BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition of Verizon Florida Inc. To)   Docket No. _050059 - TL_
Reform Its UNE Cost of Capital and)
Depreciation Inputs To Comply with the)
FCC's Guidance in *Triennial Review Order*)
_____)

DIRECT TESTIMONY OF

JAMES H. VANDER WEIDE, PH.D.

ON BEHALF OF

VERIZON FLORIDA INC.

COST OF CAPITAL

JANUARY 25, 2005

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1   I.   INTRODUCTION

2   Q.   **WHAT IS YOUR NAME AND BUSINESS ADDRESS?**

3   A.   My name is James H. Vander Weide. I am Research Professor of

4   Finance and Economics at the Fuqua School of Business of Duke

5   University. I am also President of Financial Strategy Associates, a firm

6   that provides strategic and financial consulting services to corporate

7   clients. My business address is 3606 Stoneybrook Drive, Durham,

8   North Carolina.

9

10 Q.   **WOULD   YOU   PLEASE   DESCRIBE   YOUR   EDUCATIONAL**

11   **BACKGROUND AND PRIOR ACADEMIC EXPERIENCE?**

12 A.   I graduated from Cornell University in 1966 with a Bachelor's Degree in

13   Economics. I then attended Northwestern University where I earned a

14   Ph.D. in Finance. In January 1972, I joined the faculty of the School of

15   Business at Duke University and was named Assistant Professor,

16   Associate Professor, and then Professor.

17

18   Since joining the faculty, I have taught courses in corporate finance,

19   investment management, and management of financial institutions. I

20   have taught a graduate seminar on the theory of public utility pricing and

21   lectured in executive development seminars on the cost of capital,

22   financial analysis, capital budgeting, mergers and acquisitions, real

23   options, cash management, short-run financial planning, depreciation

24   policies, and competitive strategy. I have also served as Program

25   Director of several executive education programs at the Fuqua School of

1	Business, including the Duke Advanced Management Program, the
2	Duke Executive Program in Telecommunications, Competitive
3	Strategies in Telecommunications, and the Duke Program for Manager
4	Development for managers from the former Soviet Union.
5	
6	I have conducted seminars and training sessions on financial analysis,
7	financial strategy, cost of capital, cash management, depreciation
8	policies, and short-run financial planning for a wide variety of U.S. and
9	international companies, including ABB, Accenture, Allstate, Ameritech,
10	AT&T, Bell Atlantic, BellSouth, Carolina Power & Light, Contel, Fisons,
11	Glaxo Wellcome, GTE, Lafarge, MidAmerican Energy, New Century
12	Energies, Norfolk Southern, Pacific Bell Telephone, The Rank Group,
13	Siemens, Southern New England Telephone, TRW, and Wolseley PLC.
14	
15	In addition to my teaching and executive education activities, I have
16	written research papers on such topics as portfolio management, the
17	cost of capital, capital budgeting, the effect of regulation on the
18	performance of public utilities, and cash management. My articles have
19	been published in *American Economic Review, Financial Management,*
20	*International Journal of Industrial Organization, Journal of Finance,*
21	*Journal of Financial and Quantitative Analysis, Journal of Bank*
22	*Research, Journal of Accounting Research, Journal of Cash*
23	*Management, Management Science, The Journal of Portfolio*
24	*Management, Atlantic Economic Journal, Journal of Economics and*
25	*Business,* and *Computers and Operations Research.* I have written a

1   book titled *Managing Corporate Liquidity: an Introduction to Working*

2   *Capital Management*, and a chapter for *The Handbook of Modern*

3   *Finance*, "Financial Management in the Short Run."

4

5 Q. **HAVE YOU PREVIOUSLY TESTIFIED ON FINANCIAL OR**

6   **ECONOMIC ISSUES?**

7 A.   Yes. As an expert on financial and economic theory, I have testified on

8   the cost of capital, competition, risk, incentive regulation, forward-

9   looking economic cost, economic pricing guidelines, depreciation,

10   accounting, valuation, and other financial and economic issues in

11   approximately 360 cases before the U.S. Congress, the Canadian

12   Radio-Television and Telecommunications Commission, the Federal

13   Communications Commission ("FCC"), the National Telecom-

14   munications and Information Administration, the Federal Energy

15   Regulatory Commission, the public service commissions of 40 states

16   including Florida, the insurance commissions of five states, the Iowa

17   State Board of Tax Review, the North Carolina Property Tax

18   Commission, and the National Association of Securities Dealers. In

19   addition, I have testified as an expert witness in proceedings before the

20   U.S. District Court, District of Nebraska; U.S. District Court, Eastern

21   District of North Carolina; Superior Court, North Carolina; the U.S.

22   Bankruptcy Court, Southern District of West Virginia; and the U. S.

23   District Court for the Eastern District of Michigan. With respect to

24   implementation of the Telecommunications Act of 1996, I have testified

25   in 28 states and in Washington, D.C. on issues relating to the pricing of

3

1   unbundled network elements and universal service cost studies,

2   including the appropriate cost of capital input for forward-looking

3   economic cost studies.   I have also consulted with Bell Canada,

4   Deutsche Telekom, and Telefónica on similar issues.

5

6 Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

7 A. In its *Triennial Review Order* dated August 21, 2003, the FCC clarified

8   that the cost of capital input in UNE cost studies must: (1) reflect the

9   risks of operating in telecommunications markets with facilities-based

10   competition; (2) reflect the specific risks of constructing a forward-

11   looking telecommunications network using the most efficient technology

12   each time rates are reset; and (3) provide correct economic signals for

13   competitive LECs to invest in their own facilities and thus speed the

14   development of facilities-based competition.   [Report and Order and

15   Order on Remand, *Review of the Section 251 Unbundling Obligations of*

16   *Incumbent Local Exchange Carriers*, CC Docket Nos. 01-338, 96-98-98-

17   147 ¶ 680 (rel. Aug. 21, 2003), ("*Triennial Review Order*").] I have been

18   asked by Verizon Florida Inc. ("Verizon Florida") to assess, from an

19   economic perspective whether the cost of capital in Verizon Florida's

20   last UNE proceeding is consistent with the requirements of the FCC's

21   *Triennial Review Order*. If I determine that it is not, Verizon Florida has

22   asked me to make an independent appraisal of the weighted average

23   cost of capital to be used in studies of the forward-looking economic

24   cost of providing unbundled network elements ("UNEs") in Florida that is

25   consistent with the FCC's economic principles of UNE ratemaking as

4

1   clarified in the *Triennial Review Order.*

2

3   I determined that the cost of capital in Verizon Florida's last UNE

4   proceeding is inconsistent with the requirements of the FCC's *Triennial*

5   *Review Order* noted above. Thus, I estimated the weighted average

6   cost of capital for a group of companies operating in the competitive

7   market environment required by the FCC's forward-looking economic

8   cost standard. I also performed a study of the return Verizon Florida

9   would have to earn to compensate them for the additional risk they face

10   as a result of: (1) the FCC's requirement that UNE rates be based on

11   the cost of constructing a telecommunications network using the most

12   efficient technology to meet the entire demand for telecommunications

13   service; and (2) the CLECs' real option to either cancel their UNE lease

14   with Verizon Florida and build their own facilities or renew their lease at

15   lower rates when UNE rates are reset to reflect the supposedly lower

16   cost of new telecommunications technologies.

17

18 II.   **SUMMARY**

19 Q.   **CAN YOU SUMMARIZE YOUR COST OF CAPITAL TESTIMONY IN**

20   **THIS PROCEEDING?**

21 A.   Yes. My cost of capital testimony may be summarized as follows.

22   **A. THE FCC'S FORWARD-LOOKING ECONOMIC COST**

23   **STANDARD**

24   The FCC has determined that rates for unbundled network elements

25   should satisfy four basic economic principles. Specifically, UNE rates

5

1   should: (1) be based on forward-looking economic costs, not embedded

2   or accounting costs (forward-looking economic cost principle);

3   (2) approximate the rates the incumbent LEC would be able to charge in

4   a competitive market for UNEs (competitive market principle);

5   (3) provide correct economic signals for the investment decisions of both

6   competitive and incumbent local exchange carriers (economic signal

7   principle); and (4) provide the ILECs an opportunity to recover their

8   forward-looking economic costs of providing UNEs, including the cost of

9   capital (fair rate of return principle). [See First Report and Order, *In the*

10   *Matter of Implementation of the Local Competition Provisions in the*

11   *Telecommunications Act of 1996*, 11 FCC Rcd 15499 ¶¶ 683, 704, 679,

12   738, 620 (1996) ("*Local Competition Order*"). *Notice of Proposed*

13   *Rulemaking, Review of the Commission's Rules Regarding the Pricing*

14   *of Unbundled Network Elements and the Resale of Service by*

15   *Incumbent Local Exchange Carriers*, WC Docket No. 03-173, FCC 03-

16   224 (rel. Sept. 15, 2003) ¶ 38. ("NPRM").] In its Report and Order and

17   Order on Remand, Review of the Section 251 Unbundling Obligations of

18   Incumbent Local Exchange Carriers, CC Docket Nos. 01-338, 96-98,

19   98-147 ¶ 680 (rel. Aug. 21, 2003), ("*Triennial Review Order*"), the FCC

20   reiterated that the competitive market principle applies to the TELRIC

21   cost of capital.] The cost of capital input in UNE cost studies must be

22   consistent with these four basic economic principles.

