1. Understanding Fundamental Accounting Concepts and Reporting Styles

Economic entities report information in their financial reports. That information is not random. Relations exist between reported information. Some of those relations are universal to every economic entity that reports, such as the accounting equation (Assets = Liabilities and Equity)\(^1\). Other relations are universal to sets of entities that use a specific style of reporting. For example, depository institutions all follow the interest based revenues income statement reporting style. Whether economic entities explicitly report information or users of a financial report need to impute a fundamental accounting concept value, these universal relations are at play. These universal relations are important to safely, reliably, and predictably using reported financial information and can be leveraged for things such as querying information within a report.

The fundamental accounting concept relations is a set of continuity cross-checks that helps make sure XBRL-based reports are created correctly. Financial reports contain a “skeleton” which forms a frame for a financial report. Another metaphor is that these fundamental accounting concept relations form the “keystones” of a financial report. They can be thought of as continuity equations to cross-verify information in XBRL-based digital financial reports.

1.1. Overview

Each public company that reports to the SEC has a reporting style. Each reporting style has a unique set of fundamental accounting concept relations which make up that reporting style.

A reporting style is basically a pattern of how an economic entity creates their report. Reporting styles are determined by statutory and regulatory reporting rules, policies set by a company, and preferences of those involved in creating the report.

The notion of a reporting style is not unique to the primary financial statement of a financial report. However, I am going to use the primary financial statements to explain the notion of a reporting style. Reporting styles also relate to every other disclosure contained within a financial report\(^2\). Patterns can be universally applicable to every public company or patterns can be completely unique to one specific economic entity creating a report. Every report can be distilled down to a reporting style.

As I will explain them here, a reporting style is the approach that is used to represent information on the balance sheet, income statement, statement of comprehensive income, and cash flow statement used by a public company. The graphic below shows the top 15 reporting styles and then the bottom 5 reporting styles with the middle reporting styles cut out.

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There are approximately 100 different reporting styles that have been identified that public companies use to create their financial reports. Each reporting style is assigned a code. For example, the graphic above highlights the reporting style with the code "INTBX-BSU-CF1-ISS-IEMIX-OILN" reporting style used by the 480 public companies that are depository institutions that use an interest-based revenues reporting style.

Note that about 12 different reporting styles are used by 80% of public companies.

The following is a list of fundamental accounting concept relations business rules related this specific reporting style which was given the code "INTBX-BSU-CF1-ISS-IEMIX-OILN":

| BS1 | Equity = Equity Attributable to Parent + Equity Attributable to Noncontrolling Interest |
| BS2 | Assets = Liabilities and Equity |
| BS3 | Assets = Current Assets + Noncurrent Assets (classified balance sheet) |
| BS4 | Liabilities = Current Liabilities + Noncurrent Liabilities (classified balance sheet) |
| BS5 | Liabilities and Equity = Liabilities + Commitments and Contingencies + Temporary Equity + Redeemable Noncontrolling Interest + Equity |
| IS1 | InterestIncomeExpenseOperatingNet = InterestAndDividendIncomeOperating - InterestExpenseOperating |

Note that this information is from the 10-Ks of public companies for fiscal years ended 2016.
Note that there are only three fundamental accounting concept relations that are unique to this reporting style: IS1, IS2, and IS4.

The best way to understand reporting styles and the fundamental accounting concept relations that make up each reporting style in general terms is to use the Crash Course in the Fundamental Accounting Concept Relations. In order to understand a specific reporting style, use the Fundamental Accounting Concept Relations (Working Prototype 3) metadata.

### 1.2. Working with the fundamental accounting concepts

There are several moving pieces which relate to working with fundamental accounting concepts and relations between those concepts which must be understood. Not understanding these ideas can make it hard to interpret the dynamics of situations which are encountered. There are two reasons reporting styles and fundamental accounting concept relations of each reporting style are critically important:

1. They describe to a machine such as a computer how these primary financial statements are represented.
2. They can be used to verify that the primary financial reports have been created correctly, according to what was expected from the description.

#### 1.2.1. Understanding the notion of type or class

When a concept is expressed in a conceptual model it is defined to be one specific type or class of thing. That one concept cannot be some other type/class of thing, something that it is not. Likewise, a concept cannot be two things at the same time.

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For example, the concept *Assets* is something that is completely distinct from the concept *Equity*.

