

**OTHER****Artificial intelligence in accounting: GAAP's “FAS133”****Louis P. Le Guyader**

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**Abstract**

Artificial intelligence (AI) is the necessary element to ensure that the most complex modern accounting rules are implemented correctly. This is particularly true when accounting interacts with increasingly sophisticated capital markets activities. The last 20 years' of accounting rulemaking and the dictates of regulators have ensured a need for AI. With user-friendly AI solutions, reporting entities will not shy away from business practices because they fear they cannot account for them correctly. AI will remain an opportunity and challenge to the accounting profession.

**KEYWORDS**

accounting, artificial intelligence, derivatives

Artificial intelligence (AI) was the necessary ingredient needed to implement GAAP's “FAS133” rule on derivatives.<sup>1</sup> This new AI requirement came as a shock! FAS133 was the regulators' accounting solution to a market problem with derivatives and it was too complex for manual implementation!

The accounting rules proved to be impossible to implement without systems support in the larger and more sophisticated hedging programs of SEC registrants and some private entities. Regulators effectively demanded the creation of those AI solutions. They allowed FAS133 to proceed after a 1-year delay so that a minimal AI or “systems solution” would be available.

The “FAS133-AI” experience has become a model for how accounting can use AI solutions, and regulators may demand them. The “FAS133-AI” story is also an excellent illustration of the various levels of functionality to which AI solutions can be developed in both the capital markets and accounting contexts. AI solutions in this context can range from accepting external data feeds, automating mathematical functions, producing full financial reports, and even making decisions. This article reviews the FAS133 experience as a critical AI “case in point.”

**1 | REGULATORY BACKGROUND**

This AI story is one reflecting how a regulatory push in a given field can fuel the development of a new generation of automation and AI.

**1.1 | Derivative debacles fuel the need for FAS133**

In the 1980s and early 1990s, the U.S. capital markets faced a number of derivative debacles. Losses from soured derivative positions were staggering and unexpected. Accounting was blamed for part of this problem. A governance group was convened to study the matter under the leadership of Paul Volcker, the former Chairman of the Federal Reserve, as the Group of 30. One of their recommendations was to “improve accounting for derivatives” (Group of 30 Reports, 1993).

The accounting community's response was to help the SEC and the FASB formulate FAS133. This process took more than half a decade and the results were not perfect. The initial rule responding to the recommendation required amendments that amendment process continues to this day.

“FAS133” is the well-known label for the FASB's rule on “Accounting for Derivative Instruments and Hedging Activities” (FASB, 1998). The 1-year delay was accomplished by issuing FAS137 (FASB, 1999). Despite the cost of regulatory deliberations, FAS133 was stopped cold because of this missing element, an AI solution.

In some cases it was not even a question of cost—the AI system cost versus the staffing cost for manual solutions. Too much of the rule's functionality was outside accountants' standard toolkits. Without the various capabilities of AI

tools, the accounting standard as a whole was unworkable except for the most simple derivatives instruments and the most trivial of hedge accounting elections.

## 1.2 | The FAS133 accounting model

FAS133 was based on two simple notions, that fair value was the best and only relevant measure for derivatives, and that derivatives should be recorded “on balance sheet.” Once “on balance sheet” the positions would signal possible risk of loss and investors would be warned. Fair value measurement would also impose a discipline so that all derivatives, whether exchange-traded or over-the-counter, would receive identical treatment.

The thinking of the regulators was that if the rule was written with enough flexibility, it would work equally as well with all form of derivative contracts. The controlled use of derivatives to manage risk would grow and financial risk would decrease system-wide. The U.S. FAS133 model identified derivatives through a descriptive definition rather than identifying them by contract type as did the International Financial Reporting System (IFRS). The definition captured the traditional derivative contracts, such as futures, forwards, swaps, and options. The rules were also written to capture the use of derivatives in the major market risk sectors: interest rate risk, foreign exchange risk, commodity price risk, and equity price risk. The rules remained in place as derivatives were used in new risk areas such as credit, despite the warning from Warren Buffett and Charlie Munger that certain derivatives were “financial weapons of mass destruction.”