23

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1   **B. THE *TRIENNIAL REVIEW ORDER***

2   In response to CLEC claims that the cost of capital and depreciation

3   inputs in UNE cost studies should reflect their view that ILECs are low-

4   risk providers of UNE services, the FCC clarified in its *Triennial Review*

5   *Order* that the cost of capital and depreciation inputs must reflect not

6   only the risks of markets with facilities-based competitors, but also the

7   risks of the TELRIC standard itself: that is, the risks of reconstructing

8   the local exchange network using the most efficient available technology

9   when CLECs have the option to cancel the lease at any time, and the

10   Commission has the option to reset rates to reflect the allegedly lower

11   costs of new technology before the ILEC has recovered its initial

12   investment in the network. In making this clarification, the FCC clearly

13   recognized that TELRIC rates would not send correct economic signals

14   for efficient network investment unless the cost of capital and

15   depreciation inputs reflect the risks of both competitive markets and the

16   TELRIC standard itself.

17

18   **C. THE COST OF CAPITAL IN VERIZON FLORIDA'S LAST**

19   **UNE RATE PROCEEDING**

20   In Verizon Florida's last UNE rate proceeding, the Commission

21   approved a cost of capital equal to 9.63 percent. Since the last UNE

22   rate decision was determined prior to the release of the *Triennial Review*

23   *Order*, and the approved 9.63 percent does not reflect the risks of

24   operating in competitive markets with full facilities-based competition

25   and reconstructing the network using the most efficient technology

1   under the TELRIC standard, Verizon Florida's current UNE rates do not

2   comply with the FCC's forward-looking economic cost principles. The

3   fact that the CLECs' cost of capital for use in making network investment

4   decisions exceeds the Commission's 9.63 percent approved cost of

5   capital by a wide margin is strong evidence that the approved cost of

6   capital does not reflect either the risks of operating in competitive

7   markets or the risks of the TELRIC standard, and that current UNE rates

8   in Florida do not send correct signals for efficient investment. If the

9   Commission does not adjust its approved cost of capital upward, they

10   will fail to promote the goal of the Telecommunications Act of 1996 to

11   rapidly   deploy   "advanced   telecommunications   and   information

12   technologies and services to all Americans."   In this testimony, I

13   recommend a cost of capital that does comply with the FCC's forward-

14   looking economic cost principles and furthers the goals of Congress in

15   passing the Telecommunications Act.

16

17   **D. THE ECONOMIC COST OF CAPITAL**

18   Economists unanimously agree that the forward-looking economic cost

19   of capital must be calculated using market interest rates, the market

20   required return on equity investments of comparable risk, and the

21   market value percentages of debt and equity in the target firm's capital

22   structure. Economists also agree that the forward-looking economic

23   cost of capital must reflect all the risks of the investment that is being

24   considered. In UNE cost studies, the investment being considered is a

25   forward-looking investment in a new telecommunications network using

1   the most efficient available technology and current wire center locations.

2   My recommended weighted average cost of capital is consistent with the

3   economic definition of the cost of capital, while the cost of capital

4   embedded in current UNE rates in Florida is not. The forward-looking

5   economic cost of capital should be higher than the cost of capital

6   embedded in current UNE rates in Florida because the forward-looking

7   economic cost of capital reflects market values rather than book values

8   and also reflects the risks of the TELRIC standard, while the cost of

9   capital embedded in current UNE rates does not.

10

11   **E. RISK IMPLIED BY THE FCC'S TELRIC STANDARD**

12   The FCC's forward-looking economic cost standard requires that UNE

13   rates reflect the costs—not of the existing network that is used to

14   provide UNEs—but the costs that would be incurred to provide UNEs

15   from a telecommunications network constructed using the most efficient

16   technology at each moment of time. The Commission should recognize

17   that basing rates on the TELRIC standard, while at the same time

18   permitting competitors to either cancel their lease altogether or renew at

19   lower rates when new lower-cost technologies become available, is an

20   exceedingly risky proposition. No rational investor would incur the

21   significant cost of constructing the network contemplated in UNE cost

22   studies without being compensated for the significant risk they incur in

23   making such an investment. The Commission should recognize that

24   investment risk under the FCC's cost standard is considerably greater

25   than the investment risk reflected in the cost of capital component of the

1   UNE rates approved by the Commission in Verizon Florida's last UNE

2   rate proceeding.

3

4   **F. RISK IMPLIED BY ACTUAL COMPETITIVE MARKET**

5   **CONDITIONS**

6   The risk of investing in the facilities required to provide UNEs in Florida

7   depends on operating leverage, demand uncertainty, rapidly changing

8   technology, the regulatory environment, and the cancelable nature of

9   the typical monthly UNE lease contract. Taken as a whole, these

10   factors mean that the risk of investing in the facilities required to provide

11   UNEs in Florida is significantly greater than both the risk of providing

12   local exchange service and the forward-looking risk of investing in the

13   S&P Industrials.

14

15   **G. THE FORWARD-LOOKING COST OF CAPITAL FOR**

16   **COMPANIES OPERATING IN COMPETITIVE MARKETS**

17   I calculated the forward-looking economic cost of capital for companies

18   operating in competitive markets by using: (1) the yield to maturity on A-

19   rated industrial bonds; (2) the average market value capital structure of

20   both a large sample of S&P Industrials and a group of

21   telecommunications companies with incumbent local exchange

22   subsidiaries; and (3) the Discounted Cash Flow ("DCF") model to

23   estimate the cost of equity for a large sample of companies operating in

24   competitive markets. My estimate of the forward-looking cost of capital

25   for companies operating in competitive markets is 11.64%. However,

1   this estimate does not consider the additional risk Verizon Florida faces

2   for making long-term fixed investments in network facilities while its

3   customers have the real option to either cancel their lease contract and

4   build their own facilities or to renew their lease at lower rates when UNE

5   rates are reset to reflect the supposedly lower cost of new

6   telecommunications technologies.

7

8   **H. COST OF CAPITAL FOR USE IN UNE COST STUDIES**

9   To reflect the additional risk of making long-term fixed investments in a

10 telecommunications network, while customers have an ongoing option

11 to either build their own facilities or renew their lease at lower rates, the

12 weighted average cost of capital for use in UNE cost studies must be

13 greater than the weighted average cost of capital for my proxy group of

14 industrial companies. I estimated the additional return required to

15 compensate Verizon Florida for the unique and special risks it faces in

16 providing UNEs under the TELRIC standard while competitors have an

17 ongoing real option to either build their own facilities or renew their lease

18 at lower rates by applying option pricing formulas used by many

19 financial market participants. My estimate of the required risk premium

20 is 2.56%. Thus, my recommended cost of capital for use in UNE cost

21 studies in Florida is 14.19% (11.64% + 2.56% = 14.19%). [Apparent

22 discrepancy due to rounding.]

23

24

25

1   III.   FUNDAMENTAL ECONOMIC PRINCIPLES

2   A. THE FCC'S FORWARD-LOOKING ECONOMIC COST

3   STANDARD

4   Q.   HAS THE FCC DETERMINED WHAT ECONOMIC PRINCIPLES

5   SHOULD BE USED IN SETTING RATES FOR UNBUNDLED

6   NETWORK ELEMENTS ("UNES")?

7   A.   Yes. The FCC determined the basic economic principles to be used in

8   setting rates for UNEs in its *Local Competition Order*. In that order, the

9   FCC decided that rates for unbundled network elements should: (1) be

10   based on forward-looking economic costs, not historical, embedded, or

11   accounting costs: (2) approximate the rates the incumbent LEC would

12   be able to charge in a competitive market for UNEs; (3) provide correct

13   economic signals for the investment decisions of all competitors; and

14   (4) provide an opportunity for the incumbent LEC to recover its forward-

15   looking economic cost of providing UNEs, including its cost of capital.

16

17 Q.   DID THE FCC PROVIDE ANY FURTHER GUIDANCE ON HOW ITS

18   FORWARD-LOOKING ECONOMIC COST METHODOLOGY SHOULD

19   BE IMPLEMENTED?

20 A.   Yes. The FCC specified that UNE cost models should seek to measure

21   the cost of reconstructing and operating the local exchange network

22   using the most efficient technology and current wire center locations.

23   [*Local Competition Order* at ¶ 685.] As the FCC stated in its TELRIC

24   NPRM:

25   current TELRIC models typically are designed to answer

1		the following question: If a single carrier were to build an
2		efficient network today to serve all customer locations
3		within a particular geographic area, taking as given only
4		the locations of existing wire centers, how much would it
5		cost to construct and maintain the network? [NPRM at
6		¶ 49.]
7		
8	Q.	WHY DID THE FCC DECIDE THAT UNE RATES SHOULD BE BASED
9		ON FORWARD-LOOKING ECONOMIC COSTS RATHER THAN
10		HISTORICAL, EMBEDDED, OR ACCOUNTING COSTS?
11	A.	The FCC decided to base UNE rates on forward-looking economic costs
12		rather than historical, embedded, or accounting costs because CLEC
13		and ILEC decision makers make network investment decisions based
14		on forward-looking economic costs, not historical, embedded, or
15		accounting costs. Thus, in the FCC's opinion, UNE rates based on the
16		ILECs' forward-looking economic costs send correct pricing signals for
17		the investment decisions of all competitors. [See *Local Competition*
18		*Order* at ¶ 620, NPRM at ¶¶ 30, 38.]
19		
20	Q.	WHY IS IT IMPORTANT THAT UNE RATES SEND CORRECT
21		PRICING SIGNALS FOR THE INVESTMENT DECISIONS OF ALL
22		COMPETITORS?
23	A.	UNE rates should send correct pricing signals for the investment
24		decisions of all competitors because UNE rates should be designed to
25		achieve the goals of the Telecommunications Act of 1996, and

13

1   Congress passed the Telecommunications Act "to accelerate rapidly

2   private sector deployment of advanced telecommunications and

3   information technologies and services to all Americans by opening all

4   telecommunications markets to competition." [*Telecommunications Act*

5   *of 1996*, Conference Report, Report 104-458, page 1, January 31,

6   1996.] Advanced telecommunications and information technologies and

7   services will be deployed most rapidly when CLECs and ILECs have

8   incentives to invest in their own network facilities. If UNE rates are set

9   below the forward-looking economic cost the ILECs expect to incur to

10   operate and invest in their networks, CLECs will have no incentive to

11   invest in their own networks, even if they can provide service more

12   efficiently than ILECs; and ILECs will have no incentive to make the

13   required investments in their networks to deploy "advanced

14   telecommunications and information technologies and services to all

15   Americans."

16

17 Q.   HAS THE FCC EXPRESSED CONCERN THAT ITS TELRIC RULES

18   HAVE BEEN IMPLEMENTED IN A WAY THAT DISTORTS PRICING

19   SIGNALS BY UNDERSTATING FORWARD-LOOKING ECONOMIC

20   COSTS?

21 A.   Yes. In ¶ 3 of its NPRM, the FCC stated:

22   Today, now that competition has taken root in many areas

23   of the country, we initiate this proceeding to consider

24   whether our pricing methodology is working as intended

25   and, in particular, whether it is conducive to efficient

14

1   facilities investment. To the extent that the application of

2   our TELRIC pricing rules distorts our intended pricing

3   signals by understating forward-looking costs, it can thwart

4   one of the central purposes of the Act: the promotion of

5   facilities-based competition. While our UNE pricing rules

6   must produce rates that are just, reasonable and

7   nondiscriminatory, consistent with the Act's goal of

8   promoting sustainable competition, they should not create

9   incentives for carriers to avoid investment in facilities.

