example, please see: https://appleinsider.com/articles/21/03/06/apple-to-

pay-more-tax-in-uk-following-eu-profit-shifting-law-repeal. It also makes sense that research and development (R&D) credits reduce Apple's effective tax rate, as R&D activities are often rewarded with tax credits throughout the globe. Finally, stock-based compensation plans often result in a reconciling item as there are both timing and measurement differences between tax and financial reporting rules.[16]

g. Apple's four digit standard industrial classification (SIC) 3571 can be found on the Company Information section of the SEC's Edgar Company Search results.



3. The standard tags are:

    a. The dollar amount

IncomeTaxReconciliationIncomeTaxExpenseBenefitAtFederalStatutoryIncomeTaxRate
EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Amount
EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017TransitionTaxOnAccumulatedForeignEarningsAmount
IncomeTaxReconciliationStateAndLocalIncomeTaxes
IncomeTaxReconciliationForeignIncomeTaxRateDifferential
IncomeTaxReconciliationTaxCredits

[16] Interested readers can follow up on PWC's article https://viewpoint.pwc.com/dt/us/en/pwc/accounting_guides/income_taxes/income_taxes__16_US/chapter_17_income_ta_US/172_basics_of_accoun_US.html

IncomeTaxReconciliationNondeductibleExpense
IncomeTaxReconciliationDeductions
IncomeTaxReconciliationTaxContingencies
IncomeTaxReconcilationTaxSettlements
IncomeTaxReconciliationOtherReconcilingItems

b. The percentage

EffectiveIncomeTaxRateReconciliationAtFederalStatutoryIncomeTaxRate
EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Percent
EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017TransitionTaxOnAccumulatedForeignEarningsPercent
EffectiveIncomeTaxRateReconciliationStateAndLocalIncomeTaxes
EffectiveIncomeTaxRateReconciliationForeignIncomeTaxRateDifferential
EffectiveIncomeTaxRateReconciliationTaxCredits
EffectiveIncomeTaxRateReconciliationChangeInEnactedTaxRate
EffectiveIncomeTaxRateReconciliationChangeInDeferredTaxAssetsValuationAllowance
EffectiveIncomeTaxRateReconciliationShareBasedCompensationExcessTaxBenefitPercent
EffectiveIncomeTaxRateReconciliationOtherAdjustments
EffectiveIncomeTaxRateReconciliationOtherReconcilingItemsPercent
EffectiveIncomeTaxRateContinuingOperations
IncomeTaxReconciliationIncomeTaxExpenseBenefitAtFederalStatutoryIncomeTaxRate

XBRL US Database structure

This case serves as an introduction to both XBRL and SQL queries. To facilitate this introduction, we selected a few relevant fields (columns) from four tables available in XBRL US's database. However, the database contains significantly more information then what is shown in this teaching case. The database contains all of the granular level detail available from XBRL filings from 2009 forward. We recommend starting with 2012 as the earliest year, since this is the year where information was available for most companies. To understand all of the data available and be able to tailor the teaching case to best suite your needs, we suggest that you examine FASB's most recent GAAP Reporting Taxonomy to identify tags for which you want to pull data and read XBRL US's detailed documentation.

Overall Program and SQL Program Instructions

In Appendix C we provide instructions for how to complete the SQL query in all of the following programs: Alteryx and RapidMiner. The ODBC driver required for Alteryx is also necessary for Access and Excel. XBRL US provides a method to extract the data using Python via their API. SAS allows you to call SQL programs with Proc SQL.[17] Regardless of which program you require your students to use, the process will be similar.

1. To facilitate connection with the XBRL US database, you need to provide students with the connection information, including an approved login and password information.
2. The SQL query is identical, regardless of which tool you require students to use. The SQL query we provide below demonstrates fundamental database query tasks including identification of specific data, linking tables using reference fields, limiting data, and sorting data. Instructors can tailor the SQL query by adding additional skills. The full SQL query is shown below.

```
SELECT
fact.accession_id,
fact.fiscal_year,
fact.unit_id,
fact.uom,
fact.element_local_name,
fact.fact_value,
entity.entity_id,
entity.entity_code,
entity.entity_name,
sic_code.sic_code_id,
sic_code.description as SIC_Description
FROM
public.fact, public.accession, public.sic_code, public.entity
WHERE
fact.accession_id = accession.accession_id
AND
```

[17] Instructions for using SQL in R can be found at https://db.rstudio.com/getting-started/database-queries/

```
accession.standard_industrial_classification = sic_code.sic_code_id
AND
accession.entity_id = entity.entity_id
AND
fact.element_local_name IN
('EffectiveIncomeTaxRateReconciliationAtFederalStatutoryIncomeTaxRate',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Percent',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017TransitionTaxOnAcc
umulatedForeignEarningsPercent',
'EffectiveIncomeTaxRateReconciliationStateAndLocalIncomeTaxes',
'EffectiveIncomeTaxRateReconciliationForeignIncomeTaxRateDifferential',
'EffectiveIncomeTaxRateReconciliationTaxCredits',
'EffectiveIncomeTaxRateReconciliationChangeInEnactedTaxRate',
'EffectiveIncomeTaxRateReconciliationChangeInDeferredTaxAssetsValuationAllowance
',
'EffectiveIncomeTaxRateReconciliationShareBasedCompensationExcessTaxBenefitPerc
ent',
'EffectiveIncomeTaxRateReconciliationOtherAdjustments',
'EffectiveIncomeTaxRateReconciliationOtherReconcilingItemsPercent',
'EffectiveIncomeTaxRateContinuingOperations',
'IncomeTaxReconciliationIncomeTaxExpenseBenefitAtFederalStatutoryIncomeTaxRate',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Amount',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017TransitionTaxOnAcc
umulatedForeignEarningsAmount',
'IncomeTaxReconciliationStateAndLocalIncomeTaxes',
'IncomeTaxReconciliationForeignIncomeTaxRateDifferential',
'IncomeTaxReconciliationTaxCredits',
'IncomeTaxReconciliationOtherReconcilingItems')
 sic_code_id Between 2800 and 2899          /*Substitute your own SIC code here*/
AND
fiscal_year = 2009            /*Run your initial test with fiscal_year > 2020 to ensure you
get results; for your full, change to 2011*/
ORDER BY
entity.entity_id,
fact.fiscal_year                  /*For your full query run, turn this into a comment by adding

two dashes "--" to the beginning of the line*/
```

3. Our programs demonstrate the process of writing the data to a CSV file. You can tailor the program to have students write the data to the file type of your choosing.
    a. Since financial statement data is reported on a comparative basis there will be duplicative data. You can introduce the DISTINCT command in SQL or have

students clean and transform the data after it has been queried by SQL using your program of choice.

