



WorldCom: Could Six Sigma Have Made a Difference?

Donna M. Faltin, Ph.D.
Frederick W. Faltin



The Faltin Group
Phone 518.885.7071
E-mail info@FaltinGroup.com

Executive Summary

On June 26, 2002, news media reported that an internal audit at WorldCom had uncovered misstated expenses of \$3.8 *billion*—enough to entirely wipe out 2001 profits, and to call the already ailing company's survival into question. Later that day, WorldCom became the subject of a civil complaint by the Securities and Exchange Commission, and over the coming months, further restatements, bankruptcy, and criminal indictments followed.

The outcome of pending legal proceedings may ultimately hinge on whether the specific accounting practices employed were provably illegal. From a shareholder's perspective, though, it hardly matters. The far more pertinent question is, were the manipulative financial practices followed at WorldCom discernible earlier, prior to the company's acknowledgements—perhaps even prior to the final catastrophic tumble of WorldCom's stock price?

Six Sigma—which has been adopted by leading companies worldwide to revolutionize all aspects of corporate performance—is a quality methodology that integrates organizational, analytical, and management techniques into a coherent improvement discipline. When augmented with concepts from economics and finance, Six Sigma provides the basis of a new paradigm for financial reporting (Reference 1). As detailed elsewhere (see Reference 3), the resulting approach can be employed to identify financial measures and

relationships which, collectively, provide a basis for evaluating and tracking a company's financial performance. Using the company's own past experience, and/or that of comparable firms, these tools provide an objective yardstick for determining whether key measures of business performance ("metrics") remain within established historical or industry norms. Corporate monitoring plans based on this paradigm can detect unusual behavior attributable to wide range of potential causes. This approach can be applied to investment analysis, internal auditing, regulatory compliance monitoring, or—perhaps most pressingly—as a foundation for disclosure controls and procedures required by Section 302 of the Sarbanes-Oxley Act.

WorldCom Case Study

For purposes of the current study, however, the goal was to determine whether events at WorldCom could have been detected by metrics that might reasonably have been monitored as part of a general program for tracking corporate performance. Toward that end, a collection of metrics was developed which tracked various aspects of WorldCom's revenues, expenses, debt, etc. *Only publicly available data from SEC filings and WorldCom's annual reports in the form originally published were used in conducting the analysis.*

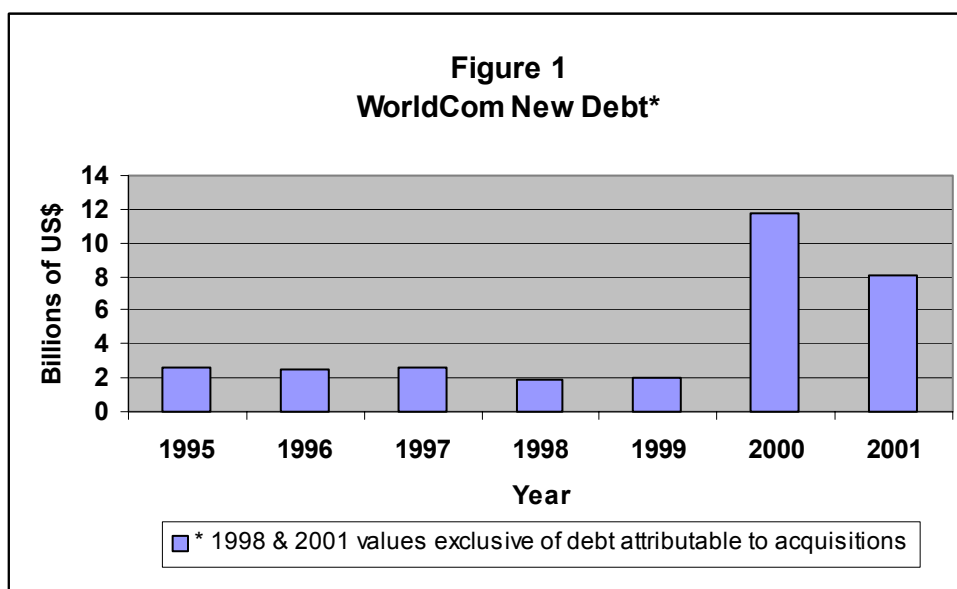
The principal issue in WorldCom's initial disclosure to the SEC was the reclassification of routine expenses as long-term capital investments.