10

11   **B. TRIENNIAL REVIEW ORDER**

12   Q. **WHAT ARE THE MAJOR COMPONENTS OF THE FORWARD-**

13   **LOOKING ECONOMIC COST OF PROVIDING UNES?**

14   A. The forward-looking economic cost of providing UNEs includes both

15   capital costs and operating expenses. The capital costs, in turn, include

16   three elements: (1) the LECs' incremental investment in the

17   telecommunications facilities required to provide UNEs; (2) the

18   economic depreciation on these facilities; and (3) the required rate of

19   return, or cost of capital, associated with these facilities.

20

21   Q. **HOW ARE UNE RATES DETERMINED FROM INFORMATION**

22   **ABOUT THE COMPANY'S FORWARD-LOOKING INVESTMENT,**

23   **OPERATING EXPENSES, DEPRECIATION, AND COST OF**

24   **CAPITAL?**

25   A. UNE rates are determined by finding those rates that equate the

1   expected present value of the company's revenues over the expected

2   life of its network to the expected present value of its operating

3   expenses plus investment.   Thus, PV (Revenues) = PV (Operating

4   Expenses) + PV (Investment) + PV (Depreciation Tax Savings), where

5   PV denotes "present value," and present values are calculated using the

6   weighted average cost of capital as a discount rate.

7

8 Q. **DO THE FCC'S ECONOMIC PRINCIPLES OF UNE RATE MAKING**

9   **APPLY TO ALL FOUR OF THE MAJOR COMPONENTS OF UNE**

10   **COSTS,   I.E.,   INVESTMENT,   OPERATING   EXPENSES,**

11   **DEPRECIATION, AND COST OF CAPITAL?**

12 A. Yes.   Since UNE rates are derived from estimates of the four

13   components of UNE costs, UNE rates can only satisfy the FCC's

14   economic principles of UNE ratemaking if these principles are

15   consistently applied to all four of the major components of UNE costs.

16   For example, if the investment and operating expense components of

17   UNE costs are estimated under the assumption that the ILEC constructs

18   a new telecommunications network in a competitive market using the

19   most efficient available technology, while the cost of capital and

20   depreciation components are estimated under the assumption that the

21   ILEC faces little or no competitive risks and can offer UNEs without

22   making substantial investment in its network, then UNE rates cannot

23   approximate the rates the ILEC would charge in a competitive market for

24   UNEs. And such rates will certainly not send efficient pricing signals to

25   all competitors.

16

1   Q.   HAS THE FCC SPECIFICALLY RECOGNIZED THE NEED TO BE

2   CONSISTENT IN APPLYING ITS ECONOMIC PRINCIPLES TO ALL

3   THE MAJOR COMPONENTS OF UNE COSTS?

4   A.   Yes. The FCC specifically recognized the need to be consistent in

5   applying its economic principles to all the major components of UNE

6   costs in the *Triennial Review Order*. Prior to the FCC's *Triennial Review*

7   *Order*, CLECs such as AT&T and MCI and many state commissions had

8   argued that the operating expense and investment components of UNE

9   costs should be based on the assumption that ILECs operate in a highly

10   competitive market where rates reflect the cost of instantaneously

11   reconstructing the ILEC's network using the most efficient available

12   technology, but the depreciation and cost of capital components of UNE

13   costs should be based on the contrary assumption that ILECs face little

14   or no competition, and must make no network investments to provide

15   UNEs. In its *Triennial Review Order*, the FCC clarified that use of these

16   contradictory approaches to estimating the four components of UNE

17   costs is inconsistent with the FCC's economic principles of UNE

18   ratemaking. Specifically, the FCC stated that the cost of capital and

19   depreciation components must be consistent with the FCC's pricing

20   principles in order to send correct economic signals for the investment

21   decisions of competitive LECs:

22   The approach advocated by AT&T and WorldCom does

23   not provide optimal incentives for investment. To calculate

24   rates based on an assumption of a forward-looking

25   network that uses the most efficient technology (*i.e.*, the

1   network that would be deployed in a competitive market),

2   without also compensating for the risks associated with

3   investment in such a network, would reduce artificially the

4   value of the incumbent LEC network and send improper

5   pricing signals to competitors. Establishing UNE prices

6   based on an unreasonably low cost of capital would

7   discourage competitive LECs from investing in their own

8   facilities and thus slow the development of facilities-based

9   competition. [*Triennial Review Order* at ¶ 682.]

10

11   Q.   WHEN WAS THE *TRIENNIAL REVIEW ORDER* RELEASED BY THE

12   FCC?

13   A.   The FCC released the *Triennial Review Order* on August 21, 2003.

14

15   C.   THE COST OF CAPITAL IN VERIZON FLORIDA'S LAST

16   UNE RATE PROCEEDING

17   Q.   WHAT COST OF CAPITAL DID THE FLORIDA PUBLIC SERVICE

18   COMMISSION ("THE COMMISSION") APPROVE IN VERIZON

19   FLORIDA'S LAST UNE RATE PROCEEDING (DOCKET NO.

20   990649B-TP)?

21   A.   The Commission approved a cost of capital of 9.63 percent for use in

22   UNE cost studies.

23

24   Q.   WHEN WAS THE ORDER IN VERIZON FLORIDA'S LAST UNE

25   PROCEEDING ISSUED BY THE COMMISSION?

1   A.   The order was issued November 15, 2002, almost one year prior to the

2   FCC's *Triennial Review Order*.

3

4   Q.   **DOES THE 9.63 PERCENT COST OF CAPITAL APPROVED IN**

5   **VERIZON FLORIDA'S LAST UNE RATE PROCEEDING REFLECT**

6   **THE RISKS OF A COMPETITIVE MARKET, AS THE TRIENNIAL**

7   **REVIEW ORDER REQUIRES?**

8   A.   No. The Commission based its 9.63 percent cost of capital decision in

9   Verizon Florida's last UNE proceeding on the testimony and cost of

10   capital results of Staff Witness Draper. Mr. Draper's testimony and cost

11   of capital results undoubtedly did not reflect the risks of operating in

12   competitive markets.

13

14 Q.   **HOW DID MR. DRAPER'S COST OF CAPITAL RESULTS FAIL TO**

15   **REFLECT THE RISKS OF OPERATING IN COMPETITIVE MARKETS**

16   **AS THE TRIENNIAL REVIEW ORDER REQUIRES?**

17 A.   There are at least four ways in which Mr. Draper's cost of capital results

18   fail to reflect the risks of operating in competitive markets. First, Mr.

19   Draper employed a non-traditional, two-stage DCF model that produced

20   cost of equity results for three of his seven proxy companies that were

21   either significantly below or approximately equal to the yield on A-rated

22   utility bonds. Since stock investments are undoubtedly more risky than

23   bond investments, the cost of equity for companies operating in

24   competitive markets must certainly be significantly higher than the yield

25   to maturity on A-rated utility bonds. The Florida Commission itself

1 recognized the reasonableness of the proposition that the return on

2 equity must be greater than the yield to maturity on debt in its BellSouth

3 UNE decision, when it rejected the low DCF cost of equity results of the

4 AT&T witness:

5 > We believe witness Hirshleifer's DCF model is flawed.

6 > Specifically, he estimates 7.86% as the cost of equity for

7 > BellSouth Corporation as of September 1999. He agrees

8 > that the yield on one of BellSouth's debentures for the

9 > same period is 7.97%. Though he agrees that investors

10 > require a higher return for equity than for debt, he refuses

11 > to eliminate the 7.86% as an illogical result. This casts

12 > doubt on Hirshleifer's DCF results. (*Investigation into*

13 > *Pricing of Unbundled Network Elements*, Docket No.

14 > 990649-TP, PSC-01-1181-FOF-TP, May 25, 2001.)

15 Since Mr. Draper's proxy group included only seven companies, the

16 unreasonably low DCF results for these three companies significantly

17 reduced his recommended cost of equity below the cost of equity for

18 companies operating in competitive markets.

19

20 Second, Mr. Draper estimated the cost of equity for Verizon's UNE

21 business from a proxy group of seven telecommunications holding

22 companies that undoubtedly face significantly less risk than Verizon's

23 stand-alone UNE business operating in competitive markets. The

24 holding companies are less risky than Verizon's stand-alone UNE

25 business because they can diversify away some of the technological,

1   regulatory, and geographical risks facing Verizon's UNE business in

2   Florida.

3

4   Third, Mr. Draper applied his criteria for inclusion in his proxy group

5   incorrectly.   Specifically, he included two companies, AT&T and

6   CenturyTel, that failed to satisfy his criteria for inclusion in his proxy

7   group, and excluded one company, SBC, that did satisfy his criteria for

8   inclusion in his proxy group. Since Mr. Draper's cost of equity results for

9   the improperly included companies were relatively low, and the DCF

10   result for the improperly excluded company would have been relatively

11   high, Mr. Draper's incorrect application of his own criteria further

12   reduced his recommended cost of equity below the cost of equity for

13   companies operating in competitive markets.