Verify the Data Collection

1. Data accuracy is an important part of data collection. As such, instructors may wish to spend time with students to assist them in identifying ways that they can check whether their data collection efforts were successful.
    a. Students can take a wide variety of approaches, including manually verifying data collected against a few 10-K's pulled from Edgar, looking for inconsistencies (e.g., identifying a firm have reconciliation data for both percentages and amounts), identifying missing, duplicate, or mistagged values (e.g., a firm has a really large percentage which, upon investigation appears that a firm used a percentage tag but reported the reconciliation on a dollar amount). The last finding is likely to be rare, thanks to efforts by the XBRL Data Quality Committee[18] and does not indicate a problem with the program written by students. However, finding a mistagging provides opportunities to discuss the influence errors can have on data collection and data analysis. If auditors become engaged to ensure XBRL reporting quality, as suggested by Hoitash et al. (2021), students who identify such errors will be prepared to help with these engagements.
    b. Students should find that there are a large number of tags which produce accurate numeric data values in their final data set.

[18] For a recently released report of items that are checked by the Data Quality Committee please see: https://www.xbrl.org/news/new-data-quality-rules-xbrl-us-consults-on-17th-dqc-ruleset/

c. Returning to part a, errors which are part of the program should ultimately build students confidence as they learn how to adjust their program to remove these errors. However, errors resulting from the XBRL reporting process should help students realize limitations for data collection and data analysis.
d. This will vary based on the industry and time period for which data was pulled.
e. This will vary based on the industry and time period for which data was pulled.
f. This will vary based on the industry and time period for which data was pulled.
g. This will vary based on the industry and time period for which data was pulled.

Optional

While the focus of this case is on data collection it can be valuable for students to have opportunities to see the impact of this data collection through data visualization. We provide some suggested questions in this *Optional* section. Instructors can broaden the analysis and discussions by including recent academic work and other cases. For example, a burgeoning literature in tax accounting is using the information in tax footnotes to answer important questions, including how net operating losses and valuation allowances impact firms effective tax rates (Drake, Hamilton, and Lusch 2020; Schwab, Stomberg, and Xia 2020). Additionally, a recently developed teaching case by Cheng, Sapkota, and Yurko (2022) uses data analytics to investigate profitable firms which report no tax expense (or receive a refund), a topic of interest to regulators, policy makers, investors, taxpayers, and students. We use the FAANG companies to provide sample answers. Student responses to this optional section will depend on the research task assigned, their industry, and the years for which data was collected.

Outlier analysis

1. Among the FAANG companies, Facebook has the highest ETR, 25.5% in 2019.
    a. For tax years before 2018, the Federal Income Tax Rate was 35%. For tax years following 2017, the Federal Income Tax Rate is 21%.
    b. Facebook had two reconciling items which were equally large in 2019: Share-based compensation and Non-deductible FTC settlement accruals. Outside of 2019 for Facebook, the Tax Cuts and Jobs Act (2017) had numerous provisions which increased some firms' effective tax rates. Effective tax rates also tend to spike for firms which have pretax losses or small pretax income. Finally, State and Local taxes often raise effective tax rates above the statutory tax rate.
    c. Both Share-based compensation and Non-deductible FTC settlement accruals increased Facebook's effective tax rate in 2019. This question may seem surprising since students likely expect the largest reconciliation item for firms with high effective tax rates to be positive. However, even firms which have high effective tax rates may have large negative reconciliation items which are overwhelmed by positive reconciliation items which overwhelm the large reconciliation item.
    d. Since the SQL query only pulled XBRL data reported using standard tags, the program will not pull data reported using custom tags. For example, Facebook reports both the Excess tax benefits related to share-based compensation and the Non-deductible FTC settlement accrual using custom tags: fb:EffectiveTaxRateReconciliationShareBasedCompensationExcessTaxBenefitPercent and fb:EffectiveTaxRateReconciliationNonDeductibleFederalTradeCommissionSettl

mentAccrualPercent respectively. The SQL query would not have picked up these custom tags. All other information in the reconciliation table was reported using standard tags, and thus, would have been captured by the SQL query for Facebook.

i. Students may need some help identifying why a given data element was not pulled. Inline XBRL (iXBRL) facilitates the discovery of custom tag elements, so students may identify this cause on their own. The discovery of custom tags promotes additional discussions of data quality and potential impacts of reporting decisions. The next question to facilitate the latter discussions.

ii. If an investors, creditors, or policy makers design a query which pulls data reported using standard tags, then their analysis can be missing data. For example, Facebook's two custom tag elements reported in 2019 would lead to a computed ETR of 21.7%, below the reported level of 25.5%. Thus, investors relying on the information in the reconciliation table may underestimate Facebook's effective tax rate for 2019.

e. The high effective tax rate reported by Facebook in 2019 appears to be the result of firm level factors (stock-based compensation and a non-deductible settlement accrual). Economic factors such periods of economic downturns and/or policy factors, such as the Tax Cuts and Jobs Act of 2017 can impact firms' effective tax rates.

2. Among the FAANG companies, Netflix has the lowest ETR, 1% in 2018.

a. For tax years before 2018, the Federal Income Tax Rate was 35%. For tax years following 2017, the Federal Income Tax Rate is 21%.
b. Netflix's largest reconciling item for 2018 was the Excess tax benefits on stock-based compensation. Netflix's second largest reconciling item for 2018 was Federal and California R&D tax credits. Outside of Netflix's 2018 data, foreign rate differentials and the Tax Cuts and Jobs Act (2017) tax rate reduction (from 35% to 21%) tend to decrease firms' effective tax rates.
c. Both of these reconciling items decreased Netflix's effective tax rate for 2018.
d. Netflix uses a custom tag for Nondeductible Officers Compensation: nflx: EffectiveIncomeTaxReconciliationChangeinTaxReserves.
    i. The SQL program does not collect data reported using custom tags.
    ii. For Netflix, this single line item comprised 94.4% (14,377/15,216) of the provision for income taxes recorded in 2018. Thus, investors or other users relying solely on standard tags, would have erroneously concluded that Netflix's 2018 effective tax rate was 0.06%. You can go beyond Netflix and Facebook with students in discussing the potential pitfalls that arise from analyzing incomplete data. For example, Drake et al. (2020) and Schwab et al. (2020) both highlight how the collection of missing data reveals that low effective tax rates are often the result of operating loss carryforwards and/or valuation allowances, not income tax shifting.
e. In addition to the policy and firm item listed in response to the previous question above, major economic events, including the global pandemic, the 2008 financial crisis, or the early 2000s events can impact the ETRs of industries.

3. Compare and contrast your answers to 1 and 2 above.
    a. Students may suggest the need to revise the query to pull data for custom tags.
    b. Since custom tags, by definition should be unique, incorporating custom tags into an SQL query can be challenging.
    c. There are a wide variety of additional data which may be useful, from firm specific data reported on the financial statement (e.g., income statement, cash flow statement, etc.), unstructured data (e.g., the narrative discussion surrounding the numeric reconciliation table), economic data, tax policy data, data on taxpayer activism (e.g., the occupy wall street movement). This list is not comprehensive, but provides some ideas of additional data sources that students may identify and instructors can discuss.