And then, true to form, the U.S. accounting regulators broadened the rules once step further to include contracts or part of contracts, and corporate hedging activities that were difficult to match up to the finance notions of four major contract types in four major risk areas. The rules were applied to “embedded derivatives,” “external versus internal” derivatives and their hedging strategies, hedging instruments other than derivatives such as those used for foreign currency hedging, and certain mortgage contracts. Many saw the growing complexity of FAS133 as regulatory over-reach but one that was facilitated by evolving AI solutions that met the requirements of “all settings most of the time.”

And yet certain contracts that met the definition of a derivative were excluded by the regulators from consideration. This was the case of derivatives on the firms' own equity, derivative contract features embedded in certain financings, certain commodity derivatives where delivery of the commodity was expected more so than financial settlement, and famously, employee stock option contracts that were to be treated as complex compensation contracts with tough valuation issues, and so forth.

It was easy for developers looking for the most robust AI solutions to miss their targets by over-developing and under-

developing. This also opened the door for AI developers to build a basic model on which tailor made solutions could be added, even if they used AI components already “on the shelf.”

## 1.3 | The need for AI to implement FAS133

The FAS133 model introduced two accounting problems, each susceptible to AI solutions.

First, the “on balance sheet” recognition rule meant that mark-to-market and mark-to-model valuations were to be treated identically for accounting purposes. This created the need for AI solutions that would obtain direct market quotes for traded derivatives. If the derivatives were over-the-counter (OCI) derivatives and not traded in an organized market, the AI solution needed to support the selection of appropriate valuation models and inputs to them to arrive at the contract value. “Mark-to-market” estimates were treated identically to “mark-to-model” approaches.

Second, the “on balance sheet” value needed to be updated with every new balance sheet date. This resulted in a fair value difference from one period to the next. Accounting regulators chose to record these changes in Earnings. But the associated hedge accounting rules were motivated by the need to eliminate that entry with offsetting entries in the hopes of bringing the Earnings impact to \$0. Alternatively, the unwanted derivative charges could be deferred by warehousing them for a time in accumulated other comprehensive income if the AI developers and accountants were up on their accounting.

The complexity of these rules created huge need for AI solutions as questions remained about the ability of accountants to develop the necessary subject matter expertise. (Le Guyader, 2013, 2014).

## 1.4 | FAS133 was mapped into ASC's topic 813 increasing need for AI

As FAS133 evolved into ASC Topic 815, it grew to a monstrous size, in the thousands of pages. Many stopped counting at about 1,800 pages. There were multiple amendments before the migration to the ASC and many since.

Some of FAS133's original rules were complex and eventually needed to be spun off into separate accounting standards, notably FAS157, *Fair Value Measurement* (FASB, 2006). Continually evolving implementation guidance in the multi-chapter “Green Book” was eventually pushed into authoritative GAAP (FASB, 2009). Some of the hedge accounting used to defer the charging of derivative changes to Earnings required an expansion of the functionality of the accounting rule on Comprehensive Income, FAS130 (FASB, 1997).

The rumors spread that no one individual could master FAS133, and chief financial officers (CFOs) had the rest of

GAAP to master in addition to it. The rule requires higher-level finance knowledge to master the details of derivatives and equally higher level accounting acumen to master the related fair value technology. Complex derivatives expose the accounting process to the most clever financial engineers.

This rule also forces accountants to act as statisticians. The hedge accounting elections use correlation testing and other such devices for so-called “effectiveness testing.”

AI functionality and solutions have ensured that the rules can be implemented across these types of technical expertise.

## 2 | AI FUNCTIONALITY FOR FAS133

The more involved FAS133 challenges were compelled by the requirements of hedge accounting.