14

15   Fourth, Mr. Draper's recommended 9.63 percent cost of capital was

16   based on a book value capital structure that contains 40 percent debt

17   and 60 percent equity, even though competitive companies use market

18   value capital structures to estimate their weighted average cost of

19   capital. Competitive companies use the market values to estimate their

20   weighted average costs of capital because competitive risks are only

21   reflected in the market values of their debt and equity securities, not the

22   book values. Mr. Draper's improper decision to base his recommended

23   cost of capital on book value capital structure weights also reduced his

24   recommended cost of capital below the cost of capital for companies

25   operating in competitive markets.

21

1   Q.   DO YOU HAVE ANY ADDITIONAL EVIDENCE THAT THE

2   9.63 PERCENT COST OF CAPITAL APPROVED IN VERIZON

3   FLORIDA'S LAST UNE RATE PROCEEDING FAILS TO REFLECT

4   THE RISKS OF COMPETITIVE MARKETS AS REQUIRED BY THE

5   TRIENNIAL REVIEW ORDER?

6   A.   Yes. In Verizon Florida's recent collocation proceeding, Docket Nos.

7   98-0934-TP and 990321-TP, Staff Witness Mr. Lester recognized the

8   impact of the Triennial Review Order in his procedures for estimating

9   Verizon Florida's cost of capital for use in collocation cost studies.

10   Specifically, Mr. Lester recognized the need to base the cost of equity

11   on a broad group of proxy companies operating in competitive markets

12   and the need to use a market value capital structure for the companies

13   operating in competitive markets as weights for estimating the weighted

14   average cost of capital. Based on the standards of the *Triennial Review*

15   *Order*, Mr. Lester recommended a weighted average cost of capital

16   equal to 11.12 percent for use in pricing Verizon Florida's collocation

17   services.

18

19 Q.   DOES THE 9.63 PERCENT COST OF CAPITAL APPROVED IN

20   VERIZON FLORIDA'S LAST UNE RATE PROCEEDING REFLECT

21   THE RISKS OF CONSTRUCTING "A FORWARD-LOOKING

22   NETWORK THAT USES THE MOST EFFICIENT TECHNOLOGY"?

23   [*TRIENNIAL REVIEW ORDER* AT ¶ 682.]

24 A.   No. As noted above, the Commission based its 9.63 percent cost of

25   capital decision in Verizon Florida's last UNE proceeding on the

1   testimony of Staff Witness Draper. Mr. Draper did not either assess or

2   quantify the risks of constructing a forward-looking network using the

3   most efficient technology anywhere in his testimony, and thus his

4   recommended cost of capital certainly did not reflect these risks. As I

5   demonstrate in this testimony, under the TELRIC standard, Verizon

6   Florida bears a significant risk that it will be unable to recover its

7   forward-looking investment and expenses if the cost of capital input is

8   not increased to reflect the greater risk of the TELRIC construct itself. I

9   also quantify how these risks impact the appropriate cost of capital for

10   use in UNE cost studies.

11

12 Q. **HAVE OTHER ECONOMISTS ALSO RECOGNIZED THAT THE ILECS**

13   **WILL NOT BE ABLE TO RECOVER THEIR FORWARD-LOOKING**

14   **ECONOMIC COST OF PROVIDING UNES UNDER THE TELRIC**

15   **STANDARD?**

16 A. Yes. That the ILECs will not recover their forward-looking economic

17   costs under the TELRIC standard is widely recognized in the economics

18   literature. In a working paper prepared by the FCC's Office of Strategic

19   Planning and Policy Analysis, for example, Mandy and Sharkey evaluate

20   the use of static cost proxy models such as TELRIC in setting forward-

21   looking prices for UNE services. They conclude that TELRIC will not

22   allow the ILECs to recover their forward-looking cost of providing UNE

23   services:

24   When TELRIC prices are recomputed at intervals shorter

25   than asset lives, the firm will generally not earn the target

23

1   rate of return. In these cases, a correction factor must be

2   applied to the TELRIC price path in order for revenues to

3   exactly recover investment cost, including the target rate of

4   return.   (David M. Mandy and William W. Sharkey,

5   "Dynamic Pricing and Investment from Static Proxy

6   Models," abstract.)

7

8   Two other papers by Mandy reach similar conclusions, "TELRIC Pricing

9   with Vintage Capital," *Journal of Regulatory Economics*, 22:3 215:249,

10   2002, and "Pricing Network Elements When Costs Are Changing,"

11   *Telecommunications Policy* 26 (2002) 53-67.

12

13   **Q.**   **HAS THE FCC ITSELF RECOGNIZED THAT THE ILECS WILL NOT**

14   **BE ABLE TO RECOVER THEIR FORWARD-LOOKING ECONOMIC**

15   **COST OF PROVIDING UNES UNDER THE TELRIC STANDARD?**

16   **A.**   Yes. In ¶ 51 of the NPRM, the FCC states:

17   Simultaneously assuming a market inhabited by multiple

18   competitors and one with a ubiquitous carrier with a very

19   large market share may work to reduce estimates of

20   forward-looking costs below the costs that would actually

21   be found even in an extremely competitive market.   It

22   therefore may undermine the incentive for either

23   competitive LECs or incumbent LECs to build new

24   facilities, even when it is efficient for them to do so.

25

1   Q.   DOES THE 9.63 PERCENT COST OF CAPITAL APPROVED IN

2   VERIZON FLORIDA'S LAST UNE RATE PROCEEDING PROVIDE

3   CORRECT ECONOMIC SIGNALS TO COMPETITIVE LECS THAT

4   ARE CONSIDERING WHETHER TO INVEST IN THEIR OWN

5   FACILITIES OR LEASE UNES FROM INCUMBENT LECS?

6   A.   No. As demonstrated in my testimony, the 9.63 percent cost of capital

7   approved in Verizon Florida's last UNE rate proceeding fails to reflect

8   the risks of the TELRIC standard itself, that is, the risk of constructing a

9   forward-looking network using the most efficient technology when

10   CLECs have the option to cancel the lease at any time, and the

11   Commission has the option to reset rates to reflect the allegedly lower

12   costs of new technology before the ILEC has recovered its initial

13   investment in the network. The FCC noted in the Virginia Arbitration

14   Order that AT&T's and MCI's internal costs of capital exceeded 15

15   percent. In response to data requests in other proceedings, AT&T has

16   indicated that it currently uses a cost of capital for network investment

17   decisions that is significantly higher than 15 percent. If CLECs can

18   obtain UNEs at rates that reflect a 9.63 percent cost of capital when

19   their own cost of capital is nearly twice as high, they will have no

20   incentive to invest in their own facilities. Clearly, a 9.63 percent cost of

21   capital utterly fails to provide correct economic signals to CLEC and

22   ILEC decision makers.

23

24

25

1 **D. THE ECONOMIC DEFINITION OF THE COST OF**

2   **CAPITAL**

3 Q. **DOES THE COST OF CAPITAL PLAY ANY ROLE IN THE FCC'S**

4 **GUIDELINES FOR FORWARD-LOOKING COST STUDIES?**

5 A. Yes. As noted above, the FCC requires that unbundled network

6 element cost studies be based on the forward-looking economic cost of

7 providing unbundled network elements. The forward-looking economic

8 cost of providing unbundled network elements includes both capital

9 costs and expenses. The capital costs, in turn, include three elements:

10 (1) the LECs' investment in the telecommunications facilities required to

11 provide unbundled network elements; (2) the economic depreciation on

12 these facilities; and (3) the required rate of return, or cost of capital,

13 associated with these facilities.

14

15 Q. **DO THE FCC'S GUIDELINES SPECIFY THE RISKS THAT SHOULD**

16 **BE REFLECTED IN THE COST OF CAPITAL INPUT IN UNE COST**

17 **STUDIES?**

18 A. Yes. The FCC's guidelines as clarified in the *Triennial Review Order*

19 specify that the cost of capital in UNE cost studies must reflect both the

20 risks of operating in markets with facilities-based competition and the

21 risks of constructing a forward-looking network using the most efficient

22 technology each time rates are reset. I will further address these risks

23 and a means of incorporating them into the estimate of the cost of

24 capital in Section V of my testimony.

25

1 Q. HOW DO ECONOMISTS DEFINE THE REQUIRED RATE OF

2   RETURN, OR COST OF CAPITAL, ASSOCIATED WITH

3   PARTICULAR INVESTMENT DECISIONS, SUCH AS THE DECISION

4   TO INVEST IN THE BUILDING OF TELECOMMUNICATIONS

5   NETWORK FACILITIES?

6 A. Economists define the required rate of return on a particular investment

7   as the return that investors forego by making that investment instead of

8   an alternative investment of equal risk.

9

10

11 Q. HOW DOES THE COST OF CAPITAL AFFECT A FIRM'S

12   INVESTMENT DECISIONS?

13 A. The goal of a firm is to maximize the value of the firm. This goal can be

14   accomplished by accepting all investments in plant and equipment with

15   an expected rate of return greater than or equal to the cost of capital.

16   Thus, a firm should continue to invest in plant and equipment only so

17   long as the return on its investment is greater than or equal to its cost of

18   capital.

19

20 Q. HOW DOES THE COST OF CAPITAL AFFECT INVESTORS'

21   WILLINGNESS TO INVEST IN A COMPANY?

22 A. The cost of capital measures the return investors can expect on

23   investments of comparable risk. Rational investors will not invest in a

24   particular investment opportunity if the expected return on that

25   opportunity is less than the cost of capital. Thus, the expected rate of

1   return on an investment in a company must exceed, or at least be equal

2   to, the cost of capital before investors will be willing to invest in that

3   company.