Investment dollars receive different accounting treatment from expenses, and therefore affect corporate performance measures differently, as well. In high-level financial documents such as quarterly reports, this reallocation would directly impact only a few values, such as operating expenses and capital expenditures. It would, of course, also indirectly impact other quantities calculated from these—including earnings, which was presumably the point of the alleged fraud. Although routinely scrutinized in public filings by dozens of analysts, regulators, investment managers, and others, these entries failed to tip off observers to what had occurred. So the question becomes, might Six Sigma have identified metrics that would somehow have pointed sooner to WorldCom's impending demise?

Perhaps. Publicly available annual reports and SEC filings are high-level summaries of company financial data.

The irrecoverable loss of information that results from such aggregation makes construction and tracking of financial metrics far more difficult from an external perspective, than when conducted as part of an internal corporate Financial Quality program as we have advocated elsewhere (References 3, 4). Nonetheless, it is interesting and instructive to take a retrospective view of WorldCom's data, to provide a glimpse of what might have been apparent had the world been watching more closely. And it goes without saying that anything which would have been visible from the outside, should have been even more readily apparent internally, had a Six Sigma monitoring system been in place to support internal audits from, say, 1999 or 2000 onward.

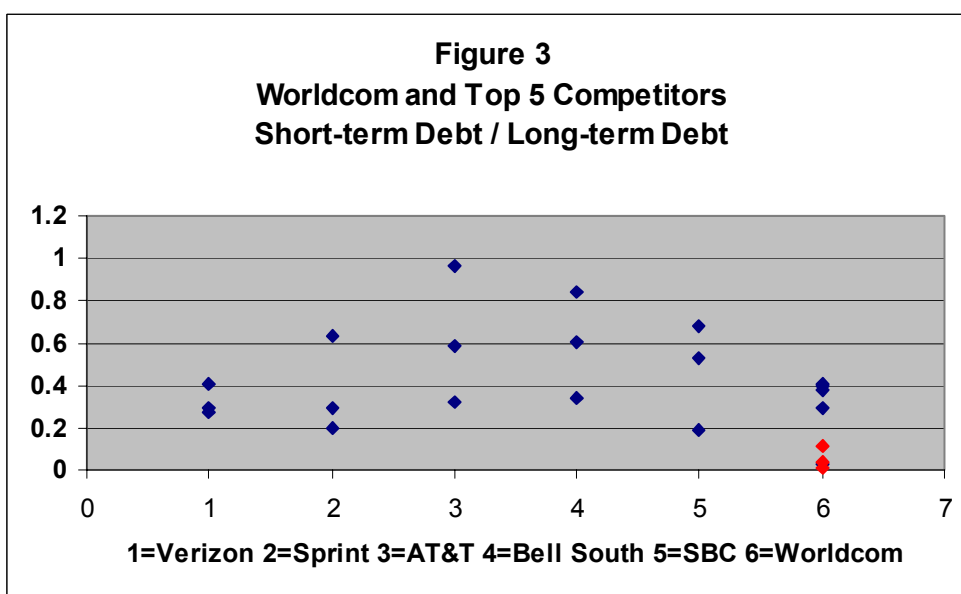
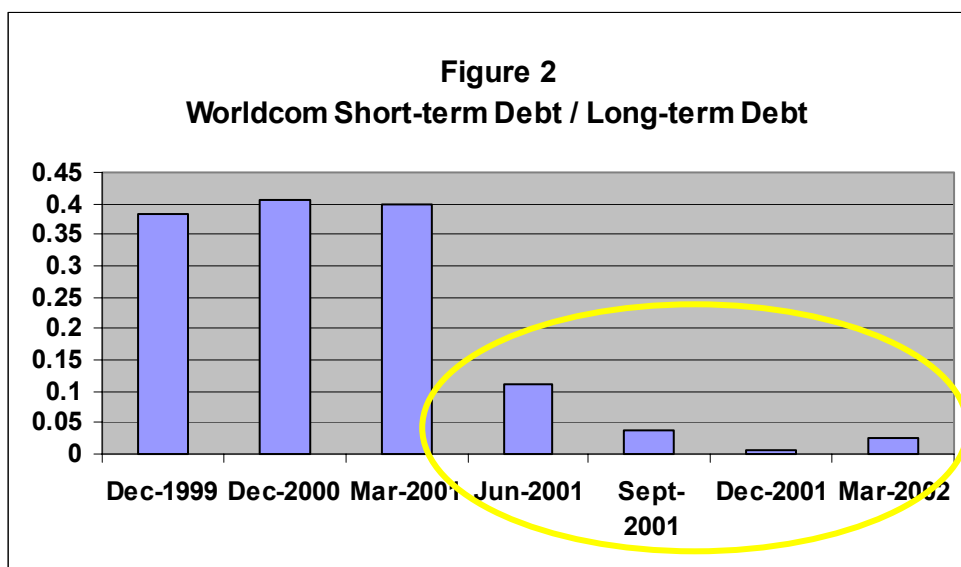
Figure 1 shows a plot of a simple metric that calculates, approximately, the total new debt taken on by WorldCom each year from 1995 through 2001.