### 2.1 | AI opportunities in hedge accounting

AI functionality now can be asked to track the ongoing matching of the derivative to the hedged item and their required “linkage,” delivering risk management in addition to hedge accounting results, and measuring, reporting, and then controlling the income manifestations of imperfect hedges. There are many AI opportunities including searching for the optimal rule to achieve a desired accounting outcome.

The array of AI solutions can start with simple excel based valuation and accounting match-ups (debits must equal credits!), to the various decisions that complex accounting rules leave to management. AI solutions can be brought to bear to make sure that every aspect of FAS133, even the most arcane, are accessible to management, from “hedging of net investment in foreign operations,” to “effectiveness testing using the ‘hypothetical’ derivative method.”

### 2.2 | Accounting choices left to managerial discretion

FAS133 leaves many choices to management. In doing so the FASB did not offer complete accounting guidance on the implementation. Compliance with GAAP is risky and that risk can be mitigated with the right AI solution.

The BIG 4 accounting firms have acted independently to limit this risk. Since 1998 they have published encyclopedic “monographs” illustrating discretionary implementation procedures they have accepted. This guidance is “non-authoritative” but limits the risks of the external auditor.

### 2.3 | Maintenance accounting during hedges

Once a hedge accounting election is made, there are many compliance steps that must be taken that are suitable to AI solutions. The accounting for derivatives and hedging offers many AI opportunities: the derivative value must be updated, its relationship to a hedged item or within a portfolio must be quantified, ongoing maintenance recalibrations including so-called “hedge effectiveness” and OCI “clawbacks” must be reported sometimes long after the derivative has matured, qualitative descriptions of the derivatives and the hedge accounting election must be recorded, archived and retrieved, the full results must be mapped into required audited disclosures, and the entire information set must be mapped into the general ledger of the reporting entity.

This is a daunting and possibly impossible task for any accountant asked to provide a manual or nonsystem solution. And any treasury, trading, or risk management professional attempting to apply FAS133 without an AI solution is almost assured of an accounting compliance or financial reporting failure upon audit. Governance officers as high as the “C-suite” and the Board have been caught by bad derivatives accounting exacerbated by faulty, incomplete, circumvented, or non-existent AI solutions. This led to the restatements at Fannie Mae's annual reports over a decade ago. The more recent “London Whale” trading scandal at JPMorgan Chase was caused in part when the fair value process was circumvented (Le Guyader, 2015).

## 3 | THE PRINCIPAL ELEMENTS OF AN AI SOLUTION FOR DERIVATIVES ACCOUNTING

By experience, we know that a viable AI solution for the accounting for derivatives must contain these basic elements:

1. A valuation engine for derivatives with two mechanisms:
  - a. A recognition intelligence able to discern the type of derivative using the four major categories (forwards, futures, swaps, or options) and/or to break a complex contract down into a combination of contracts;
  - b. A valuation intelligence to match an identified contract to a suitable market place or valuation model and the ability to propose a GAAP conforming fair value using
    - i. A direct value feed from a market source, such as Thomson Reuter, or Bloomberg for a mark-to-market functionality; or
    - ii. An information feed with market factors (interest rates, foreign exchange rates, volatilities, etc.) to use as inputs into a mark-to-model functionality;

2. A “consistency” intelligence meant to ensure that proposed fair values and their changes remain within the boundaries of SEC regulations and GAAP guidelines, including
  - a. Consistency parameters ensuring market data described in “1” above are taken from the same source for a given derivative;
  - b. Valuation tags forcing the use of the same model for the mark-to-model process and blocking changes in models for the process envisioned in “1.b.” above;
3. A “mapping” intelligence permitting the translation of the results from the steps above to the differential analysis and reporting requirements of the ASC Topic 820 on fair value, especially the characterization of each fair value within 820’s “level 1, 2, 3 or ‘out’” functionality.
4. A “linkage intelligence” that proposes the designation of the derivative to the hedged item and tracks them together through their contract terms, and/or expected duration, and beyond. In essence this intelligence replaces the accounting for the derivative and the hedged item as stand-alone accounting realities and replaces them with an artificial reality consisting of the linked “hedged pair”; that intelligence should ideally
  - a. Discern derivative and hedged item balances and changes to propose relevant accounting;
  - b. Produce “net offset” results known as “accounting ineffectiveness” or outputs that will permit an AI user to derive these amounts
5. All the above must be of sufficient quality and durability to survive audit.