4

5 Q. DO ALL INVESTORS HAVE THE SAME POSITION IN THE FIRM?

6 A. No. Debt investors have a fixed claim on a firm's assets and income

7   that must be paid prior to any payment to the firm's equity investors.

8   Since the firm's equity investors have a residual claim on the firm's

9   assets and income, equity investments are riskier than debt

10   investments. Thus, the cost of equity exceeds the cost of debt.

11

12 Q. WHAT IS THE OVERALL OR WEIGHTED AVERAGE COST OF

13   CAPITAL?

14 A. The overall or weighted average cost of capital is a weighted average of

15   the cost of debt and cost of equity, where the weights are the

16   percentages of debt and equity in a firm's capital structure.

17

18 Q. CAN YOU ILLUSTRATE THE CALCULATION OF THE OVERALL OR

19   WEIGHTED AVERAGE COST OF CAPITAL?

20 A. Yes. Assume that the cost of debt is 7%, the cost of equity is 14%, and

21   the percentages of debt and equity in the firm's capital structure are

22   25% and 75%, respectively. Then the weighted average cost of capital

23   is expressed by (0.25 times 7%) plus (0.75 times 14%), or 12.25%.

24

25

1   Q.   HOW DO ECONOMISTS DEFINE THE COST OF DEBT COMPONENT

2   OF THE WEIGHTED AVERAGE COST OF CAPITAL?

3   A.   Economists define the cost of debt as the market interest rate that a firm

4   would have to pay on newly-issued debt obligations with the appropriate

5   maturity.   [It is generally appropriate to match the duration of the

6   company's debt to the duration of the company's assets.   Thus,

7   companies with long-term assets rely heavily on long-term debt to

8   finance those assets.]   In efficient markets, the market interest rate is

9   also the best estimate of future interest rates.   The correct economic

10   definition of the cost of debt is thus forward-looking and market-oriented.

11

12 Q.   HOW DO ECONOMISTS DEFINE THE COST OF EQUITY

13   COMPONENT OF THE WEIGHTED AVERAGE COST OF CAPITAL?

14 A.   Economists define the cost of equity as the return investors expect to

15   receive on alternative equity investments of comparable risk. Since the

16   return on an equity investment of comparable risk is not fixed by

17   contract, the cost of equity is more difficult to measure than the cost of

18   debt. There is agreement, however, as I have already noted, that the

19   cost of equity is greater than the cost of debt. There is also agreement

20   among economists that the cost of equity, like the cost of debt, is both

21   forward-looking and market-based.

22

23 Q.   WHAT APPROACHES DO ECONOMISTS EMPLOY TO OBTAIN

24   NUMERICAL ESTIMATES OF THE COST OF EQUITY?

25 A.   Economists generally use market models such as the DCF Model to

1   estimate a firm's cost of equity. The DCF Model is based on the

2   assumption that the market price of a firm's stock is equal to the present

3   value of the stream of cash flows that investors expect to receive from

4   owning the stock. The cost of equity in the DCF Model is that discount

5   rate which equates the firm's stock price to the present value of the

6   future stream of cash flows investors expect from owning the stock.

7

8 Q. HOW DO ECONOMISTS MEASURE THE PERCENTAGES OF DEBT

9   AND EQUITY IN A FIRM'S CAPITAL STRUCTURE?

10 A. Economists measure the percentages of debt and equity in a firm's

11   capital structure by first calculating the market value of the firm's debt

12   and the market value of its equity. Economists then calculate the

13   percentage of debt by the ratio of the market value of debt to the

14   combined market value of debt and equity, and the percentage of equity

15   by the ratio of the market value of equity to the combined market values

16   of debt and equity. For example, if a firm's debt has a market value of

17     $25 million and its equity has a market value of $75 million, then its total

18   market capitalization is $100 million, and its capital structure contains

19   25% debt and 75% equity.

20

21 Q. WHY DO ECONOMISTS MEASURE A FIRM'S CAPITAL

22   STRUCTURE IN TERMS OF THE MARKET VALUES OF ITS DEBT

23   AND EQUITY?

24 A. Economists measure a firm's capital structure in terms of the market

25   values of its debt and equity because that is the best measure of the

1   amounts of debt and equity that investors have invested in the company

2   on a going-forward basis. Furthermore, economists generally assume

3   that the goal of management is to maximize the value of the firm, where

4   the value of the firm is the sum of the market value of the firm's debt and

5   equity. Only by measuring a firm's capital structure in terms of market

6   values can its managers choose investment and financing strategies

7   that both maximize the value of the firm and allow investors to earn a

8   return on their investment that is commensurate with returns on other

9   investments of comparable risk.

10

11   Q.   DOES THE ECONOMIC LOGIC BEHIND THE DEFINITION OF THE

12   COST OF CAPITAL HAVE ANY IMPLICATIONS FOR COMPETITIVE

13   ENTRY IN THE LOCAL EXCHANGE MARKET IN FLORIDA?

14   A.   Yes. If the Commission wants to encourage efficient facilities-based

15   competitive entry in the market for local exchange services, the cost of

16   capital input in Verizon Florida's forward-looking cost studies must be at

17   least as large as the return those potential facilities-based competitors

18   can earn on other investments of the same risk. If potential competitors

19   can lease local exchange facilities from Verizon Florida at rates that

20   include a 9.63 percent rate of return on investment, for example, they

21   will have no incentive to invest in their own facilities if they can earn

22   returns greater than 9.63 percent on other investments of comparable

23   risk. In short, it would make more sense for those competitors to lease

24   the undervalued unbundled network elements from Verizon Florida than

25   to build their own facilities. To provide correct incentives for entry into

31

1   local exchange markets, the Commission should recognize all of the

2   risks Verizon Florida faces in making network investment decisions

3   under the TELRIC standard and also recognize that CLECs use

4   significantly higher costs of capital than the Commission approved in

5   Verizon Florida's last UNE rate proceeding.

6

7 Q. **DOES THE ECONOMIC DEFINITION OF THE COST OF CAPITAL**

8   **HAVE ANY IMPLICATIONS FOR THE POLICY GOAL OF**

9   **ENCOURAGING INVESTMENT AND INNOVATION IN**

10   **TELECOMMUNICATIONS SERVICES?**

11 A. Yes. The Commission should likewise use a market definition of the

12   cost of capital if it wishes to promote efficient investment and innovation

13   in telecommunications services. In competitive markets, the incumbent

14   and its competitors can only be encouraged to invest in new

15   technologies, products, and services if the rate of return they can earn

16   on the market value of their investments exceeds the rate of return they

17   could earn on the market value of other investments of the same risk.

18

19 Q. **WHY DO INVESTORS MEASURE THE RETURN ON THEIR**

20   **INVESTMENT PORTFOLIOS USING MARKET VALUE WEIGHTS**

21   **RATHER THAN BOOK VALUE WEIGHTS?**

22 A. Investors measure the return on their investment portfolios using market

23   value weights because market value weights are the best measure of

24   the amounts the investors currently have invested in each security in the

25   portfolio. From the point of view of investors, the historical cost or book

1   value of their investment is entirely irrelevant to the current risk and

2   return on their portfolios because if they were to sell their investments,

3   they would receive market value, not historical cost. Thus, the return

4   can only be measured in terms of market values.

5

6 Q. **IS THE ECONOMIC DEFINITION OF THE WEIGHTED AVERAGE**

7   **COST OF CAPITAL CONSISTENT WITH THE DEFINITION OF THE**

8   **WEIGHTED AVERAGE COST OF CAPITAL THE COMMISSION**

9   **USED IN VERIZON FLORIDA'S LAST UNE RATE PROCEEDING?**

10 A. No. The economic definition of the weighted average cost of capital is

11   based on the market costs of debt and equity, the market value

12   percentages of debt and equity in a company's capital structure, and the

13   future expected risk of investing in the company. In contrast, the

14   Commission defined the weighted average cost of capital using the *book*

15   *values* rather than the *market values* of debt and equity, and a cost of

16   equity that fails to reflect the risk of operating in competitive

17   telecommunications markets under the TELRIC standard.

18

19 Q. **WHAT IS THE DIFFERENCE BETWEEN THE MARKET VALUE AND**

20   **THE BOOK VALUE OF A COMPANY'S DEBT?**

21 A. The market value of a company's debt represents the current price in

22   the capital markets of the company's debt obligations. The book value

23   of a company's debt is the historical face value of its debt adjusted for

24   the accounting amortization of premiums and discounts. The market

25   value of a company's debt is approximately equal to the book value of

1		its debt when market interest rates are approximately equal to the
2		average interest rate of the company's previous debt issuances.
3		
4	Q.	**WHAT IS THE DIFFERENCE BETWEEN THE MARKET VALUE AND**
5		**THE BOOK VALUE OF A COMPANY'S EQUITY?**
6	A.	The market value of a company's equity is simply the market price of the
7		company's stock times the number of shares outstanding. The book
8		value of equity is more complex: it represents the sum of paid-in capital
9		and retained earnings, where paid-in capital represents the amount of
10		capital a firm has historically obtained from stock issuances, and
11		retained earnings represent the cumulative earnings over the life of the
12		company that have not been paid out as dividends. In addition, the
13		book value of a company's equity is adjusted periodically for accounting
14		events such as changes in accounting rules and regulations, write-offs,
15		and extraordinary events.
16		
17	Q.	**DOES THE BOOK VALUE OF A COMPANY'S EQUITY REFLECT**
18		**THE HISTORICAL COST OF ITS ASSETS?**
19	A.	Yes. According to basic accounting principles, the book value of a
20		company's assets, liabilities, and equity are measured using historical
21		costs. For example, Kieso, Weygandt, and Warfield state in their
22		widely-used text that the historical cost principle is one of four basic
23		principles of accounting: "GAAP requires that most assets and liabilities
24		be accounted for and reported on the basis of acquisition price. This is
25		often referred to as the *historical cost principle*." [Donald E. Kieso, Jerry

1   J. Weygandt, and Terry D. Warfield, *Intermediate Accounting*, at 44

2   (John Wiley & Sons 10th ed. 2001). (Emphasis in original.)] Thus, by

3   definition, the book value of a company's equity reflects the historical

4   cost of the company's assets.

