



Aaron Brown

# The Hardship of Accounting

**Aaron Brown** suggests that the next great leap in quantitative finance requires a vigorous accounting profession

*“Never ask of money spent  
Where the spender thinks it went.  
Nobody was ever meant  
To remember or invent  
What he did with every cent.”*

Robert Frost, “The Hardship of Accounting”  
*A Further Range*. New York: Henry Holt, 1936

**F**rost wrote these words just as public accounting was coming into its own as one of the major supports of capital market efficiency. A hundred years earlier, public companies typically reacted to any request for information by public investors with “none of your business.” Fifty years earlier financial companies and utilities issued rudimentary statements but most industrial companies did not. Ten years earlier most public companies issued financial statements of some sort, but with no consistent methodology or regulatory oversight.



*“Again! How many beans make five?”*

## Born on Black Thursday

The Great Crash of 1929, and more importantly the financial scandals uncovered in the ebbing tide as stock prices fell 85 per cent in four years, led to the Securities Acts of 1933 and 1934 in the United States, and similar changes in the British Commonwealth. For the first time there was a legal demand for public companies to produce

regular, reliable, consistent financial statements certified by an independent auditor.

It’s easy to understand Frost’s objection to clear public disclosure, he was a Californian living in England trying to be the poet laureate of New England. His main connection with the region was dropping out of two colleges there and failing at running a New Hampshire farm. But most people, investors first and corporate managers a little later, felt that rigorous public accounting was essential to efficient capital markets.

## Where’s a policeman when you need one?

Of course, financial fraud did not disappear. It’s not even clear that it decreased. But good financial statements make it difficult to fool investors for long without clearly criminal actions such as forging documents. Investors expect accountants to be like the police in a certain kind of detective mystery: they are not supposed to solve the crime, but they are supposed to do the tedious gathering and sifting of evidence that allows the brilliant detective (the investor) to crack the case. Then the accountants should produce the document trail that sends the evil-doers to prison.

Recently, this pleasant partnership seems to have broken down. Financial surprises are sprung on the market not from careful review of published statements, but when business reverses reveal a major inconsistency in a company’s financial picture. Instead of providing signed

fraudulent documents to cement a conviction, public accountants claim the old accounting that fooled investors was proper.

This has led to many proposals to reform accounting from a variety of sources. There are critics who wanted change long before there was widespread acknowledgment of a problem. Other critics never looked at a financial statement before accounting became a hot issue (or even after in some cases). Some proposals are aimed at the organizational structure of audit firms, some on the legal structure of disclosure responsibility and some on technical accounting rules.

### **He stilled the rising tumult; he bade the game go on**

I think it's time for the quantitative finance community to express an opinion. The phenomenal success of quantitative finance in the last 20 years was a direct result of improvements in accounting, and those improvements are threatened by tinkering, well-meaning or not. The next big leap in quantitative finance requires a vigorous accounting profession, and many proposed reforms would drive talented people out of the profession or inhibit innovation.

I do not mean this to be a balanced consideration of accounting reform. Lots of people will have opinions: retail investors, institutions, creditors, analysts, managers, lawyers, regulators, politicians and newspaper editorialists. This essay is intended only to convey my version of the quantitative finance voice. So far, that voice has been quiet.

At first consideration, this does not seem strange. Quantitative finance and accounting are opposed in many respects. Ask any numerically complex problem on a finance exam, such as making students compute MACRS depreciation to figure tax cash flows, and you will hear the time-honored whine of "this is just accounting" (the student will draw out each syllable successively longer with the terminal "ing" lasting until you reply "shut up and do it" and kiss your professor-of-the-year award goodbye, not incidentally teaching the class a powerful lesson about the relation of the two fields, and it will do no good to tell the class "when I was a graduate student we had to do these problems on HP12C's without

laptops running Excel"). The course Financial Statement Analysis is traditionally shared by the two departments, and it is mandatory to begin each course with the statement that everyone who took this from Professor X of the opposing department learned everything wrong.

### **That was then; this is now**

But the traditional picture has changed remarkably in the last 20 years. Financial accounting (statements issued to investors) used to be the glamorous, highly-paid, intellectually challenging half of accounting, while cost accounting (internal statements used by management) was the course that left no student awake. But that has changed.

Financial accounting, despite valiant efforts by practitioners, has run up against a fundamental block. Until the early 1980's the book value of companies (the financial statement assets minus liabilities) was pretty close to the market value (the price per share times the number of shares

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outstanding). The ratio went up and down, but never stayed far from one for long.