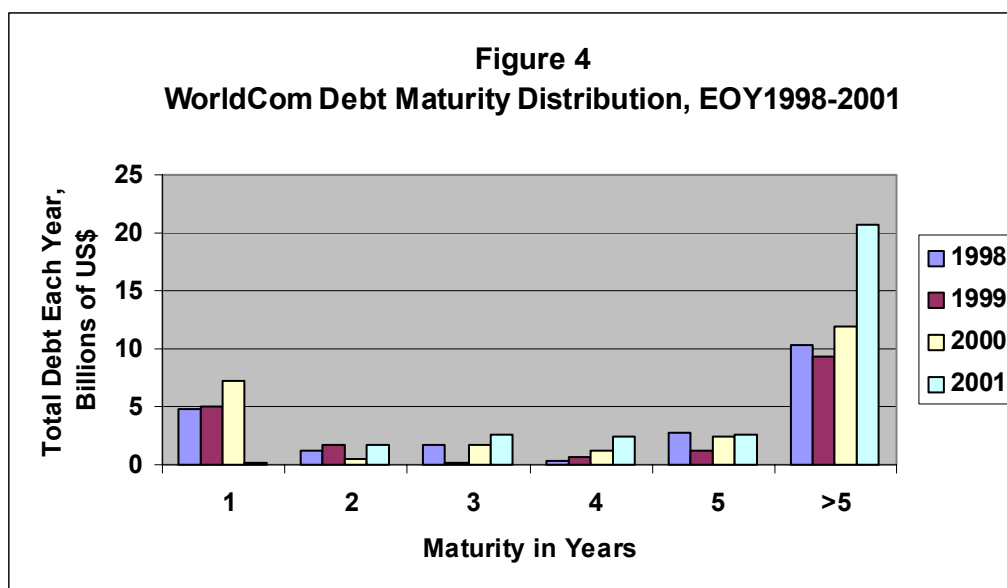
The huge spike in financing activity during 2000-2001 started around the time that accounting irregularities are now alleged to have begun, and continued into the period during which civil and criminal complaints assert the improper expense restatements occurred.

The next three figures deal with WorldCom's debt structure. Figures 2 and 3 show the ratio of WorldCom's

short-term debt to its long-term debt annually in 1999 and 2000, and quarterly during 2001 and the first quarter of 2002 (unfortunately, historical comparisons of this ratio to prior years are not meaningful due to extensive merger activity during 1998). In Figure 2 the data is plotted over time; in Figure 3 WorldCom's debt ratio is compared to that of five similarly sized competitors in its industry.



The sharp decrease during 2001 reflects massive restructuring of short-term debt into longer maturities that would not come due until future years. Figure 4 details the maturity distribution of WorldCom's debt for the years 1998-2001.



Interestingly, the ratio of short-term to long-term debt is not a new metric; it is sometimes used for monitoring the health of companies' debt structure. Ironically, however, analysts are commonly concerned if this measure is too *high*, which might indicate problems meeting short-term liabilities. In this case, the ratio becoming uncharacteristically *low*—a possible indicator of pushing debt out due to concerns about earnings—apparently went unnoticed.

Clearly, there was a crescendo of major structural changes in WorldCom's finances during the period leading up to the disclosures of June 2002. This fact alone, of course, does not imply any wrongdoing. Nor does the fact that detectable changes have occurred necessarily point us easily to their root

causes. Indeed, barring revelations not on record as of this writing, the timing of some of the preceding observations suggests that the alleged fraud at WorldCom was a symptom of the company's financial collapse, not its cause. Was the extension of WorldCom's debt maturity during 2001 a separate (and almost certainly legal) action taken in parallel with the expense restatements, but with the same purpose: to maintain the appearance that liabilities were in line with earnings? Or was refinancing an additional \$7 billion of debt a smokescreen intended to divert attention from \$3 billion used to cover the questionable "investments"? Or both?