Data exploration:

4. Beyond the required tags for effective tax rate and statutory tax rate, common standard tags include those associated with other, state and local taxation, foreign tax rate differentials, and stock-based compensation.
    a. All five FAANG companies had reconciling line items associated with these common standard tag items. In addition, all five companies report R&D and the Tax Cuts and Jobs Act as reconciling line items.
    b. This frequency was due to all five FAANG companies using these reconciling line items.
5. This will vary based on the industry and time period for which data was pulled. Less common tags can be time dependent (related to the Tax Cuts and Jobs Act of 2017) or firm dependent (changes to the valuation allowance account). For example, Facebook

was the only firm which reported the Non-deductible FTC settlement accrual, and Netflix was the only firm to report a Global corporate structure simplification line item. Each of these line items only affected one year of the firm's reconciliation table.

6. In a globally connected business environment corporations often operate in multiple tax jurisdictions. Thus, it is not surprising that foreign tax rate differentials and state and local taxes may top the list. Additionally, many jurisdictions offer incentives for research and development and many corporations take advantage of stock-based compensation plans. On the other hand, policy specific impacts and firm losses are hopefully less frequent events, and thus, are tags that should appear less frequently in the data.
7. Expand your analysis to the top three, bottom three tags in terms of frequency.
    a. Students can answer this question is a variety of ways, from visual to statistical analysis. As an example of the former, this question can be combined with the trend analysis suggested in the next section. As an example of the latter, students could run correlation analysis to examine the univariate association between the effective tax rates and the reconciliation items as reported. If you encourage students to pursue the latter, consider having students convert the numeric values reported in amounts to percentages (or vice versa) to improve the power of the statistical test since the data is on an industry basis.

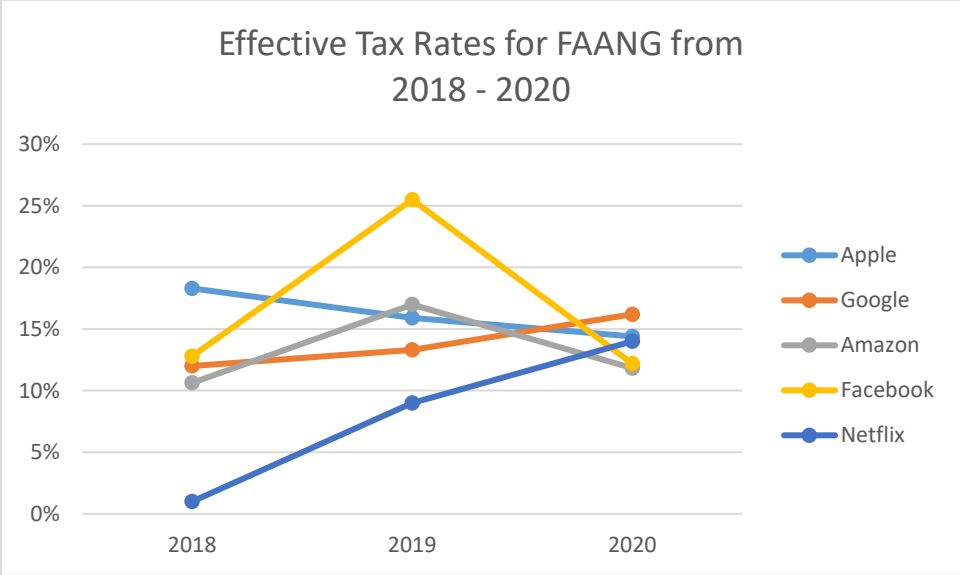
Trend analysis:

8. Trend analysis can be quickly performed using data visualization, where mean and median values of tags are plotted for the industry over time. Instructors requiring students to perform trend analysis should consider having students convert the numeric values reported in amounts to percentages or vice versa so that the entire industry can be used

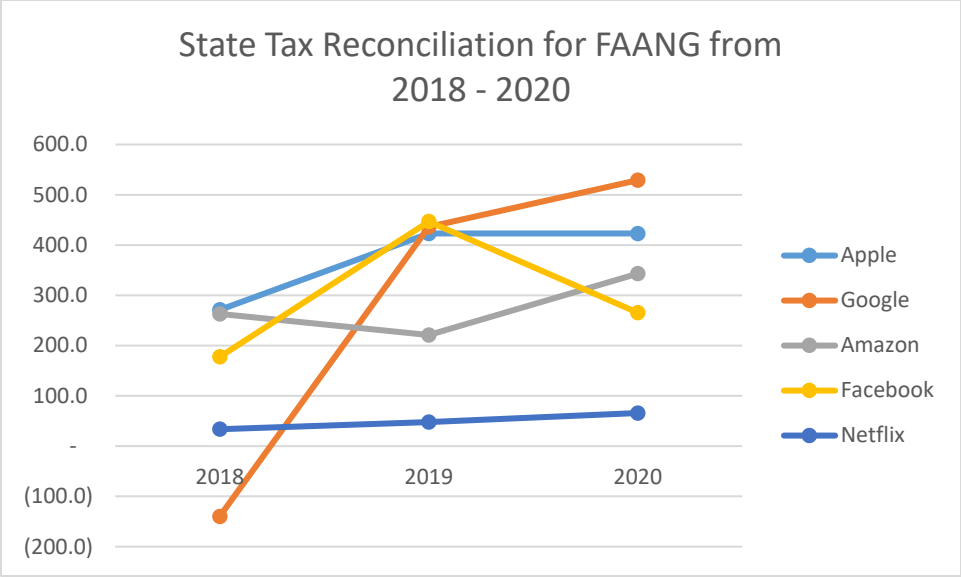
for the trend analysis. For example, three of the FAANG companies report using dollar amounts, while the remaining two companies report using percentages. For the purpose of this trend analysis, we converted the companies which report using percentages to dollar amounts.

