Elements of Financial Statements – Governmental Accounting Standards

Building on the double-entry accounting model and the accounting equation

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Last Revised – October 31, 2019 (DRAFT)

"I skate to where the puck is going to be, not where it has been." *Wayne Gretzky*, legendary Canadian hockey star

Executive summary:

- The double-entry accounting model and the accounting equation form the core shell for all financial reporting schemes.
- This document enhances the accounting equation in two ways. First, it puts these definitions in machine-readable form[1]. Second, it puts the elements in context by explicitly showing the associations between the defined elements.

[1] Human-readable and machine-readable documentation, http://xbrlsite.azurewebsites.net/2019/Core/core-sfac6/

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ACKNOWLEDGEMENTS

I would like to thank the following people for enabling me to understand and get my head around all of this information. Thomas Egan is likely the best professional accountant that I know. He has expertise in both US GAAP and IFRS. Thomas McKinney has expertise with US GAAP and creating XBRL-based financial reports that are submitted to the U.S. Securities and Exchange Commission. Rene van Egmond has the unique skill of understanding my "business speak" and then being able to convert that to terms that are understandable to computer science professionals. Dean Ritz and Timothy Randle have been thinking about XBRL-based digital financial reporting, along with Rene and myself, while we worked together at UBmatrix. Andrew Noble is an accountant and a true visionary in Australia who created the LODGEiT system for submitting XBRL information to Australian regulators and the AccFx accounting software system which is built using Wolfram's Mathematica. He is focused on leveraging XBRL for transaction processing. Hamed Mousavi is a software engineer with a very good background in accounting. Hamed and I have been collaborating to create the Pesseract application for five years. David Eichner, CPA (david@icansoftware.com) sells and installs accounting software and has been a long-time collaborator and colleague and has worked to implement what amounts to a fact ledger in Microsoft Dynamics and Acumatica. Pete Rivett and Elisa Kendall are both experts in knowledge engineering and I learned about that important topic while working with them to create the OMG Standard Business Report Model (SBRM). Rajib Doogar is an accounting professor at the University of Washington Bothell Campus. His ideas about looking at the general ledger as "trees", "branches", and "leaves" and explaining the matrix algebra behind these relations was very helpful. Ghislain Fourny is a data scientist who I met when doing a database project relating to XBRL for a company he used to work for, 28msec. Finally, all of the editors and contributors of the XBRL 2.1 technical specification that helped me get my head around the technical aspects of XBRL. Thanks to everyone!

The accounting equation and double-entry accounting are the foundation of financial reporting schemes.

This document enhances the accounting equation in two ways. First, it puts these definitions in machine-readable form. Second, it puts the elements in context by showing the associations between the concepts in machine-readable form.

Double-entry Accounting.

Single-entry accounting is how 'everyone' would do accounting. In fact, that is how accounting was done for about 4,000 years before double-entry accounting was invented. Double-entry accounting was the invention of medieval merchants and was first documented by the Italian mathematician and Franciscan Friar Luca Pacioli[2] in 1494. The section related to double-entry accounting was translated into English in 1914[3].

Double-entry accounting adds an additional important property to the accounting system, that of a clear strategy to identify errors and to remove the errors from the system. Even better, double-entry accounting has a side effect of clearly firewalling errors as either accident or fraud. This then leads to an audit strategy. Double-entry accounting is how professional accountants do accounting.

Which came first, double-entry accounting or the enterprise? It is hard to overstate the impact of double-entry accounting on the evolution of the complex global enterprise[4].

Foundational Mathematical Equation for Double-Entry Accounting

The foundational basis of double-entry accounting is straightforward. Quoting David Ellerman from his paper *The Math of Double-Entry Bookkeeping: Part I (scalars)*[5]:

> "Given an equation w + … + x = y + … + z, it is not possible to change just one term in the equation and have it still hold. Two or more terms must be changed."