5

6 Q. **IS THE COMMISSION'S DEFINITION OF THE AVERAGE COST OF**

7   **CAPITAL IN VERIZON FLORIDA'S LAST UNE RATE PROCEEDING**

8   **CONSISTENT WITH THE FCC'S FORWARD-LOOKING ECONOMIC**

9   **COST PRINCIPLES?**

10 A. No.   The FCC has determined that UNE rates must be based on

11   forward-looking economic costs, not historical or embedded costs. As

12   the FCC states: "Embedded costs are the costs that the incumbent

13   LECs carry on their accounting books that reflect historical purchase

14   prices, regulatory depreciation rates, system configurations, and

15   operating procedures." [*Local Competition Order* ¶ 632.] Furthermore,

16   the FCC has specifically stated that UNE rates cannot be based on

17   embedded or historical costs. See, for example, the *Local Competition*

18   *Order* at ¶ 673: "In this section, we describe this forward-looking, cost-

19   based pricing standard in detail.   ...[W]e address potential cost

20   measures that must not be included in a TELRIC analysis, such as

21   embedded (or historical) costs."

22

23   Thus, the economic principles underlying a forward-looking economic

24   cost study require that the average cost of capital be calculated using a

25   *market* interest rate, a *market value* capital structure, and a cost of

35

1   equity that measures the return investors require in ___competitive___

2   markets on other investments of the same risk.

3

4   In contrast, the Commission's definition of the weighted average cost of

5   capital in Verizon Florida's last UNE rate proceeding was based on a

6   book value capital structure and a cost of equity that fails to measure the

7   risks of reconstructing Verizon Florida's network in competitive markets

8   under the TELRIC standard. The Commission's definition of Verizon

9   Florida's weighted average cost of capital is inconsistent with the

10   economic principle that economic costs are forward looking and market

11   based, not backward looking and accounting based and also

12   inconsistent with the economic principle that UNE rates should send

13   correct economic signals to promote facilities-based competition.

14

15 Q. IN SUM, THEN, WHAT IS THE PROPER DEFINITION OF THE

16   AVERAGE COST OF CAPITAL FOR USE IN VERIZON FLORIDA'S

17   FORWARD-LOOKING COST STUDIES?

18 A. The Act removes all barriers to entry in the local exchange market and

19   opens the market to full competition. In a competitive market for local

20   exchange service, forward-looking economic cost is the appropriate cost

21   benchmark for forward-looking cost studies. Furthermore, the FCC has

22   determined that forward-looking economic costs should approximate the

23   costs the incumbent LEC would incur in a competitive market for UNEs

24   and reflect the risks of reconstructing the local network using the most

25   efficient available technology each time rates are reset.

1   Thus, for use in Verizon Florida's forward-looking economic cost

2   studies, the average cost of capital should be defined in terms of the

3   market costs of debt and equity, the market values of debt and equity in

4   the company's capital structure, and investors' expectations regarding

5   the future risk of investing in Verizon Florida under the TELRIC

6   standard. This is the only definition of the average cost of capital that is

7   consistent with the underlying assumptions of Verizon Florida's forward-

8   looking cost studies.

9

10   IV.   RISK

11   A. RISK IMPLIED BY THE FCC'S TELRIC COST STANDARD

12   Q.   HOW DOES THE FCC'S TELRIC STANDARD AFFECT THE

13   APPROPRIATE VIEW OF INVESTMENT RISK USED TO ESTIMATE

14   THE COST OF CAPITAL COMPONENT OF TELRIC COST STUDIES?

15   A.   The FCC's TELRIC standard affects the appropriate view of investment

16   risk in several ways. First, the FCC has specifically stated that its cost

17   standard should produce rates that "approximate what the incumbent

18   LEC would be able to charge if there were a competitive market for such

19   offerings." Firms in a fully competitive environment would certainly face

20   higher investment risk and higher costs of capital than firms in a less

21   competitive environment.

22

23   Second, the FCC has stated that its TELRIC standard should reflect the

24   forward-looking investment and operating costs of reconstructing the

25   incumbent LEC's telecommunications network using the most efficient

37

1   available technology each time rates are set. If UNE rates are reset

2   every four or five years to reflect the supposedly lower cost of

3   reconstructing and operating Verizon Florida's network using a more

4   efficient technology, but Verizon Florida is required to depreciate its

5   investment over an average period exceeding 22 years, Verizon Florida

6   will earn a return on its investment that is significantly less than its

7   market cost of capital.

8

9   Third, Verizon Florida's investment in the facilities required to provide

10   UNEs is generally long lived and largely sunk once the investment is

11   made. Yet there is nothing in the UNE lease contract that requires the

12   CLEC to lease UNEs at fixed rates for the life of the network. Indeed,

13   the typical lease contract gives the CLEC the option to either cancel its

14   lease and build its own facilities or renew its lease at lower rates each

15   time rates are reset. In addition, the CLEC has this option on an on-

16   going basis every month. The risk that the CLEC will either cancel its

17   lease for network facilities entirely or renew its lease at lower lease

18   payments after Verizon Florida has made a significant fixed investment

19   to construct its network must be considered when estimating the cost of

20   capital component for use in TELRIC cost studies.

21

22   Fourth, state commissions have frequently used the TELRIC standard

23   as a justification for using highly optimistic assumptions in UNE cost

24   studies. For example, UNE cost studies are frequently based on the

25   assumption that the ILEC will not lose any customers if CLECs build

38

1   their own facilities and that the ILEC will be able to achieve large switch

2   discounts on every switch when it reconstructs its network from scratch.

3   Since these assumptions are unrealistic, the ILEC faces the likelihood

4   that its return on investment will be less than its cost of capital.

5

6 Q. **IS IT POSSIBLE TO HAVE "COMPETITIVE MARKET" RATES IF THE**

7   **EXPENSE AND INVESTMENT COMPONENTS OF UNE COSTS**

8   **REFLECT HIGHLY COMPETITIVE MARKET CONDITIONS, WHILE**

9   **THE DEPRECIATION AND COST OF CAPITAL COMPONENTS**

10   **REFLECT LESS THAN COMPETITIVE MARKET CONDITIONS?**

11 A. No. If the Commission assumes the market is fully competitive when

12   determining the expense and investment components in UNE cost

13   models, but not when determining depreciation rates and the cost of

14   capital, the resulting forward-looking economic cost studies _will not_

15   _replicate_ the results of a competitive market. Indeed, since the

16   resulting forward-looking economic costs would then be less than the

17   costs competitors would face in building their own networks, there would

18   be no incentive for facilities-based competition. Similarly, there would

19   be no incentive for incumbent LECs to continue to invest in and upgrade

20   their networks. Thus, customers would be deprived of the advanced

21   technologies that the authors of the Telecommunications Act

22   envisioned. The FCC recognized the importance of assuming

23   competitive market risk when estimating the cost of capital in its

24   *Triennial Review Order.*

25

1 Q. CAN YOU ILLUSTRATE HOW THE FCC'S TELRIC STANDARD

2   AFFECTS VERIZON FLORIDA'S RISKS OF INVESTING IN THE

3   FACILITIES REQUIRED TO PROVIDE UNES TO CLECS?

4 A. Yes. Suppose that Verizon Florida's initial UNE rates are based on the

5   assumption that Verizon Florida could reconstruct its network by

6   committing to a stream of TELRIC costs, including operating expenses

7   and investment, which have a discounted present value of $8 billion.

8   Since the present value of Verizon Florida's lease revenues must equal

9   the present value of its operating expenses plus investment at the time

10   rates are reset, the present value of Verizon Florida's lease revenues

11   must also be $8 billion.

12

13   Now suppose that a new telecommunications technology appears that

14   would allow Verizon Florida to reconstruct its network once again, at a

15   lower discounted present value of $6 billion.   Under the TELRIC

16   standard, Verizon Florida's UNE rates will be reduced to the level where

17   the present value of Verizon Florida's lease revenues is $6 billion. Of

18   course, Verizon Florida would not find this second reconstruction of its

19   network to be economically attractive because it would incur a large

20   investment just to achieve a small savings in operating expenses.

21   However, since TELRIC rates are based on the FCC's view of the

22   forward-looking economic cost of the most efficient current technology,

23   Verizon Florida's UNE rates will be reduced.   As a result, Verizon

24   Florida will not be able to recover the forward-looking economic cost of

25   the network it was presumed to construct the first time UNE rates were

1   set.

2

3 Q.   **WHAT ARE THE ECONOMIC IMPLICATIONS OF THE FCC'S TELRIC**

4   **STANDARD?**

5 A.   Under the TELRIC standard, the present value of Verizon Florida's

6   lease revenues will almost certainly be less than the present value of

7   Verizon Florida's network expenses and investment. In terms of the

8   previous example, the present value of Verizon Florida's revenues will

9   equal $8 billion if no new lower-cost technology appears, but only $6

10   billion if a new lower cost technology appears.   Yet, once Verizon

11   Florida reconstructs its network the first time, Verizon Florida's costs are

12   fixed at $8 billion.   As shown in Table 3 below, assuming a 50/50

13   probability that a new lower cost technology will appear, the expected

14   value of Verizon Florida's stream of lease payments will equal $7 billion,

15   while its expenses will still be $8 billion.   Thus, the expected (i.e.,

16   probability weighted) present value of Verizon Florida's revenues will be

17   less than the present value of its expenses plus investment.   [The

18   expected value is the probability weighted average of the two outcomes.