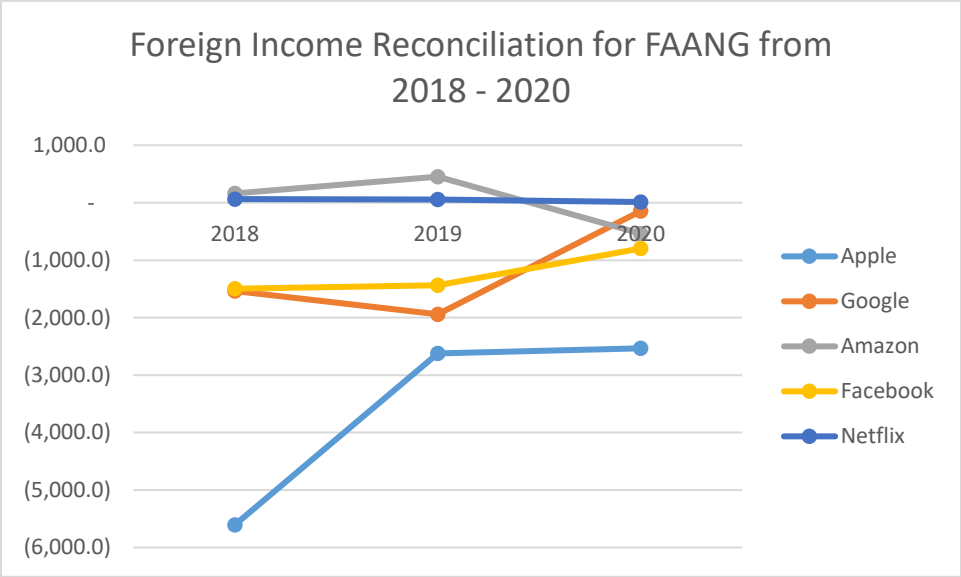
   a. Visual trend analysis may help students 'see' other factors (e.g., policy, economic, or firm) that they did not think about in response to earlier questions.

9. A data visualization for firms' ETR trends (such as the figure shown below) can help students identify firms which have unusually high, or unusually low ETRs.



10. These data visualizations may help students 'see' a pattern that they had not previously noted, both at the industry and the firm level. Two sample trend analyses are shown below.


State Tax Reconciliation for FAANG from 2018 - 2020
600.0
500.0
400.0
300.0
200.0
100.0
-
(100.0)
(200.0)
2018
2019
2020
Apple
Google
Amazon
Facebook
Netflix


Foreign Income Reconciliation for FAANG from 2018 - 2020
1,000.0
-
(1,000.0)
(2,000.0)
(3,000.0)
(4,000.0)
(5,000.0)
(6,000.0)
2018
2019
2020
Apple
Google
Amazon
Facebook
Netflix

APPENDIX C

EXTRACTING DATA FROM THE XBRL.US DATABASE

The first step in extracting XBRL data from the EDGAR XBRL database is to determine which tool you plan to use. If you plan to use Alteryx Designer (Desktop), Microsoft Access, or Microsoft Excel, you will need to install an ODBC (Open Database Connectivity) database driver for PostgreSQL on your computer. If you plan to use RapidMiner Studio, you can skip the ODBC driver download and configuration.

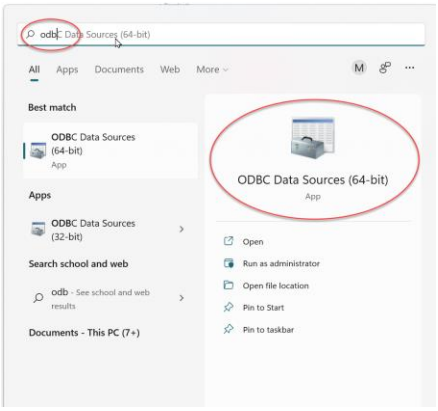
Downloading and configuring your ODBC Driver (for Alteryx Designer, Microsoft Access, Microsoft Excel)

You can follow along with these instructions at: https://youtu.be/azMEsJm5YfM

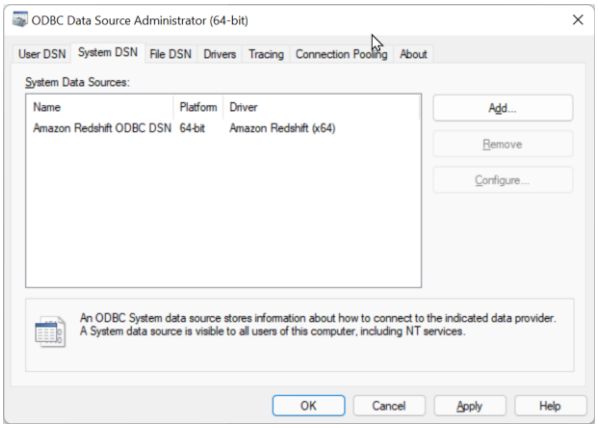
You can find the most recent version of the driver at: https://www.postgresql.org/ftp/odbc/versions/msi/ (scroll down the page to find more recent versions). The driver is a zip file containing a Windows MSI installation file, with a file name like: *psqlodbc_##_##_####-x64.zip*. You can download it, unzip the MSI file, then double-click the MSI file to start the installation process.

➦ URLs may change, so if you don't find the installation files at the link listed above, go to https://www.postgresql.org/ , click or search for "Downloads," click the link for Windows, then click "Download the installer."

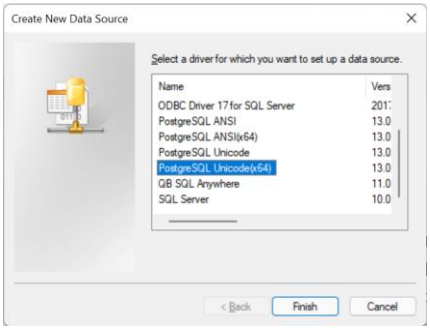
Now that you have installed the PostgreSQL ODBC driver, you need to configure a connection to the xbrl.us database. Bring up the Start menu and type in ODBC to find the ODBC Data Sources app.



Open up the ODBC Data Sources app and make sure either the User DSN or System DSN tab is open. You can set up your connection in either one – a User DSN will only be available to your Windows user ID, while the System DSN will be available for any user ID on your computer.



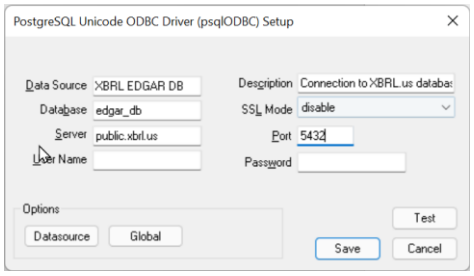
Click “Add…” to add a new connection. You will see a list of ODBC drivers you can use to add a new connection. Select “PostgreSQL Unicode(x64)” and click “Finish.”



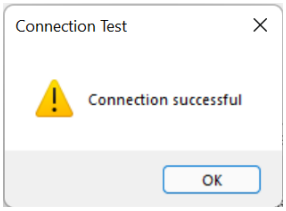
In the setup dialog, enter the following:

Data Source: Any name you choose – maybe **MY XBRL EDGAR DB**
Description: Optional – you can enter any additional information here

Database:	**edgar_db** (or other database as provided by your instructor)
SSL Mode:	(leave as is: **disable**)
Server:	**public.xbrl.us** (or server provided by your instructor)
Port:	**5432** (or other port as provided by your instructor)
User Name:	Your user name (supplied by XBRL US/your instructor)
Password:	Your password



Click "Test" to test your connection. Hopefully, you'll get a "Connection successful" message. If not, go back and check all your entries in the Setup dialog box. Cases and punctuation should match, and there should be no extraneous spaces.