One thing can be a sub-type of some other thing. For example, *Cash and cash equivalents* can be a sub-type of *Current asset*. By defining *Cash and cash equivalents* as a type of *Current asset*, you are implying that it is not a sub-type of *Equity*.

When some new thing is created, it needs to be created based on some other thing and not just placed into a conceptual model and not associated with anything at all. For example, when a public company creates an extension concept, that extension concept needs to be associated with something else for a machine-based process to understand what that extension means.

Public companies creating XBRL-based financial filings sometimes move a fundamental accounting concept to be part of some other fundamental accounting concept, "crossing types", causing confusion when information is interpreted by users of the information from the financial report.

Also, when an extension concept is created by a public company and no machine-readable information exists which relates an extension concept to some existing US GAAP XBRL Taxonomy concept or concept type/class, the machine using the information cannot possibly know the nature of the extension concept, the *extension concept is unknowable*. For example, if a filer reports the concept *my:SomeTypeOfOperatingExpense* and they intended that to be an operating expense, while a human can figure out the nature of the extension concept by reading the documentation, but a machine cannot understand that the extension is an operating expense. However, if the public company created a machine-readable relation using the provided XBRL “general-special” relation, then computers attempting to make use of this information could decipher the nature of the extension concept.

While in many cases the intent of the reporting entity can be implied from perhaps roll up relations which have been expressed, in many other cases the intent cannot be interpreted. Neither the FASB nor SEC provides explicit guidance and therefore many different arbitrary interpretations could result. The best case scenario is for intent of reporting entities to be explicitly stated.

### 1.2.2. Understanding the notion of WHOLE and PART

Concepts in a conceptual model can be a WHOLE and/or they can be a PART of some WHOLE. For example, *Cash and cash equivalents* is PART of the WHOLE *Current assets*. Using PARTS and WHOLES correctly and consistently with the intensions of the US GAAP XBRL Taxonomy is important. Further, it is important that the US GAAP XBRL Taxonomy be clear when it defines such WHOLES and PARTS.

### 1.2.3. Deriving information as compared to explicitly reported information

If a reporting entity explicitly reports the concept *Noncurrent assets*, an analyst using a financial report can always be 100% sure of the value of *Noncurrent assets*. If, however, a reporting entity does not explicitly report the concept *Noncurrent assets*; but does report explicit values for *Current assets* and *Assets* (total assets), and the relation *Assets = Current assets + Noncurrent assets* is known to always be true; then an analyst can always safely and reliably use the rules of logic and math
to derive or impute the value of Noncurrent assets using the know business rule relation between Assets, Current assets, and Noncurrent assets.

Using explicitly reported information is always safer, but using the rules of logic and math to derive a value is likewise very safe if certain relations are always known to be true. With explicitly reported information you can also check relations in numerous ways in order to be ultra-sure that you are using the reported information correctly, somewhat like a parity check or check sum. But parity checks are not as useful if information is derived because you cannot really double-check values to be sure they are correct.

1.2.4. Mapping reported concepts

Sometimes, creators of a financial report have several different alternative concepts which they might use to report what amounts to the same fact. For example, consider the concept Equity. The US GAAP XBRL Taxonomy provides numerous concepts which could be used to report the fundamental accounting concept Equity:

![Conceptual Model Table]

Part of the reason multiple concepts exist has to do with inconsistencies in the US GAAP XBRL Taxonomy. One type of inconsistency is interpreting what is an entirely different concept and what is really only different preferred labeling of what amounts to really be the same concept. For example, stockholders equity, partner capital, and member equity are all really one concept Equity (defined by SFAS 6) with three different preferred labels for the one concept.

Another reason different concepts are used is differences in interpretation of the meaning of certain line items. For example, if an economic entity reports Equity attributable to parent, Equity attributable to noncontrolling interest, and Equity (total equity, parent + noncontrolling interest); it is easy to sort out which concept is being used to report Equity. However, many times a reporting entity with report the line item labeled Equity and implies the meaning Equity attributable to parent; or report the line item labeled Equity and imply the meaning Equity (total equity). This can take some sorting out. As long as completely incorrect concepts are used, this can be sorted out by machines such as computers.