19   Thus, the expected PV revenues equals .5(8) + .5(6) = $7B.]

20   **Table 1**

21   **PRESENT VALUE OF LEASE REVENUES AND TELRIC COSTS**

22 **WITH AND WITHOUT ARRIVAL OF NEW LOWER-COST TECHNOLOGY**

Outcome	Probability	PV Revenues	PV Expenses Plus Investment
No new technology	0.5	$8B	$8B
New technology	0.5	$6B	$8B

| 1 | Expected value | $7B | $8B |

2

3 Q. **WHAT DOES YOUR ILLUSTRATION SAY ABOUT VERIZON**

4   **FLORIDA'S INVESTMENT RISK UNDER THE TELRIC STANDARD?**

5 A. The implication of my illustration is that, under the TELRIC standard, the

6   expected present value of Verizon Florida's revenues will be less than

7   the present value of its expenses plus investment. Whenever the

8   present value of revenues is less than the present value of expenses

9   plus investment, a company's return on investment is less than its cost

10   of capital. Thus, Verizon Florida's investment risk is high under the

11   TELRIC standard.

12

13 Q. **DO UNREGULATED COMPANIES IN COMPETITIVE MARKETS**

14   **ALSO FACE THE RISK THAT THEIR RETURNS ON INVESTMENT**

15   **WILL BE LESS THAN THEIR COST OF CAPITAL?**

16 A. Yes. Competitive companies always face some risk that their returns on

17   investment will be less than their costs of capital. However, unregulated

18   competitive companies also have a significant probability that they will

19   earn a return on investment that *exceeds* their cost of capital.

20   Moreover, unlike Verizon Florida, unregulated competitive companies

21   are free to set prices that reflect realistic assumptions regarding

22   investment, expenses, and depreciation, and realistic estimates of the

23   risks and costs of technological change. In addition, competitive

24   companies can use realistic demand forecasts and, if those forecasts

25   are exceeded, their revenues will be higher than expected. And

42

1   unregulated competitive companies do not have an obligation to provide

2   facilities to competitors under cancelable leases that by design are

3   intended to facilitate the transition by those competitors to alternative

4   facilities or technologies. Unregulated competitive companies will not

5   undertake investments when the expected rate of return on investment

6   is less than their cost of capital.

7

8 Q. **WHY IS THE RISK OF INVESTING IN THE FACILITIES NECESSARY**

9   **TO PROVIDE UNES UNDER THE TELRIC STANDARD GREATER**

10   **THAN THE RISK OF INVESTING IN THE AVERAGE COMPETITIVE**

11   **COMPANY?**

12 A. The risk of investing in the facilities required to provide UNEs under the

13   TELRIC standard is greater than the risk of investing in the average

14   competitive company because: (1) TELRIC rates are initially set to

15   recover investments over a long time frame, but rates are re-set every

16   few years in order to reflect the supposedly lower costs of building a

17   new network using the latest available technology; (2) TELRIC rates are

18   based on idealized economic assumptions that are often unachievable

19   in the real world; (3) TELRIC rates are based on the unrealistic

20   assumption that the telecommunications network can be reconstructed

21   each time a new technology appears and companies incur no costs in

22   transitioning to new technologies; and (4) TELRIC rates do not reflect

23   the higher costs and risks of making large sunk investments in network

24   facilities when customers have the option to either build their own

25   facilities or renew their lease of network facilities at lower rates

43

1   whenever new lower-cost technologies become available.

2

3   Q. HOW CAN THE COMMISSION SET RATES SO AS TO ALLOW THE

4   TELECOMMUNICATIONS COMPANY UNDER THE TELRIC

5   STANDARD TO HAVE THE OPPORTUNITY TO EARN ITS

6   WEIGHTED AVERAGE COST OF CAPITAL OVER TIME?

7   A. The Commission must use a cost of capital input in UNE cost models

8   that reflects the additional regulatory risk of operating under the TELRIC

9   standard. Such a cost of capital would of course be greater than the

10   average competitive market cost of capital because competitive

11   companies do not face the additional risk of regulation under the

12   TELRIC standard.

13

14 Q. WHY IS REGULATORY RISK AN IMPORTANT ISSUE IN THIS

15   PROCEEDING?

16 A. Regulatory risk is an important issue because the TELRIC standard

17   greatly increases the risk that Verizon Florida will be unable to earn a

18   fair rate of return on its investment in network facilities. [In the *Hope*

19   *Natural Gas Case*, the U.S. Supreme Court defined a fair rate of return

20   as a return that is "commensurate with returns on investments in other

21   enterprises having corresponding risks." *Federal Power Comm'n v.*

22   *Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944).] If Verizon Florida is

23   not compensated for regulatory risk, it will have no incentive to invest in

24   network facilities, and CLECs will have the incorrect incentive to lease

25   UNEs from Verizon Florida, even if they could construct and operate

44

1   telecommunications facilities more efficiently than Verizon Florida.

2

3   Q.   HAS THE FCC ITSELF RECOGNIZED THAT THE REGULATORY

4   RISK OF THE UNE COST MODEL MUST BE CONSIDERED WHEN

5   ESTIMATING THE COST OF CAPITAL COMPONENT OF UNE COST

6   STUDIES?

7   A.   Yes. In its reply brief filed in the TELRIC cases before the Supreme

8   Court, the FCC stated that "an appropriate cost of capital determination

9   takes into account not only existing competitive risks...but also *risks*

10   *associated with the regulatory regime to which a firm is subject.*"

11   [Reply Brief for Petitioners United States and the Federal

12   Communications Commission, *Verizon Communications Inc. v. FCC*,

13   (Nos. 00-511, 00-555, 00-587), 00-590, 00-602) at 22 ("FCC Reply

14   Brief").]

15

16 Q.   HAS THE U. S. SUPREME COURT ALSO ACKNOWLEDGED THAT

17   REGULATORY RISK MUST BE CONSIDERED IN ESTIMATING THE

18   COST OF CAPITAL FOR USE IN RATEMAKING?

19 A.   Yes. In the *Duquesne* decision, the U.S. Supreme Court explicitly

20   recognizes that regulatory risk should be considered in setting the cost

21   of capital for use in ratemaking:

22   The loss to utilities from prudent but ultimately

23   unsuccessful investments under such a system is greater

24   than under a pure prudent investment rule, but less than

25   under a fair value approach. Pennsylvania's modification

45

1   slightly increases the overall risk of investments in utilities

2   over the pure prudent investment rule. *Presumably the*

3   *PUC adjusts the risk premium element of the rate of return*

4   *on equity accordingly.* [*Duquesne Light Co. v. Barasch,*

5   488 U.S. 299, 311-12, (1989) (emphasis added).]

6

7   **B.   THE REGULATORY RISK OF THE TELRIC STANDARD**

8   **IS NOT COMPENSATED IN THE MARKET COST OF**

9   **CAPITAL**

10   Q.   **IS THE REGULATORY RISK OF THE TELRIC STANDARD ALREADY**

11   **INCLUDED IN MARKET ESTIMATES OF THE COST OF CAPITAL?**

12   A.   No. The market cost of capital is estimated from models, such as the

13   DCF, that are incapable of considering the regulatory risk that arises

14   when customers have the option to cancel their lease contract at any

15   time.   Indeed, Professors Black and Scholes developed their world-

16   famous Black Scholes option pricing model specifically because

17   traditional valuation models fail to reflect the economics of investments

18   that involve real options.

19

20   Q.   **WHY DO TRADITIONAL VALUATION MODELS FAIL TO REFLECT**

21   **THE ECONOMICS OF INVESTMENTS THAT INVOLVE REAL**

22   **OPTIONS?**

23   A.   An option gives an investor the right, but not the obligation, to make

24   decisions at a later time, that may increase the investor's return on

25   investment.   Examples of such options include the option to cancel

1   lease payments when lower cost alternatives become available, the

2   option to expand investment if initial results are favorable, the option to

3   abandon if initial results are unfavorable, and the option to delay

4   investment until a later time. In contrast, market cost of capital models

5   are based on the assumption that investors have no ability to make

6   follow-on decisions once their investment is made. Since an option to

7   make follow-on decisions that enhance the return on investment is

8   valuable, and market cost of capital models do not allow for these

9   options, these models do not reflect the risks associated with decisions

10   involving real options such as the CLECs' option to either build their own

11   facilities or renew their lease of UNEs at lower rates.

12

13   **Q.   DO FINANCE PROFESSIONALS RECOGNIZE THAT TRADITIONAL**

14   **COST OF CAPITAL MODELS, SUCH AS THE DCF, FAIL TO**

15   **ACCOUNT FOR THE VALUE AND RISK OF OPTION CONTRACTS?**

16   A.   Yes. In their text, *Principles of Corporate Finance*, 6th edition, Brealey

17   and Myers state at p. 622:

18   Discounted cash flow (DCF) implicitly assumes that firms

19   hold real assets passively. It ignores the options found in

20   real assets—options that sophisticated management can

21   act to take advantage of. You could say that DCF does not

22   reflect the value of management.

23

24   Remember that the DCF valuation method was first

25   developed for bonds and stocks. Investors in these

1   securities are necessarily passive: with rare exceptions,

2   there is nothing investors can do to improve the interest

3   rate they are paid or the dividends they receive.   A bond

4   or common stock can be sold, of course, but that merely

5   substitutes one passive investor for another.

6

7   Options and securities which contain options, such as

8   convertible bonds, are fundamentally different.   Investors

9   who hold options do not have to be passive.   They are

10   given a right to make a decision, which they can exercise

11   to capitalize on good fortune or to mitigate loss. This right

12   clearly has value whenever there is uncertainty. However,

13   calculating that value is not a simple matter of discounting.

14   Option pricing theory tells us what the value is, but the

15   necessary formulas do not look like DCF.

16   Although the Brealey-Myers' argument was made in the context of

17   valuing internal investment projects, their argument also applies to stock

18   investments because the net cash flows available to stock investors are

19   simply the sum of the net cash flows from all of the firm's internal

20   investment projects. Thus, if the DCF equation cannot be used to value

21   internal investment projects in the presence of real options, it cannot be

22   used to value the net cash flows to investors in the presence of real

23   options. If the DCF or CAPM methods are used in the presence of real

24   options, the resulting cost of equity will always be understated.

