Daniel A. LaGattuta *is a Senior Consultant in the New York office of National Economic Research Associates (NERA), where he has worked on a wide variety of financial issues, including analysis of derivative products, risk management, securities class actions, and financial analysis.*
Jeremy C. Stein *is a Professor of Economics at Harvard University. Prior to coming to Harvard this year, he spent 10 years on the finance faculty at MIT's Sloan School of Management.*
Michael L. Tennican *is Senior Vice President and Director at NERA's Cambridge, Massachusettes, office, where he directs NERA's energy practice. Dr. Tennican previously held identical posts at Mercer Management Consulting, a sister firm of NERA. Earlier, he was a professor at the Harvard Business School.*
Stephen E. Usher *is a Consulting Economist for NERA. While on the NERA staff from 1988–99, he worked on a wide variety of financial matters, including the pricing and hedging of financial instruments, risk management, and securitization of insurance. Prior to joining NERA, Dr. Usher was a staff economist at the Federal Reserve Bank of New York.*
Jeff Youngen *is a Consultant at NERA who has worked on estimating damages and multi-trader analyses for securities litigation.*
The authors thank Lou Guth for his support and advice on this project. Thanks also go to Omar Choudry and Amy Shiner for research assistance, and to Ken Froot, Paul Hinton, and Jonathan Falk for helpful comments.

Cashflow-at-Risk and Financial Policy for Electricity Companies in the New World Order

A new statistical tool for measuring energy companies' cashflow-at-risk shows that average cashflow volatility about doubled in the late 1990s. Evidence also suggests that the median company in the industry has not reduced its debt burden. It appears that some companies have meaningfully increased the probability of finding themselves in a cash-strapped position.

Daniel A. LaGattuta, Jeremy C. Stein, Michael L. Tennican, Stephen E. Usher, and Jeff Youngen

I. Introduction

In many parts of the United States as well as countries all over the world, the electricity sector is undergoing rapid deregulation, with power now bought and sold in competitive wholesale markets. In many areas, the supply of power to final customers has also been opened up to competition. In addition, as part of the process of deregulation, many companies involved in transmission and distribution, which remain regulated, have had to divest some or all of their generation assets. This has exposed some of those companies (i.e., the ones that retain responsibility for supplying power to customers at regulated rates) to the price volatility inherent in buying that power in competitive wholesale markets.

Electricity companies are responding to these changes in the environment with a rapid evolution of new structures and strategies, dramatically changing the way the business is run. The deregulation of generation and the plant

PII S1040-6190(00)00163-9

divestitures often required as part of the process have led many companies, both other utilities expanding geographically and independent power producers, to invest in what were formerly monopoly franchise areas. Many companies have also embarked on programs of mergers and acquisitions, including many "convergence" mergers and acquisitions involving gas and electric companies. Many of the recent investments and acquisitions have been across national boundaries, with U.S. firms moving into Europe, Latin America, and elsewhere, and with European firms moving into the United States and Latin America.

The industry's quickly changing environment has clearly altered the risk of doing business for most electric power companies. But any quantification of changes in a company's *overall* risk has been difficult to achieve, and precise measurement has been, until now, non-existent. To fill this gap, we have developed a sophisticated statistical tool for measuring energy companies' cashflow-at-risk, or C-FaR for short. C-FaR quantifies the risk of unforeseen shortfalls in earnings before interest, taxes, depreciation, and amortization (EBITDA). Our C-FaR model comprises a database of quarterly cashflow and other financial data from approximately 100 electricity companies over the 10-year period 1990–1999, along with a statistical methodology for transforming the data into peer-benchmarked risk measurements.[1]

Even though our database contains a number of companies that remain wholly or largely under traditional forms of regulation in monopoly franchise areas, our analysis reveals a significant rise in cashflow volatility during the four years 1996–1999, which we loosely characterize as representing the beginning of the electric industry's new world order, as compared to the old order that prevailed before 1996. (This point is discussed further in Section III below.)

Interestingly, the data also suggest that, at the same time that cashflow volatility has increased sharply, electric companies' capital structure policy has hardly changed at all. This can be seen in **Table 1**. Median balance sheet ratios (e.g., debt-to-assets) have hardly changed since the beginning of the decade, and measures of interest coverage (e.g., EBIT-to-interest) have also remained nearly constant.

While it is not clear why capital structure policy would not have responded to increased cashflow volatility, part of the reason may be that it has been very difficult for companies to determine how much their cashflow risk exposure has gone up and thus to have a starting point for figuring out the appropriate response.

Table 1: Capital Structure Measurements, 1990–1999

	Industry Median	
Year	EBIT/Interest	Debt/Assets
1990	2.60	0.389
1991	2.68	0.383
1992	2.81	0.383
1993	3.02	0.362
1994	3.09	0.358
1995	3.12	0.352
1996	3.20	0.363
1997	2.91	0.377
1998	2.88	0.368
1999	2.82	0.386

The problem is that a company's own history in the new regime provides little insight into the nature of the risks it faces. After all, individual companies have only limited experience in the new environment. If we define the new environment as having started four years ago, each company has at best 16 quarterly observations on its cashflow. Consequently, financial officers may be unable to form adequate judgments, especially about the likelihood of extreme events, which by definition occur only infrequently.

Our innovation fills this logical gap with a statistical methodology for utilizing data on a set of comparable companies and transforming it into estimates of the probability of extreme cashflow events for an individual company. The NERA C-FaR model constructs tailored forward-looking cashflow distributions for quarter-ahead and year-ahead horizons based on large samples of cashflow shocks experienced by a set of peer-group firms. These samples are large enough to make relatively precise statements about one in 10- or one in 20-year bad outcomes. The distributions also allow quantification of the probability of specified adverse cashflow shocks, e.g., "What is the likelihood that cashflow falls by 50 percent in the next year?"

  PII S1040-6190(00)00163-9