1.2.5. Importance of coordination and cooperation in achieving system harmony

There are exactly three possible reasons why a relation between the high-level fundamental accounting concepts expressed within XBRL-based public company financial reports do not conform to these fundamental accounting concept relations:

- **Filer reporting error**: The XBRL-based public company financial report to the SEC which reports some fact or facts does so incorrectly; a fact is wrong or a relation between facts is wrong or is interpreted differently than was anticipated for some reason. Basically, there is some inconsistency between the description of the information and what is reported.
• **Base taxonomy error**: The US GAAP XBRL Taxonomy expresses a concept which would be used to report a fact is unclear, inconsistent, logically inconsistent, or otherwise ambiguous and therefore there are different possible interpretations by those using that taxonomy or some important or common concept is missing altogether. Basically, there is some inconsistency between how reporting entities interpret the information description.

• **Test business rule error**: The business rules used by the software algorithm to compute or otherwise interpret the fundamental accounting concepts or the relations between those concepts are in error or are interpreted differently by different software creators. Basically, software used to make use of fundamental accounting concept information is not consistent with the description provided by the US GAAP XBRL Taxonomy.

Coordination and cooperation in arriving at the description of concepts and relations between concepts is crucial. Idiosyncrasies in interpretations cause the system to not work as anticipated. Fundamental accounting concepts and relations between concepts is a control mechanism to help coordinate consistent understanding. The notion of all stakeholders being in harmony as contrast to stakeholder dissonance is used to explain system function.

### 1.3. Notion of fundamental accounting concepts

While not all financial reports have 100% of all facts in common and while different industries or accounting activities can even use some different concepts to report key facts, there are core concepts which all accounting entities have. At the highest level is the accounting equation: Assets = Liabilities and Equity. These fundamental concepts can be thought of as “key stones” or “corner stones” which hold a financial report together or provide somewhat of a “skeleton” for a financial report. Note that this is not to say that all accounting entities report each of these accounting concepts; if a concept is not reported it can be logically derived leveraging information that was reported and known business rules which describe relations between these key concepts.

For example, below are fundamental accounting concepts which are common to most commercial and industrial reporting entities in all industries and relations which exist between these fundamental concepts which can never change:

• Assets = Liabilities and Equity
• Assets = Current Assets + Noncurrent Assets (classified balance sheet)
• Equity = Equity Attributable to Parent + Equity Attributable to Noncontrolling Interest
• Liabilities = Current Liabilities + Noncurrent Liabilities (classified balance sheet)
• Liabilities and Equity = Liabilities + Commitments and Contingencies + Temporary Equity + Equity
• Current Liabilities = Liabilities - Noncurrent Liabilities (classified balance sheet)
• Gross Profit = Revenues - Cost Of Revenue (Multi-step approach)
• Operating Income (Loss) = Gross Profit - Operating Expenses + Other Operating Income (Multi-step approach)
• Operating Income (Loss) = Revenues - Costs And Expenses + Other Operating Income (Single-step approach)
• Costs And Expenses = Cost Of Revenue + Operating Expenses (Single-step approach)
• Income (Loss) from Continuing Operations after Tax = Income (Loss) from Continuing Operations Before Tax - Income Tax Expense (Benefit)
• Net Income (Loss) = Income (Loss) from Continuing Operations After Tax + Income (Loss) from Discontinued Operations, Net of Tax + Extraordinary Items, Gain (Loss)
• Net Income (Loss) = Net Income (Loss) Attributable to Parent + Net Income (Loss) Attributable to Noncontrolling Interest
• Net Income (Loss) Available to Common Stockholders, Basic = Net Income (Loss) Attributable to Parent - Preferred Stock Dividends and Other Adjustments
• Comprehensive Income (Loss) = Comprehensive Income (Loss) Attributable to Parent + Comprehensive Income (Loss) Attributable to Noncontrolling Interest
• Comprehensive Income (Loss) = Net Income (Loss) + Other Comprehensive Income (Loss)
• Net Cash Flows, Operating = Net Cash Flows, Operating, Continuing + Net Cash Flows, Operating, Discontinued

However, there is some variability in how a handful of these fundamental accounting concepts are reported by economic entities. This brings us to the notion of reporting styles.
1.4. Notion of reporting styles

Economic entities report using different reporting styles (or reporting pallets or report frames). For example, consider the variability in where public companies report the line item Income (Loss) from Equity Method Investments:

- 624 entities (60%) reported the line item before tax directly as part of income (loss) from continuing operations before tax
- 132 entities (12%) reported the line item between income (loss) from continuing operations before and after tax
- 128 entities (12%) reported the line item as part of nonoperating income (expense)
- 20 entities (2%) reported the line item as part of revenues
- 10 entities (less than 1%) reported the line item as part of costs and expenses
- 8 entities (less than 1%) reported the line item as part of operating expenses
- 126 entities (11%) did something else which was not directly analyzed so exact placement is unknown

Comprehensive testing of all XBRL-based financial reports submitted to the SEC at this very high level revealed a very limited amount of variability most of which occurs on the income statement. This variability is not random. Most variability relates to the reporting practices of different industries which account for different activities. The following is a summary of and a complete inventory of this variability at this high-level of a financial report:

- Entities report using some accounting industry or activity
  - Commercial and industrial (standard approach)
  - Interest based revenues
  - Insurance based revenues
  - Securities based revenues
  - REIT (real estate investment trust)
  - Utility

- Balance sheets can be
  - Classified and report current and noncurrent assets and liabilities
  - Unclassified
  - Regulated utility which reports capitalization
  - Report using liquidity based reporting

- Income statements can be

7 See a detailed analysis of this topic here, http://xbri.squarespace.com/journal/2014/10/14/options-for-dealing-with-line-items-that-bounce-around-incom.html
8 This Excel spreadsheet is helpful in understanding reporting variability, http://xbri.squarespace.com/journal/2014/9/15/wonderful-things-xbri-based-structured-information-enables.html
• Multi-step and report gross profit  
• Single-step and does not report gross profit  

- Income statements can  
  - Report operating income (loss)  
  - Do not report operating income (loss)  

- Income (loss) from equity method investments can be reported on the income statement  
  - As part of revenues  
  - As part of nonoperating income (loss)  
  - Before taxes as a separate line item  
  - Between income (loss) from continuing operations before and after taxes  

- Cash flow statements can report net cash flow as  
  - Including exchange gains (losses)  
  - Not including exchange gains (losses)  

This is a comprehensive and complete inventory of the high level variability in public company financial filings. This information is not a statistical analysis or speculation. This is observable empirical evidence provided by the XBRL-based public company financial filings submitted to the SEC.

A coding scheme was developed to articulate this information in both human readable and machine readable form. Below is a brief description of that coding scheme. Each code has approximately six parts: "COMID-BSC-CF1-ISS-IEMIB-OILY". This explains each part and the codes used for each part and shows the number of entities which have that characteristic (note that the totals add up to 6,943 and not 6,947; this relates to an issue with CIK numbers):

- **Part 1: Industry codes**: (Total 6,943)  
  - COMID=Commercial and Industrial (5,985)  
  - INTBX=Interest based revenues (632)  
  - INSBX=Insurance based revenues (50)  
  - SECBX=Securities based revenues (93)  
  - REITX=Real estate investment trust (158)  
  - UTILX=Utility (25)  

- **Part 2: Balance sheet form codes**: (Total 6,943)  
  - BSC=Classified balance sheet (5,527)  
  - BSU=Unclassified balance sheet (1,412)  
  - BSR=Regulated utility  
  - BSL=Liquidity based balance sheet (4)

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9 I did unfortunately break this pattern, but the number of parts really is meaningless.
Part 3: Cash flow statement exchange gains codes: (Total 6,943)
  o CF1=Exchange gains (losses) part of net cash flow or does not report line item (6,845)
  o CF2=Exchange gains (losses) part of cash roll forward (98)

Part 4: Income statement form codes: (Total 6,943)
  o ISS=Single step income statement (4,255)
  o ISM=Multi step income statement (2,688)

Part 5: Income (loss) from equity method investments location codes: (Total 6,943)
  o IEMIX=Income (loss) from equity method investments not reported (5,290)
  o IEMIB=Income (loss) from equity method investments reported BEFORE tax (1,402)
  o IEMIN=Income (loss) from equity method investments reported within nonoperating income (loss) (122)
  o IEMIT=Income (loss) from equity method investments reported between income (loss) from continuing operations before and after taxes (113)
  o IEMIR=Income (loss) from equity method investments reported within revenues (16)

Part 6: Operating income (loss) codes: (Total 6,943)
  o OILY=Operating income (loss) reported (5,120)
  o OILN=Operating income (loss) not reported (1,823)

While the complete set of codes and reporting styles cannot be known until the process of breaking public company filings into these sets and testing each filing and set as to their conformance to the fundamental accounting concepts and relations within the set and the success of this process is verified by 100% conformance by each reporting entity to 100% of the fundamental accounting concepts and relations between those concepts within each set; this is achievable.