#### 4 | WHY AI SOLUTIONS ARE PREFERABLE TO MANUAL FUNCTIONALITY

The use of derivatives for hedging is a rarefied financial management field that requires a requisite level of finance knowledge expertise as well as accounting acumen. Few finance professionals have the requisite accounting education. Few accounting professionals have the requisite finance education.

The standard AI solution in this setting finds the derivative and hedging activity centered in the firm’s Treasury department, while the control and reporting for this activity reside in the Controller’s department. Treasury and Controller functions both report independently to the Chief Financial Officer. The AI functionality must feed into the General Ledger from which financial reports are created.

An AI solution such as a “Treasury work station” vetted by the Controller and the external auditor and authorized by the Board or Management Committee will constitute a suitable tool with the requisite training and

oversight. FXpress and Trema, among others are examples of workstation solutions that were among the first to earn compliance accolades when offered as solutions to FAS133 after the FAS137 postponement. Those solutions were assimilated into enterprise-wide software such as SAP and automated General Ledger solutions such as JD Edwards, and the Oracle suite of products.

The ongoing monitoring for FAS133 accounting elections should be normally performed by the Controller’s Group. However, accountants rarely acquire the level of finance expertise needed to match the skills of the finance officers who are responsible for derivative contracting and hedge activity. An AI solution bridges this divide. AI solutions, if properly designed, allow Treasurers and Controllers, and their staff, to communicate.

“C” suite officers and their boards are required to sign and certify the financial statements of public companies under the Sarbanes Oxley law. They are reliant on an AI function that must be accurate and timely, and a reasonable substitute for any experience or education that is lacking.

#### 5 | AI AS A NEW RISK

AI solutions also carry new risks. The easiest offset to these risks is to ensure that users of AI receive the necessary training. An “old school” CFO who earned his CPA 30 to 40 years ago will recall the days of heightened audit risk around “Electronic Data Processing” issues—the new competence of the 1980s and the forerunner of AI. It is almost plainly obvious that this same CFO adopting the newest AI solutions must ensure his team has the necessary competence to use their new tool.

The training regime for new AI functionality and the new AI itself creates the unintended risk that the staff will be trained in AI, but not in the concepts, rules, and details of the underlying accounting standards. Where a standard such as FAS133 brings capital markets notions into the accounting solution, and only a subset of accountants gain the requisite finance training, the AI solution decreases the need to acquire that extended expertise. Yet at the same time it may also camouflage the accountant’s lack of mastery over an admittedly complicated rule book.

At the same time, the CFO must be sure that his external auditor has the requisite skills to audit a reporting solution dominated by AI functionality. Across the board from staff through to expert outsiders such as external auditors, the CFO, and Controller have significant incentives to implement an AI solution with “all hands on deck” from Day 1 to provide the necessary training and make sure that the entire solution, from inputs to AI out to auditable reporting results, is both available and understood.

The fundamental risk to the auditing profession, however, remains. Over long periods of time, competence in AI

solutions will be the cost effective attribute used to staff accounting positions, more so than competence in the underlying accounting rules. Meanwhile AI solutions, like robots in brick and mortar assembly plants, will replace personnel.

The challenges to the profession from the emergence of AI include the need for accountants to become expert in AI and related technology as users. We have already entered an age where in the complex accounting topics, very few accountants have the acumen to implement the accounting manually with “sharp pencils.” AI has become a necessary part of the accounting toolkit. AI also challenges the capacity and willingness of the profession to educate its own members on the underlying accounting rules the AI solution is meant to address.