Of course, not all of the financial metrics studied showed anything of interest during this period—in fact, most did not.

One of these was EBITDA—Earnings Before Interest, Taxes, Depreciation and Amortization. During the 1990s, EBITDA was the metric that gained greatest favor among analysts following the telecommunications industry. It might be presumed that industry insiders were aware of this preoccupation. In fact, the government alleges that WorldCom's CFO determined the amount of improper expense restatements in order to keep EBITDA numbers more in line with company guidance and analysts' expectations. Moreover, it is charged that the mechanism by which this was effected was to fictitiously keep a particular expense to revenue ratio approximately constant, thus giving the impression that costs were in line, and yielding the expected results for EBITDA in turn. Other related metrics, such as those discussed above, would likely have deviated from their nominal values *if a Six Sigma system of financial tracking had been in place*. But such was not the case, and the action went unnoticed for nearly a year and a half.

Whether or not the government proves its case against the remaining defendant(s), the WorldCom example illustrates clearly that individual financial metrics can be discouragingly easy to

manipulate. What is needed is not one or even several independent measures, but a set of interlocking metrics that capture key measures and drivers of corporate performance—and the relationships among them.

Conclusion

The purpose of Six Sigma monitoring of financial reporting and other corporate governance metrics is more to raise questions than to answer them—there are many other ways of doing that. Rather, it is to build a web through which it will be far more difficult for fraud and mismanagement to pass in the future than it has been in the past—and it is difficult to imagine investors and the media not responding more vigorously to WorldCom's decline if there had been a more comprehensive picture presented to them at the time. On March 30, 2001, the day WorldCom's SEC form 10-K filing documented the new debt taken on during 2000, the company's stock closed over \$18/share. On August 15, 2001, when WorldCom's quarterly report first placed its debt ratio below 12%, its stock closed just under \$14. On July 1, 2002, the first full day of trading after release of the company's internal audit, its value was just *6 cents*.

References

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About the authors

DONNA M. FALTIN, Ph.D.

Donna M. Faltin offers consulting services in a variety of areas of business economics, including risk management, econometrics, pricing, and Six Sigma for Marketing. Dr. Faltin's work has encompassed a broad spectrum of domestic and international financial, service and manufacturing businesses. From 1996-2002 she served as GE's senior economist, in which role she supported senior GE leadership in designing strategic applications in finance, risk, and marketing. While at GE she received the company's prestigious Whitney Technical Achievement award for the development of innovative Six Sigma applications to Financial Quality, and was one of the principal authors of GE's DFSS for Marketing curriculum. Prior to joining GE, Dr. Faltin was a professor of Economics and International Finance at the University of Florida's Warrington College of Business, where she taught and published in financial economics, pricing, and international economics. She received her Ph.D. in Economics from the University of Rochester and is a member of the Financial Management Association, the American Economic Association, and the National Association of Business Economists. Her research interests include applications of leading indicators to corporate dashboards and financial monitoring, and the design of systems for tracking corporate regulatory compliance.

FREDERICK W. FALTIN

Frederick Faltin is Managing Partner of *The Faltin Group*. Since 1999, he has offered quantitative management consulting to an international clientele based in Europe and Asia, as well as the U.S. His work has focused on collaborating with senior corporate leaders to identify and resolve strategic issues in Quality, Supply Chain Management, and business process optimization, and on implementing and managing corporate Six Sigma initiatives. Prior to establishing *The Faltin Group*, Mr. Faltin founded and managed the Strategic Enterprise Technologies laboratory at GE Global Research. A contributor to the company's *Design for Six Sigma* initiative, he served on GE's Corporate Supply Chain Council, and as GE Corporate R&D's Information Technology liaison to GE Plastics and NBC. He holds his S.B. in Mathematics from MIT, M.S. degrees in Mathematical Statistics and in Operations Research from Cornell University, and is a graduate of GE's management training curriculum. He has published numerous articles, book chapters, and scholarly research—including recent seminal work on applying Six Sigma to Finance—and served on the Editorial Review Board of the *Journal of Quality Technology*. Mr. Faltin is a recipient of the Shewell Prize of the *American Society for Quality*, is a Fellow of the *American Statistical Association*, and served as Chair of ASA's Quality & Productivity Section.