In fact, testing shows that this objective has already been achieved for 99.0% of relations and 81.0% of all public company financial reports submitted to the SEC using the XBRL format. Further, which reporting entities do not conform to these concepts and relations and why they do not conform is easy to observe.\(^\text{10}\)

1.5. Measuring public company financial reports using fundamental accounting concept relations

In order to tune the filings of public companies, the US GAAP XBRL Taxonomy, and the tests uses to describe and evaluate the fundamental accounting concept relations; measurements are taken periodically.

The most current measurement of the fundamental accounting concept relations is shown below for the 480 public companies that report using the “INTBX-BSU-CF1-ISS-IEMIX-OILN” reporting style:

<table>
<thead>
<tr>
<th>Generator</th>
<th>Filings Count</th>
<th>Filings With No Errors</th>
<th>Sum Errors (all filings)</th>
<th>Average Errors per Filing</th>
<th>Percent Without Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thunderdome</td>
<td>50</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>F3 Data Systems</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Merrill</td>
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<td>33</td>
<td>0</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>EDGARfilings PROfile</td>
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<td>26</td>
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<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>DataTracks</td>
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<td>32</td>
<td>0</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Compas</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>RR Donnelley</td>
<td>68</td>
<td>67</td>
<td>1</td>
<td>0</td>
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</tr>
<tr>
<td>Cement (was Rivet)</td>
<td>28</td>
<td>27</td>
<td>1</td>
<td>0</td>
<td>96%</td>
</tr>
<tr>
<td>Ex XBRL</td>
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<td>25</td>
<td>2</td>
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</tr>
<tr>
<td>GoXBRIL</td>
<td>12</td>
<td>12</td>
<td>1</td>
<td>1</td>
<td>97%</td>
</tr>
<tr>
<td>Workiva (WebFilings)</td>
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<td>141</td>
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</tr>
<tr>
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<td>8</td>
<td>3</td>
<td>3</td>
<td>80%</td>
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<tr>
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<td>16</td>
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<td>1</td>
<td>94%</td>
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<tr>
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</tr>
<tr>
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<td>1</td>
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<tr>
<td></td>
<td>480</td>
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<tr>
<td>Percent of all filings conforming to all FAC relations</td>
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<td></td>
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<tr>
<td>Total filings NOT conforming</td>
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<td></td>
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</tr>
<tr>
<td>Total tests</td>
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<tr>
<td>Total inconsistent</td>
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<tr>
<td>Total consistent</td>
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<tr>
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<tr>
<td>Difference from target</td>
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<td>0.6454933%</td>
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</tbody>
</table>

A generator is any software application or filing agent that generates an XBRL-based financial report. The graphic above shows the 480 XBRL-based financial reports summarized by generator of that report. What is shown is the “Filing Count” which shows the total number of reports for that generator; “Filings With No Errors” indicating the number of those reports that have an error, “Sum Errors (all filings)” which shows the count of errors for all those filings; “Average Errors per Filing” which is the number of errors per report; and “Percent without Error” which indicates the number of reports for a Generator which the fundamental accounting concepts are analyzed are 100% consistent with expectation.

Each quarter for the past several years I have provided a measurement of the consistency of XBRL-based financial reports of public companies to the set of fundamental accounting concept relations. Each quarter the overall consistency has increased.

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1.6. Compare periods, shows public company fixing inconsistency

This graphic below shows that the filer “PINNACLE FINANCIAL PARTNERS INC” whose XBRL-based financial report was created using the assistance of “EDGARfilings PROFILE” had an income statement related inconsistency for a number of periods but then the issue was created once the filing agent/software vendor was made aware of the error.

1.7. Disclosures have patterns also

To close off this introduction to the notion of the fundamental accounting concepts and reporting styles I want to reiterate that disclosures have patterns also\(^\text{13}\). Patterns in disclosures can be measured also. This will be covered separately.