## ENDNOTE

<sup>1</sup> “GAAP” is the U.S. accounting model, *generally accepted accounting principles*; and “FAS” denotes a Financial Accounting Standard issued by the Financial Accounting Standards Board, the “FASB,” prior to the promulgation of its Accounting Standards Codification, the “ASC.” The authoritative source for U.S. GAAP is the ASC. All prior FAS’s were mapped into the ASC and are now superseded by it. ASC Topic 815 is now the principal GAAP rule governing this area; nonetheless many market practitioners and regulators continue to use the label “FAS133.” The U.S. Securities and Exchange Commission (the SEC) is the principal U.S. regulator overseeing accounting rules in order to ensure the orderly functioning of the capital markets.

## REFERENCES

- FASB Green Book. (2009). Statement 133 Implementation Issues, Financial Accounting Standard Board, Norwalk Ct, as published before the release of the Accounting Standards Codification in 2009 and later incorporated therein as Topic 105. Retrieved from [https://www.fasb.org/jsp/FASB/FASBContent\\_C/DerivativesPage&cid=900000015389](https://www.fasb.org/jsp/FASB/FASBContent_C/DerivativesPage&cid=900000015389)
- FASB (1997). FASB Statement No. 130, *Comprehensive Income*, Financial Accounting Standards Board, Norwalk Ct, 1997 subsequently amended and mapped into ASC as Topic 220.
- FASB (1998). FASB Statement No. 133, *Accounting for Derivatives Instruments and Hedging Activities*, Financial Accounting Standards Board, Norwalk Ct, 1998, subsequently amended and mapped into the ASC as Topic 815
- FASB (1999). FASB Statement No. 137, *Accounting for Derivative Instruments and Hedging Activities – Deferral of the Effective Date of FASB Statement No. 133*, Financial Accounting Standards Board, Norwalk Ct, 1999.
- FASB (2006). FASB Statement No. 157. *Fair Value Measurements*, Financial Accounting Standards Board, Norwalk Ct, 2006 subsequently amended and mapped into ASC as Topic 820
- Le Guyader, L. P. (2013). Can accountants understand derivatives? *The Journal of Corporate Accounting and Finance*, 24, 49–54.
- Le Guyader, L. P. (2014). Can accountants demystify derivatives? *Journal of Corporate Accounting and Finance*, 25, 49–54.
- Le Guyader, L. P. (2015, April). The tale of a whale. *Strategic Finance*. Institute of Management Accountants. ISSN 1524-833X.
- Working Group on Global Derivatives. (1993). *Derivatives: Practices and principles* (pp. 1–30). Washington, DC: Group of 30.

## AUTHOR BIOGRAPHY

**Louis P. Le Guyader**, PhD, CPA led a significant foray into the use of artificial intelligence to make complex accounting standards workable. He was PWC's lead FAS133 subject matter expert on IBM's implementation of FAS133 in 1999 and then worked with a number of systems providers to devised AI solutions including Treasury Work Stations and modules on specified accounting functionality. After leaving PWC, he was engaged as a consultant to Fannie Mae during its efforts to restate its financials due to its historic FAS133 reporting failure. Lou is a PWC alum where he served as a consultant in the National Office and as a founding consultant of the firm's Financial Risk Management Consulting Group. Prior to this Big 4 experience Lou was a senior banker at BNP Paribas in its Capital Markets Group. He earned his PhD in Business at Columbia University specializing in accounting, his MBA from the University of Virginia's Darden School and his AB from Princeton. Lou began his study of accounting in the Price Waterhouse Liberal Arts Program at Cornell University's Johnson School. He is a New York State CPA. He is currently an Associate Professor of Accounting at South-eastern Louisiana University in Hammond, Louisiana.

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