When it became clear that a market to book ratio above two was a permanent condition, accounting had to face that the majority of equity assets by value were not on the balance sheet, and therefore changes in the value of those assets were not reflected in the income statement. The two biggest efforts to address the problem, making foreign currency translation and employee stock option value flow through the income statement were defeated for political reasons. In a clear reversal of the spirit of 1930s security market reforms, what companies wished to report carried more weight than what accountants thought was right.

Even if accountants had been given a free hand, there was no obvious good solution. Some

people wanted to add a lot of intangible assets to get book value up near market. The trouble is these assets are hard to value and easy to manipulate. On the other hand, letting book value become irrelevant encouraged investors to rely on *pro forma* numbers and badly controlled numbers like revenue growth rate.

During the same years the sister field of cost accounting was enjoying unprecedented success. Changed business models forced companies to shed most of those hard assets that financial accounting was designed to track. Outsourcing reduced the need for fixed assets, improved controls slashed the need for inventory, cash and other current assets. Improved computer technology has given the modern CFO precise real-time information and control from the bottom to the top of the business.

Twenty years ago, a January sales report might be available to top management in the middle of February. That, along with the January production report would be used to make deci-

sions to be implemented in March. With ordering and switchover lags, it could be June before the units responding to the January sales information were available for shipping, at which time the stronger handle on the snow shovel didn't really make much difference. Today companies expect cycles like this to take place in hours or days, not weeks or months. Much, arguably all, of the unprecedented stock market gains from 1982 to 2002 were due to more efficient use of assets through improved cost accounting.

Something similar happened in Finance. Harry Markowitz, Franco Modigliani and Merton Miller laid out the basics of investments and corporate finance in the 1950s. Enormous progress was made in the fields in the last 50 years, but little of practical use. The basic problem of investments is how to get the maximum return on



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invested capital while controlling risk. No one has come up with anything better than buy an index fund and adjust to the level of risk with treasury bills. The basic problem of corporate finance is how to raise capital as cheaply as possible and direct it to the highest return projects. In 50 years, no one has even come up with a convincing proof that capital structure matters at all, much less has shown a way to calculate the optimum capital structure or budget.

Of course, there are successful investors and business managers. But quantitative finance does not help them make day-to-day decisions. The academic study of investments and corporate finance is still important, the theoretical advances clear out a lot of untruth and help in the design and regulation of markets. But they can't beat the market and they can't run a business.

Despite the lack of progress in its two core fields, quantitative finance has exploded in importance in the last 20 years, even more than cost accounting. But it is the trading of derivatives that did it. In the unglamorous shirt-sleeve world of pork bellies and changing foreign currency, mastery of advanced mathematics and abstruse financial theory commands respect, respect you will not get from white-shoe investment bankers or buttoned-down investment managers.

This is the flip side of the growth in cost accounting. Businesses shed assets and replaced them with information systems linked to derivative markets. The right-hand side of the balance sheet had to shrink as well, this was accomplished through financial engineering. Companies use half the assets of 20 years ago, but trade ten times as much as they use.

### **We're all playing in the same band**

All of this is related. When investors realized they couldn't beat the market, they switched atten-

tion from picking good companies to improving the performance of the market. For all of recorded history up to 1980, all CEOs could be above average. Suddenly, half the CEOs were found to be underperforming the S&P500 or their relevant industry indices. Institutional pressure, up to and including hostile takeovers, was brought to bear on the laggards.

This forced businesses to concentrate on return on equity rather than earnings growth, which in turn led to slimmed down companies that used assets sparingly. The decline in hard assets while companies were getting more profitable, and the substitution of debt for equity, caused market value to soar above book. Investors forced managers to concentrate exclusively on market value with the stick (hostile takeover) and carrot (stock options). This led to enormous growth in demand for financial derivative products and much less importance for both investment management (almost all money went to index funds or was benchmarked to them) and capital management (there was less capital to manage). The complex new derivative products, which were almost entirely off-balance sheet, proved impossible to describe fairly in financial reports.

### **Come together**

The convergence of the two fields is deeper than the parallel, reinforcing growth. Quantitative finance was born in equities, using only price data. Expansion to foreign exchange and commodities meant including some non-price variables, interest rates and mortgages required far more. But it was credit derivatives that made it clear that quants would have to learn some serious accounting in order to support valuation and trading. Structural models of credit are explicitly accounting based, and have to deal with the same issues as underlie recent accounting disasters,

such as consolidation rules and revenue recognition. Once the barrier was broken, accounting numbers and concepts moved into many quantitative models.

Another bridge came via the requirement to tie risk management to books and records. The line between accounting control and financial risk management on one hand, and financial risk management and accounting reporting on the other has blurred everywhere and no longer exists at all at some firms.

Meanwhile, accountants had to learn finance. More and more accounting treatments were based on quantitative finance models. In some cases entire firms and industries had values that could only be described in Greek.