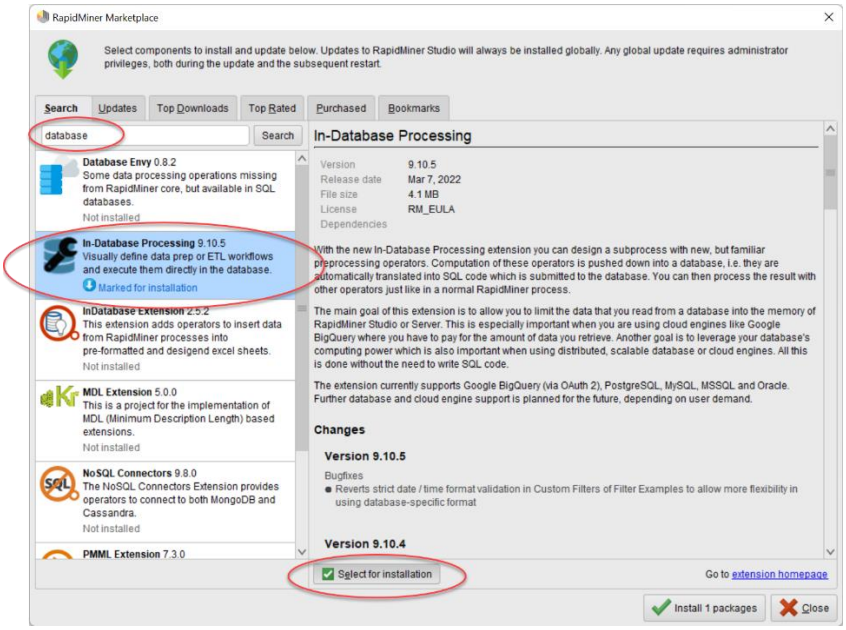


Once you have successfully tested your connection, click "Save." Your new connection is now ready to be used.

Extracting XBRL Data in RapidMiner Studio

You can follow along with these instructions at: https://youtu.be/bNhFnbiJSJ4
(These instructions assume you already have some experience working with RapidMiner.)

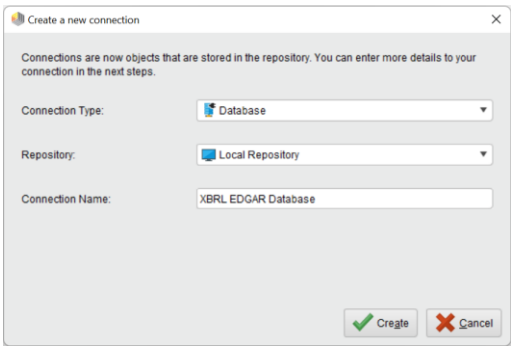
RapidMiner uses JDBC (Java Database Connectivity) to connect to databases. To enable JDBC processing, you will add the "In-Database Processing" extension to RapidMiner. In the RapidMiner application menu, select "Extensions," "Marketplace." Type "database" in the search box and click the "Search" button. In the search results, select the "In-Database Processing" extension (you may need to scroll down the list to see it), then check the "Select for installation" checkbox.



You can select other extensions to install as well. Click "Install # packages" when you have selected all the extensions you want. Accept the license terms on the next dialog box, then click "Install # packages" again. RapidMiner will download the extension files and prompt you to restart RapidMiner Studio. Click "Yes" to restart RapidMiner.

Now that you've added the In-Database Processing extension, you can create a new connection to the XBRL database in your RapidMiner Repository. Open up RapidMiner and begin a new blank process. In the application menu, select "Connections," "Create Connection." Select or enter the following values:

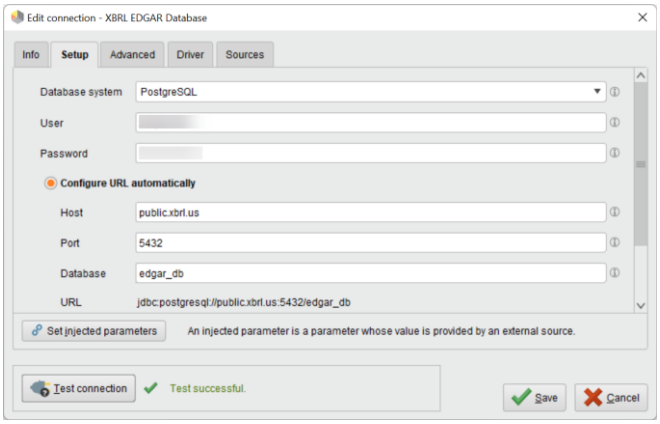
Connection Type:	**Database**
Repository:	**Local Repository**
Connection Name:	Your choice – maybe **XBRL EDGAR Database**



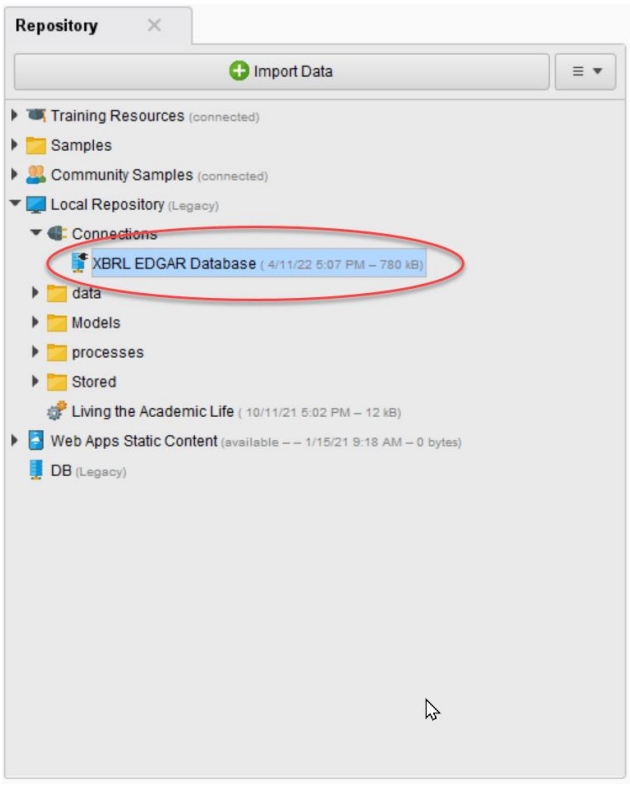
Click “Create” to continue. In the following Edit Connection dialog box, enter or select the following:

Database System:	PostgreSQL
User:	Your user ID (provided by instructor/XBRL US)
Password:	Your password (provided by instructor/XBRLUS)
Host:	public.xbrl.us
Port:	5432
Database:	edgar_db