And so, the left-hand side of the equation "w + … + x" (the DEBIT side) must always equal the right-hand side of the equation "y + … + z" (the CREDIT side) in double-entry accounting. The

[2] Wikipedia, *Luca Pacioli*, https://en.wikipedia.org/wiki/Luca_Pacioli
[3] J. B. Geijsbeek, *Ancient Double-Entry Bookkeeping*, https://archive.org/details/ancientdoubleent00geij/page/n3
[4] Ian Grigg, *Triple Entry Accounting*, https://iang.org/papers/triple_entry.html
[5] David Ellerman, *The Math of Double-Entry Bookkeeping: Part I (scalars)*, http://www.ellerman.org/the-math-ofdouble-entry-bookkeeping-part-i-scalars/

reason that double-entry accounting is used, as contrast to single-entry accounting, is double-entry accounting's capability to detect errors and to distinguish an error from fraud.

Of course, there are a lot of details associated with setting up and operating an accounting system appropriately, but the fundamental feature is that DEBITS must equal CREDITS and if they don't, then something is up which needs to be investigated and corrected.

If you desire to learn more about double-entry accounting, see Colin Dodd's rap song, Debit Credit Theory (Accounting Rap Song)[6].

The Accounting Equation: Framework for Financial Accounting

While the model "Debits = Credits" or the notion of basically using two single entry ledgers and synchronizing them to detect errors or fraud is useful; additional power is provided to double-entry accounting via the accounting equation[7] which is:

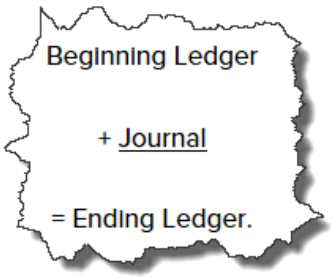
"Assets = Liabilities + Equity"

The accounting equation within the double-entry accounting is the fundamental basis for financial accounting. By definition, every financial reporting scheme[8] has this high-level model at its core.

Ledgers and Journals, Stocks and Flows

Another important piece of double-entry accounting is explained well in David Ellerman's article, *The Math of Double-Entry Bookkeeping: Part II (vectors)*, is ledgers and journals[9]. Many accountants use the terms "ledger" and "journal" incorrectly. This works the same for general and special ledgers and journals. This is the relationship between a ledger and a journal:

[6] YouTube, *Colin Dodd's rap song, Debit Credit Theory (Accounting Rap Song)*, https://www.youtube.com/watch?v=j71Kmxv7smk
[7] Wikipedia, Accounting Equation, https://en.wikipedia.org/wiki/Accounting_equation
[8] Charles Hoffman, CPA, *Comparison of Financial Reporting Schemes High Level Concepts*, http://xbrlsite.azurewebsites.net/2018/Library/ReportingSchemes-2018-12-30.pdf
[9] David Ellerman, *The Math of Double-Entry Bookkeeping: Part II (vectors)*, http://www.ellerman.org/the-math-of-double-entry-bookkeeping-part-ii-vectors/



Ledgers summarized balances. For example, the general ledger summarizes account balances.

Journals record the transactions which make up the changes between ledger balances. Other terms used for the relationship shown above are "roll forward" or "movements" or "stocks and flows" or "account analysis". All three of these terms basically explain the following equation:

"Beginning balance + Additions - Subtractions = Ending balance"

Balance sheet accounts are stocks. Roll forwards of the beginning and ending balances of balance sheet accounts are flows. The income statement is a flow of net income (loss). The cash flow statement is a roll forward of the net change in cash and cash equivalents. The statement of changes in equity is a roll forward of equity accounts.

Many transactions, events, circumstances, and other phenomenon are recorded as transactions in a journal, make their way to a ledger, and then end up in the primary financial statements or within disclosures which detail the line items of the primary financial statements. Much of this information is part of the two trees which make up the roll ups of "Assets" and "Liabilities and Equity". However, other there are other trees that can make up the complete "forest" of a financial report. For more information about the "forest" and the "trees" of a financial report, see the document *Leveraging the Theoretical and Mathematical Underpinnings of a Financial Report*[10]. That document also has some good information related to triple-entry accounting which I am not going to get into here.