### **Quis custodiet custodes?**

The growth and change in accounting and finance, like all innovation, was accompanied by many disasters. However, quantitative finance was allowed to sort out its problems on its own. While there were calls for imposed regulation, particularly in 1994, the consensus answer to quantitative financial disaster has been more quantitative finance: risk management has become a major specialty within quantitative finance. Accounting has not been so fortunate. For some reason accounting disasters have been dealt with primarily through litigation, and recently through administrative and legislative action.

Any discussion of these proposals will be out of date by the time this article appears. But look at the accounting systems designed by the critics. Government proposals will make financial accounting more like the tax code with rules such as requiring managers to take personal criminal responsibility for the filing, eliminating reporting flexibility and creating an aggressive enforcement agency. Aren't the Financial Accounting Standards Board and the American Institute for Certified Public Accountants, at their worst, far, far better than the tax code? The Securities and Exchange Commission proposes to make financial statements more like prospectuses with soft disclosure, oversight by non-accountants and "GAAP is not enough" full disclosure. Is there

anyone who values a company by prospectus rather than turning right to those despised GAAP financial statements?

It makes more sense to consider the proposals made by the people who foresaw the current crisis than those made by people who became aware of accounting this year. And given the enormous changes in the field in the last 20 years, it's important to go back to first principles to do so, and consider everything from the standpoint of modern quantitative finance.

## Tabula rasa

Accounting began when one person owned or controlled more assets than he or she could see at once, whether due to their quantity or dispersal. It became useful to list them. Unfortunately, writing would not be invented for at least a thousand more years (and would evolve from accounting records). So tokens were made to represent assets. Later arranged on checkerboards or threads, and still later drawn on tablets. These more sophisticated systems could represent liabilities as well. However, without the invention of double-entry bookkeeping, the income statement was limited to a rudimentary measure of asset growth.

The first question we have to ask is, which things do we write down? How about "air" for example? It's clearly valuable, without it all the other assets are worthless. But the business owner has no ownership claim to it, and it does not play a part in business decision-making. Prehistoric accountants, as best we can tell, restricted accounting to assets that were easily bought and sold. This worked pretty well up to 1980 when those assets became inadequate to explain the market value of companies. Since then, people have been proposing all sorts of additions to the list of assets.

One popular liberal idea is to add employees as assets. That way, money spent on recruitment and training would be a capital investment, not an expense. When workers were fired, the company would find wage savings more than offset by the asset write-offs. Putting workers on the balance sheet is supposed to increase corporate concern for employees.

I never considered this a good idea. There was a time when people were on balance sheets, it

was called slavery. Moreover corporate cost cutters and downsizers have never been discouraged by asset write-offs, they glory in them. In a similar vein social activists want to include things like environmental quality (pollution produced would decrease this asset, any investment in clean-up would increase it) and reputation (to capitalize charitable contributions and taxes among other things).

The Economic Value Added movement has called for more businesslike additions like capitalizing most research and development, brand names and certain long-term marketing expenses. Other people have suggested adding real option valuation of strategic positions.

These proposals will not appeal to quants. The job of accounting is to add things up. The value of financial statements is they are produced in a reasonably consistent way and (despite current opinion) audited reliably. Including things that cannot be added up consistently or reliably adds more noise than signal. What these people really want is changes in corporate behavior or more supplementary disclosure so they can calculate the numbers for themselves. To a quant, you don't change behavior by changing a number, any more than you try to slow down a car by moving the speedometer needle. And while additional disclosure may be valuable to analysts (possibly at some business risk), there's no point putting the numbers in the accounting statements unless the accountants can measure them well.

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## Show me the money

Making models of all your assets, or writing them down, is fine for business management, but it doesn't tell you much about profit and loss, or help you make business decisions. The next step in accounting, taken slowly over the 6,000 or so years between the first known ledgers and Luca Paccioli is to collapse the dimensionality. Instead of owning four ephahs of wheat, five hins of wine and twelve cubits of cloth (and each of those assets would have additional qualities you could track like quality, age and so on), you converted everything to silver and said you had three minas. If a year later your goods were worth five minas, you had a profit of two minas. If you send your nephew on a trading journey with two minas of goods, and he spends two more minas on expenses before returning with six minas of goods, you had a 50% return on investment.

Another school of accounting reform wants to restore some of that dimensionality. For example, the "triple bottom line" movement wants to assign a social and environmental value to everything, as well as an economic, and come up with three net incomes for every company. Of more appeal to quants is the notion that exposure to derivatives for which liquid markets do not exist should be listed on accounting statements by net sensitivity to a variety of market-factor Greeks. Although this would primarily affect financial companies, it would also make a difference to corporations that issued convertible bonds or more complex securities, or dealt in OTC exotic options. Of course, cost accounting has always been multi-dimensional, managers don't care about the purchase price of a truck net of accumulated depreciation, they care about its condition, capacity, mileage, location, registration and so on.