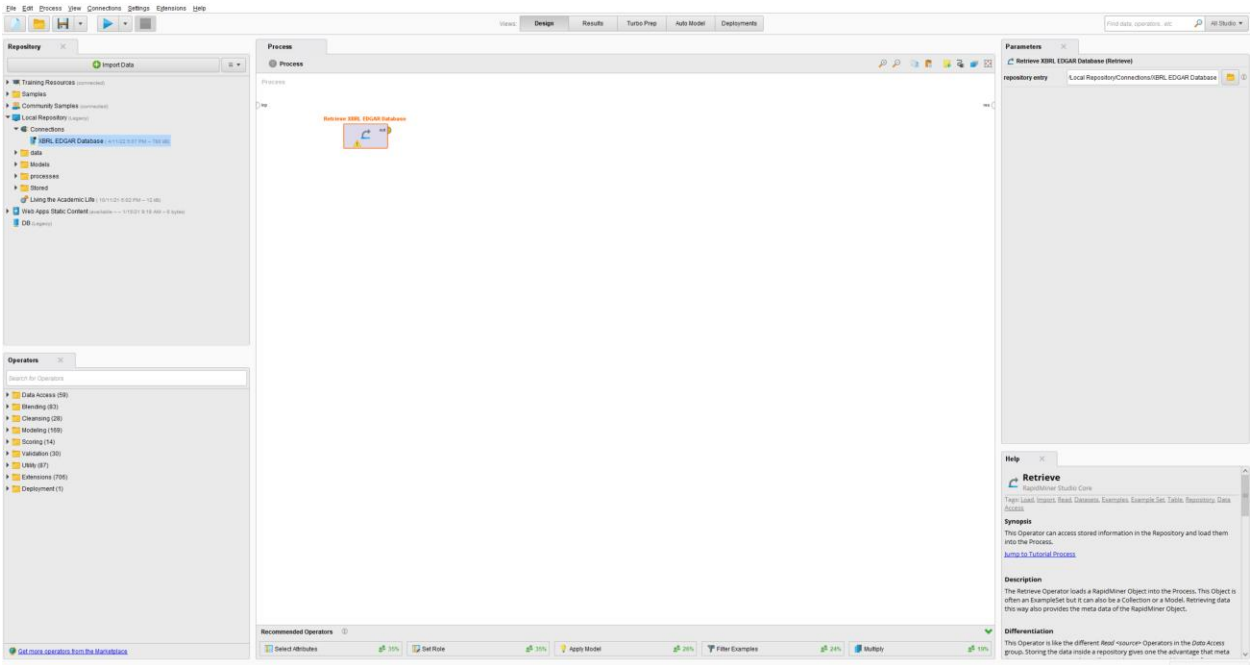
(Leave the “Configure URL automatically” button selected)



Click “Test connection” to make sure you can connect to the database, then click “Save” to save your new connection to your local repository.



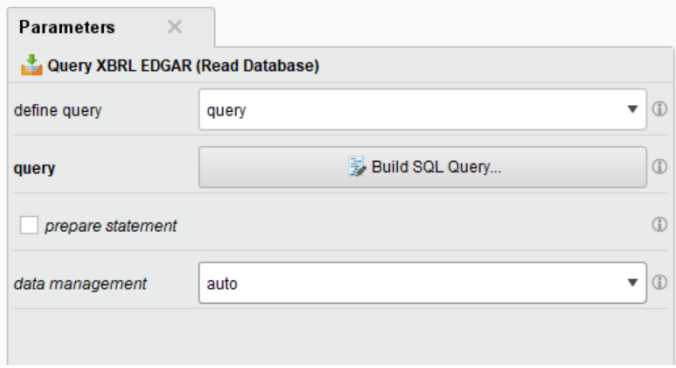
Drag your new XBRL Edgar Database connection out into your Process workspace.



RapidMiner gives the operator the default name “Retrieve XBRL Edgar Database,” which is fine. Next, drag in the “Read Database” operator and connect the output port of the Retrieve…

operator to the connection port of the Read Database operator. You may wish to change the name of the Read Database operator to something more informative, such as “Query XBRL EDGAR.” While your Read Database operator is selected, review the parameters. Set the parameters as follows:

define query:	query
prepare statement:	unselected
data management:	auto

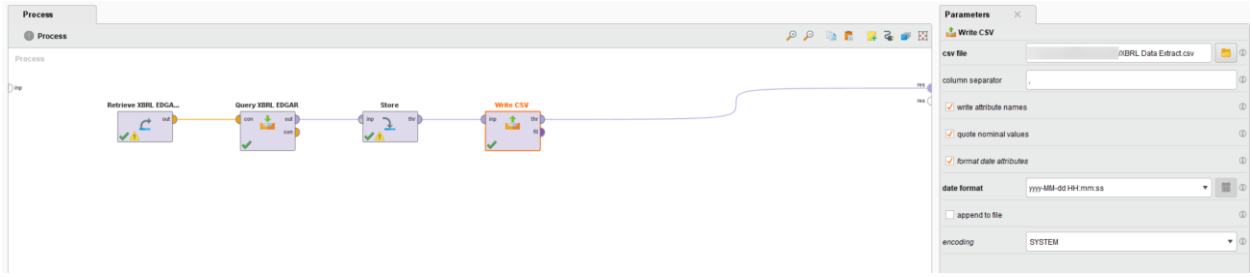


Click the “Build SQL Query” to create your SQL query. You can use the query-by-example tools in the dialog, but you may find it easier to simply write the query directly in the SQL Query text box. A sample query is presented at the end of this Appendix, or you can work with your instructor to build your query. Click “OK” to save your query and parameters.

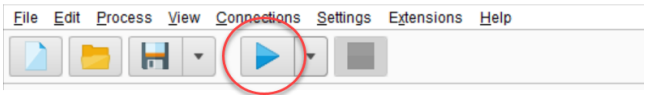
You can now choose what to do with the results of your query. To save the results in your RapidMiner repository, you can use the “Store” operator. Drag it into your Process workspace, then set the parameters to select a location in your repository (i.e., the “Data” folder), and create a name for your datastore (i.e., “XBRL EDGAR Extracted Data”).

To save the results to a file in your file system, you can use the “Write…” operators. In this example, we’ll use the “Write CSV” operator. The Parameters for the “Write CSV” operator allow you to specify the location and file name of your output, which column separator to use, whether to include field/attribute names in the first row, whether to add quotation marks to your fields, how to format dates, whether to append to the file if it already exists, and what encoding system to use for the file.