As pointed out in the document *General Ledger Trial Balance to External Financial Report*[11], each balance sheet line item has a roll forward. While perhaps not reported externally, these roll forwards can be quite helpful internally to verify that a financial report has been created correctly.

[10] Charles Hoffman, CPA, *Leveraging the Theoretical and Mathematical Underpinnings of a Financial Report*, http://xbrlsite.azurewebsites.net/2018/Library/TheoreticalAndMathematicalUnderpinningsOfFinancialReport.pdf#page=6

[11] Charles Hoffman, CPA, *General Ledger Trial Balance to External Financial Report*, http://xbrlsite.azurewebsites.net/2018/RoboticFinance/TrialBalanceToReport.pdf

The Accounting Equation

The accounting equation[12] defines three core elements of a financial report:

- Assets
- Liabilities
- Equity

The accounting equation defines three terms and provides the relations between the three terms:

Assets = Liabilities + Equity

The following logical system provides the same information in machine-readable and human-readable form.

Logical System Represented Using XBRL

The following is a summary of the logical model of the accounting equation in both machine-readable and human-readable terms.

TERMS[13,14]:

#	Label	Data Type	Period Type	Balance Type	Prefix	Standard label, Documentation, References, Concept name	Count
1	Assets	Monetary	As Of (instant)	Debit	core	*Filer label:* Assets *Documentation:* Assets are economic resources controlled by an entity. *References:* Publisher | Reference Name | Reference Information: URIDate: 2019-09-02, URI: https://en.wikipedia.org/wiki/Accounting_equation *Name:* core:Assets	1
2	Equity	Monetary	As Of (instant)	Credit	core	*Filer label:* Equity *Documentation:* Equity is the ownership interest in the assets of an entity after deducting its liabilities. *References:* Publisher | Reference Name | Reference Information: URIDate: 2019-09-02, URI: https://en.wikipedia.org/wiki/Accounting_equation *Name:* core:Equity	1
3	Liabilities	Monetary	As Of (instant)	Credit	core	*Filer label:* Liabilities *Documentation:* Liabilities are claims against assets by non-owners. *References:* Publisher | Reference Name | Reference Information: URIDate: 2019-09-02, URI: https://en.wikipedia.org/wiki/Accounting_equation *Name:* core:Liabilities	1

Three terms are defined.

[12] Wikipedia, *Accounting Equation*, https://en.wikipedia.org/wiki/Accounting_equation
[13] Machine-readable terms, http://xbrlsite.azurewebsites.net/2019/Core/core-ae/core.xsd
[14] Human-readable terms, http://xbrlsite.azurewebsites.net/2019/Core/core-ae/evidence-package/contents/ReportElements-Concepts.html

ASSOCIATIONS[15,16]:

Balance Sheet [Abstract]	Period [Axis]
	2020-12-31
Balance Sheet [Abstract]	
Assets	5,000
Liabilities	1,000
Equity	4,000

The association between the three terms and the balance sheet are provided.

ASSERTIONS[17,18]:

#	Label	Result	Rule
1	Accounting Equation (Assets = Liabilities and Equity) (ASSERTION_CORE_Equality_AccountingEquation)	Pass	$Assets = $Liabilities + $Equity

The mathematical relationship between the terms are established.

[15] Machine-readable associations, http://xbrlsite.azurewebsites.net/2019/Core/core-ae/core-presentation.xml
[16] Human-readable associations, http://xbrlsite.azurewebsites.net/2019/Core/core-ae/evidence-package/contents/#Rendering-Core-Implied.html
[17] Machine-readable assertions, http://xbrlsite.azurewebsites.net/2019/Core/core-ae/core-formula.xml
[18] Human-readable assertions, http://xbrlsite.azurewebsites.net/2019/Core/core-ae/evidence-package/contents/#BusinessRulesSummary.html