Unlike the first set of proposals, these would clearly add important new information to financial statements, and advances in cost accounting have made them much easier to implement. The good of that has to be balanced against the business disadvantage of revealing additional detail. My feeling is there are some interesting possibilities to extend accounting by adding dimensionality to reports, but it's quixotic to suggest creative extensions of the field when most people are distrustful and calling for a return to simple basics.

## ...investors are forced to rely on non-accounting information. This creates a temptation for manipulation

### What do you know and when did you know it?

Once you list all your assets and liabilities and assign dollar amounts to them, the next question is how to report the results. The traditional solution was been dictated by technology. You have to pick a cut-off time so you know you are adding contemporaneously (otherwise you could miss or double count intracompany transactions). The basic raw numbers have to be sent up the reporting chain, accumulated and passed on until they reach the top. The data must be checked, intracompany transactions eliminated, then the numbers must be analyzed, adjusted, consolidated and formatted properly. The statements are then printed and mailed out.

As late as 1980, this is how most cost accounting data was processed as well. With technology of that era, it was impractical to produce anything more frequent than quarterly statements, released about a month after quarter end. Auditable quality statements were available only annually, generally four or five months out of date.

Not only were the numbers infrequent and stale, many of them depended on estimates such as percentage of receivables that would become uncollectable or the taxes that would eventually be paid on income. As these numbers became known, it was impractical to go back and correct the earlier financial statements, so any effect was simply added to current statements. That made it very difficult to determine actual performance in any period. At many companies, management deliberately manipulated the estimates to paint a misleading financial picture. But even without “earnings management” the noise introduced by estimates and corrections made analysis more difficult.

As cost accounting improved, the gap between what managers knew and what investors knew widened. Managers learned more

detail faster and had the tools to analyze it immediately. Official public disclosure did not change. This led to a number of problems such as over-reliance on *pro forma* numbers, selective disclosure, investor distrust and litigation. In some cases, such as Cendant, managers used their superior information and cost accounting tools to come up with plausibly misstated financial results.

Improvements in communications technology have led to the suggestion that companies should provide more frequent, even real-time, disclosure, in a format investors can use it (like a web page that can be imported into spreadsheets and databases). More radically, adjustments to prior period estimates could be reported separately. Thus investors could see whether reported numbers were systematically adjusted upwards or downwards, or perhaps smoothed; and form faster, more accurate evaluations of management performance.

This is a quant’s dream. Numbers like this are good enough to put into models and used for serious valuation. No doubt trading would commence in accounting-based derivatives, such as P/E and Market/Book ratios. It would restore accounting numbers as the solid fundamental of equity valuation and credit analysis, directly solving the core problem that has led to the financial market problems of the last five years. It would restore faith in accountants, not by imposing stricter rules and harsher penalties, but by allowing them to deliver a product worthy of trust.

The objection to such numbers is that they might reveal too much information to competitors. From a social welfare standpoint, and that of an index fund investor, that’s not an issue. In any case, the technology exists to separate the useful valuation and oversight information from the business specifics.

### Failure is not an option

I don’t think there is any other solution. I don’t believe there are any numbers you can write down quarterly, deliver a few weeks later and never adjust that give investors the information they need to determine if market prices are fair and management is doing a good job. I think virtually all quants will agree with me. You can’t deliver numbers like that in the 21st century and expect anyone to pay attention, any small value they have has long since leaked out to the market in other ways.

Therefore, without improvements to the delivery of financial results, investors are forced to rely on non-accounting information. This creates a temptation for manipulation and insider trading and makes irrational exuberance and irrational pessimism easy. When share prices move sharply in the absence of accounting information, it leads to suspicion and litigation.

While other proposals to improve accounting have merit, none can restore confidence, and none are likely to be adopted in the absence of confidence. Treating accountants more like criminals will not help. It’s not as if greed-crazed accountants corrupted innocent managers. Letting governments and quasi-government entities write accounting rules is more likely to hurt than help.

Improvements in financial reporting can drag equity and credit analysis into modern financial models and restore the partnership between finance and accounting. I think the resulting economic rationalization could spark a stock market boom as big as the one from 1982 to 1997. The crisis in confidence of today is an opportunity to enact a change that would be far too radical for calm times.

So let the voice of financial quants be a clear call for optimistic progress, in contrast to the spiritless patching up called for by others. We need those numbers to do our jobs, and the people who can produce them need and deserve our help.

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