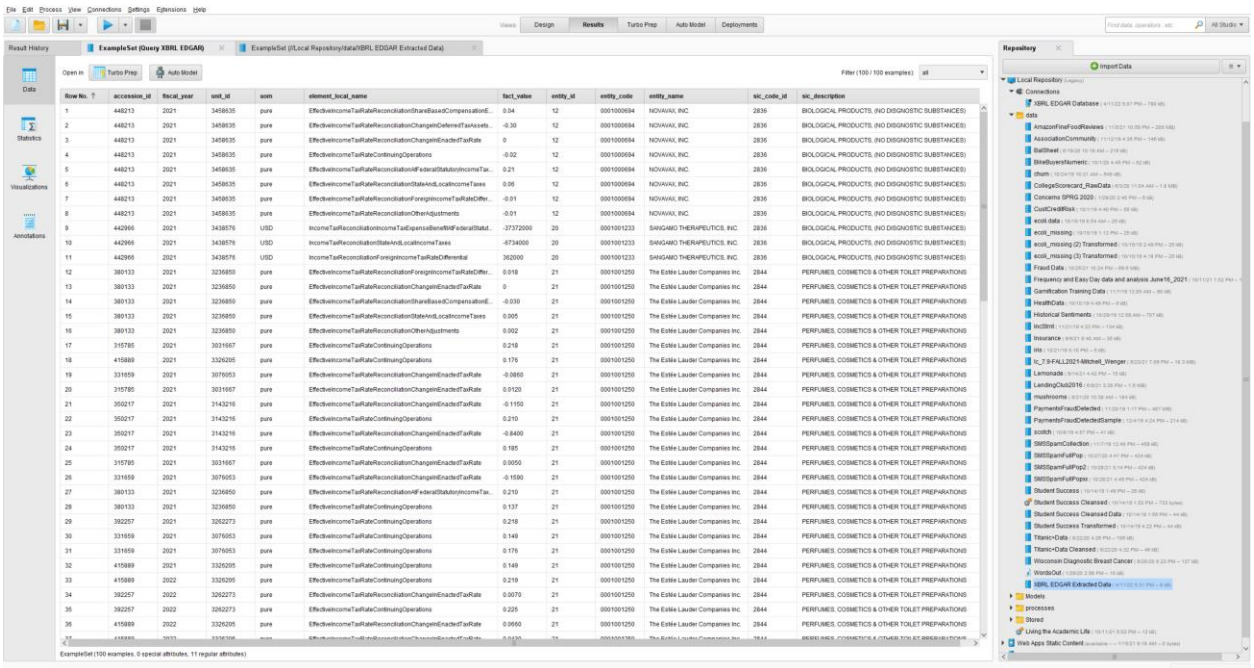
The following screen shot shows the process with both the Store and Write CSV operators, which will save the output in the local RapidMiner repository and as a file on the computer’s hard drive.



Click “Run Process” to execute your database query and write your output.



Depending on your query, you will likely see results similar to the following:

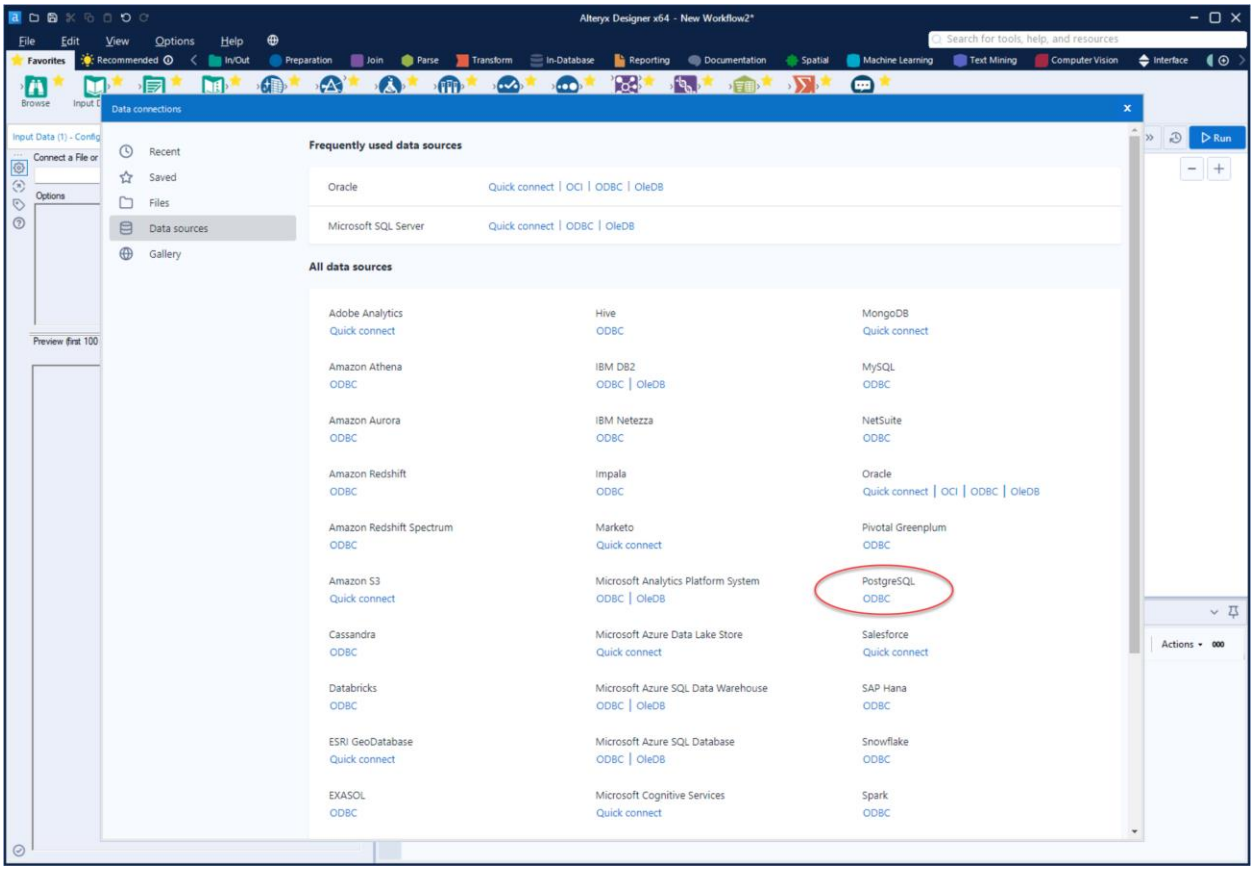


You may now use your results in additional RapidMiner processes (from the Repository) or in another tool of choice (from your extracted CSV file).

Extracting XBRL Data in Alteryx Designer

(These instructions assume you already have some experience working with Alteryx Designer.)

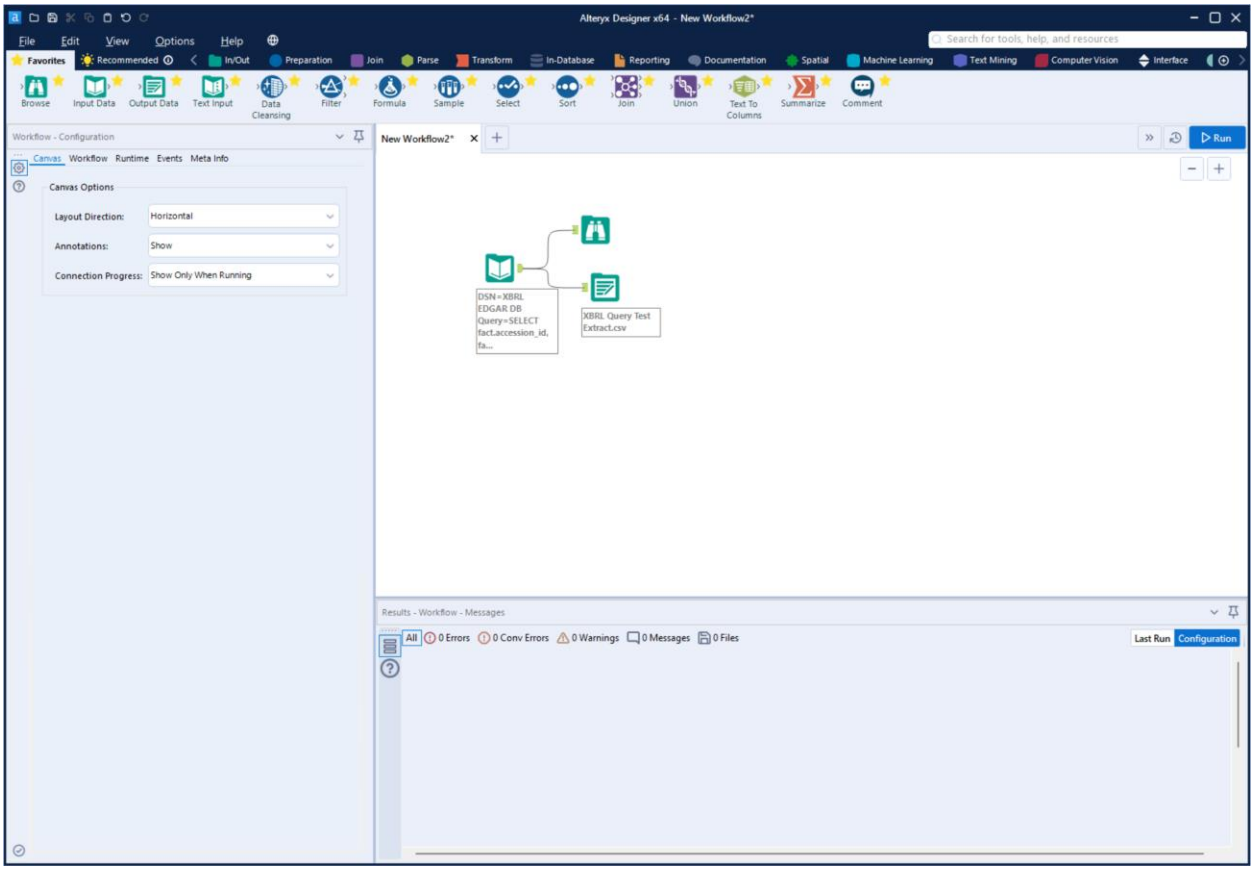
Alteryx can utilize the ODBC driver set up earlier. You can begin by creating a new, blank workflow in Alteryx. Drag the “Input Data” tool into the workspace, and click on the drop-down arrow “Connect a File or Database” in the Configuration pane. Select the “Data Sources” tab in the dialog box, then the PostgreSQL “ODBC” link.



If your XBRL EDGAR DB data source name appears in the drop down list, select it. If it doesn’t yet, you can add it by clicking on “ODBC Admin” and finding it or creating it as outlined earlier. In the PostgreSQL Connection dialog, add your User Name and Password for the XBRL database in the appropriate fields, then click “OK.”

Alteryx now allows you to select tables, use the visual query builder, or create a query directly in the SQL Editor tab. Select the SQL Editor tab, then enter your query. A sample query is presented at the end of this Appendix, or you can work with your instructor to build your query. Click “OK” to save your query and parameters.

Your query is now ready to use, but you may wish to attach a Browse or Output Data tool to your query in order to verify your results before continuing your project.



Sample Query

The following query will work as is in Alteryx or RapidMiner.

```
SELECT
fact.accession_id,
fact.fiscal_year,
fact.unit_id,
fact.uom,
fact.element_local_name,
fact.fact_value,
entity.entity_id,
entity.entity_code,
entity.entity_name,
sic_code.sic_code_id,
sic_code.description as SIC_Description
FROM
public.fact,
public.accession,
public.sic_code,
public.entity
WHERE
fact.accession_id = accession.accession_id
AND
accession.standard_industrial_classification = sic_code.sic_code_id
AND
accession.entity_id = entity.entity_id
AND
fact.element_local_name IN
('EffectiveIncomeTaxRateReconciliationAtFederalStatutoryIncomeTaxRate',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Percent',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017TransitionTaxOnAc
cumulatedForeignEarningsPercent',
'EffectiveIncomeTaxRateReconciliationStateAndLocalIncomeTaxes',
'EffectiveIncomeTaxRateReconciliationForeignIncomeTaxRateDifferential',
'EffectiveIncomeTaxRateReconciliationTaxCredits',
'EffectiveIncomeTaxRateReconciliationChangeInEnactedTaxRate',
'EffectiveIncomeTaxRateReconciliationChangeInDeferredTaxAssetsValuationAllowa
nce',
'EffectiveIncomeTaxRateReconciliationShareBasedCompensationExcessTaxBenefitPe
rcent',
'EffectiveIncomeTaxRateReconciliationOtherAdjustments',
'EffectiveIncomeTaxRateReconciliationOtherReconcilingItemsPercent',
'EffectiveIncomeTaxRateContinuingOperations',
'IncomeTaxReconciliationIncomeTaxExpenseBenefitAtFederalStatutoryIncomeTaxRat
e',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017Amount',
'EffectiveIncomeTaxRateReconciliationTaxCutsAndJobsActOf2017TransitionTaxOnAc
cumulatedForeignEarningsAmount',
'IncomeTaxReconciliationStateAndLocalIncomeTaxes',
'IncomeTaxReconciliationForeignIncomeTaxRateDifferential',
'IncomeTaxReconciliationTaxCredits',
'IncomeTaxReconciliationOtherReconcilingItems')
```

```
AND
sic_code_id BETWEEN 2800 AND 2899     /*Substitute your own SIC code here*/
AND
fiscal_year > 2008         /*Run your initial test with fiscal_year > 2020 to
ensure you get results; for your full, change to your earliest desired year*/
ORDER BY
entity.entity_id,
fact.fiscal_year
Limit 100      /*For your full query run, turn this into a comment by adding
two dashes "--" to the beginning of the line*/
;
```