1   **C. RISK IMPLIED BY ACTUAL COMPETITIVE MARKET**

2   **CONDITIONS**

3   Q. **WHAT ARE THE PRIMARY RISKS VERIZON FLORIDA FACES**

4   **WHEN IT INVESTS IN THE FACILITIES REQUIRED TO PROVIDE**

5   **UNES TO CLECS?**

6   A. Verizon Florida faces the risks associated with operating leverage,

7   demand uncertainty, technological change, regulation, and the

8   cancelable nature of the lease contract with CLECs.

9

10 Q. **WHAT IS OPERATING LEVERAGE?**

11 A. Operating leverage refers to the relationship between the company's

12   revenues, on the one hand, and the company's fixed and variable costs

13   on the other. The provision of facilities-based telecommunications

14   services is a business that requires a large commitment to fixed costs in

15   relation to variable costs, a situation called high operating leverage. The

16   relatively high degree of fixed costs in the provision of facilities-based

17   telecommunications service exists because of the average LEC's large

18   investment in fixed assets such as central office, transport, and loop

19   facilities. High operating leverage causes Verizon Florida's net income

20   to be highly sensitive to fluctuations in revenues. There is a positive

21   correlation between operating leverage and risk: as operating leverage

22   rises, so does the risk of operation.

23

24 Q. **IS THE DEMAND FOR TELECOMMUNICATIONS SERVICES**

25   **RELATIVELY CERTAIN?**

49

1 A. No. The demand for telecommunications services is becoming

2   increasingly uncertain as a result of its sensitivity to the general level of

3   economic activity and increased competition. In addition, the TELRIC

4   standard requires that Verizon Florida's rates for UNEs approximate the

5   rates Verizon Florida would be able to charge in a competitive market

6   for UNEs. Thus, the demand for telecommunications services is highly

7   uncertain under the TELRIC regulatory regime.

8

9 Q. **WHAT IS THE CURRENT STATUS OF COMPETITION IN THE**

10   **LOCAL EXCHANGE MARKET IN FLORIDA?**

11 A. First, it should be noted that, as discussed previously, the FCC has

12   clarified that application of the TELRIC standard requires the

13   assumption of a competitive market irrespective of the actual state of the

14   market. Nonetheless, actual competition is extensive throughout the

15   local exchange market in Florida. The Florida Commission reports that

16   they have certified 421 CLECs to provide competitive local phone

17   service. Of these, 8 ILECs and 28 CLECs reported to the FCC that they

18   serve a significant number of access of lines in Florida. (Only CLECs

19   that serve more than 10,000 access lines are required to report to the

20   FCC.)

21

22   With regard to access lines, the FCC's Local Competition Report dated

23   December 22, 2004, indicates that the number of CLEC lines in Florida

24   increased from 681,382 in December 1999 to 1,785,001 in June 2004,

25   an increase of 162 percent. During this same period, the number of

1   ILEC lines in Florida decreased from 11,090,801 to 9,633,565, a

2   decrease of 13 percent. As a result of these changes, the percentage of

3   lines served by CLECs increased from 6 percent in December 1999 to

4   16 percent in June 2004. (See Table 2 below.)

5   **Table 2**

6   **Changes in Access Lines Served in Florida by CLECs and ILECs**

7		Dec-99	June-04	Gain/(Loss)
8	ILEC	11,090,801	9,633,565	-13%
9	CLEC	681,382	1,785,001	162%

10

11   Q.   **IN ADDITION TO CLECS, ARE THERE ANY SOURCES OF LOCAL**

12   **EXCHANGE COMPETITION IN FLORIDA?**

13   A.   Yes.   The CLEC access line data noted above understate the true

14   extent of competition in Florida because they exclude the large increase

15   in mobile wireless subscribers, and they also fail to take into account the

16   dramatic increases in the number customers who obtain broadband

17   services from non-ILECs. From December 1999 through June 2004, the

18   number of wireless subscribers increased in Florida from 5,158,079 to

19   11,916,615, an increase of 131 percent. Furthermore, Verizon Florida's

20   local exchange territory in Florida is served by several wireless carriers

21   that provide local and long distance telecommunications services at

22   prices that are very competitive to the prices charged by Verizon Florida.

23   Recent wireless plans offer as many as 1,000 anytime minutes with no

24   long distance charges for as little as $39 per month. Even for customers

25   with modest monthly toll usage, these rates are highly competitive with a

1		package of Verizon Florida's local exchange service and toll service.
2		(Even some years ago, a majority of Florida residents already
3		considered wireless to be a "close substitute" to wireline service,
4		according to the Florida Commission's Annual Report on Competition as
5		of June 30, 2002, "Telecommunications Markets in Florida," pages 7-9.)
6		
7		With regard to broadband services, almost two-thirds of high-speed lines
8		are served by non-ILECs nationwide, and non-ILECs serve a similar
9		percentage of high-speed lines in Florida. Aggressively priced
10		packages of local, long distance, and high-speed data services using
11		VoIP technology are being offered to customers. For example, AT&T is
12		heavily promoting its CallVantage service, which provides unlimited local
13		and long distance calling using VoIP technology, at a monthly price of
14		$29.99. Vonage offers unlimited local, regional, and long distance,
15		including calls to Canada, at a rate of $24.99, and a plan which includes
16		500 minutes of calling to anywhere in the United States and Canada at a
17		monthly rate of $14.99.
18		
19	Q.	HAS VERIZON FLORIDA EXPERIENCED LINE LOSSES IN ITS
20		SERVICE TERRITORIES IN FLORIDA?
21	A.	Yes. From the first quarter of 2002 through June 30, 2004, Verizon
22		Florida lost 10 percent of its business lines and 8 percent of its
23		residence lines in Florida.
24		[http://investor.verizon.com/business/wireline.html.] (See Table 3.)
25		

1   **Table 3**

2   **Changes in Access Lines Served by Verizon Florida in Florida**

3		1Q 2002	3Q 2004	Gain/Loss
4	Business	676,128	604,060	-11%
5	Public	16,463	11,775	-28%
6	Residence	1,708,371	1,574,414	-8%
7	Total	2,400,962	2,190,249	-9%

8

9 Q.   **ARE INVESTORS AWARE OF THE INCREASED COMPETITION IN**

10   **LOCAL EXCHANGE MARKETS?**

11 A.   Yes. There have been numerous discussions in investor reports and

12   articles in the business and financial press regarding increased demand

13   uncertainty in the telecommunications industry. Investors are especially

14   aware of the enormous potential threat to wireline telecommunications

15   demand arising from the introduction of new wireless, VoIP, and cable

16   TV technologies. For example, in a recently published lead article on

17   the implications of VoIP and improved cable technologies for traditional

18   telecommunications companies such as Verizon Florida, *The Wall*

19   *Street Journal* states:

20   In just over a year, one out of every eight households in

21   the Portland, Maine, region has signed up for Internet

22   phone service supplied by Time Warner Inc.'s cable-

23   television unit. For many, the phone jack in the wall that

24   connects to the phone company's network is now just a

25   useless hole. Time Warner is rolling out the same service

1   to millions of consumers nationwide.

2

3   It's one more sign of a telecommunications upheaval that's

4   unfolding at warp speed. And it isn't good news for Bell

5   phone companies such as Verizon Communications Inc.,

6   which through its predecessors has controlled local phone

7   service in the Northeast since the start of the 20th century.

8   Already, Verizon's traditional phone lines are down by nine

9   million, or 16%, since the end of 2000, according to

10   research firm Precursor Group.

11

12   Across the nation, the business models that have worked

13   for decades for Verizon and other phone giants are

14   showing signs of unraveling. The cable industry's push into

15   the phone business and a torrent of innovations such as

16   Internet calling and advanced wireless technology are

17   threatening the foundations of the nation's $300 billion

18   telecom industry.   [Heavy Toll: Phone Industry Faces

19   Upheaval as Ways of Calling Change Fast – Cable,

20   Internet, Wireless Hurt the Value of Old Networks,

21   Threaten a Business Model," *The Wall Street Journal*,

22   August 25, 2004.   Also see "Free for All: Telecom

23   companies are invading one another's turf like never

24   before;" "Here Comes Cable ... and it wants a big piece of

25   the residential phone market;" "Outside the Lines: As their

1		traditional local-phone business slips away, the Bells look
2		for ways to adapt," from "Technology (A Special Report),"
3		*The Wall Street Journal*, September 13, 2004; and "Vision,
4		meet reality," a special report on mobile 3G telecoms, *The*
5		*Economist*, September 4, 2004, pp. 63 – 65.]
6		Similarly, a recent article in *The Economist* concludes that the rapidly
7		increasing migration from traditional networks to VoIP "makes traditional
8		telephone networks obsolete;" makes geography, distance, and time
9		irrelevant; and de-links the previously intertwined components of
10		traditional telephony—access to the network and service. In addition to
11		the dramatic changes in wireline telephony, including VoIP, rapid
12		advances in wireless technologies are increasingly driving voice traffic to
13		wireless networks and displacing voice traffic from fixed wireline
14		networks altogether. Analysts predict that new wireless technologies
15		such as WiMax will become increasingly available to provide broadband
16		access over the airwaves. ("The phone call is dead; long live the phone
17		call: Who wins and who loses as phone calls move on to the internet?,"
18		*The Economist*, December 4, 2004, pp. 61 – 62.)
19		
20	Q.	HOW DOES RAPIDLY CHANGING TECHNOLOGY AFFECT THE
21		RISK OF INVESTING IN TELECOMMUNICATIONS COMPANIES
22		SUCH AS VERIZON FLORIDA?
23	A.	Rapidly changing technology increases the risk of investing in
24		telecommunications companies such as Verizon Florida in two ways.
25		First, it threatens Verizon Florida's ability to recover the investment cost

1		of its new telecommunications plant. Second, it reduces the cost of
2		entry for competitors. Rapid advances in fiber optics, wireless, and
3		multimedia transmission technologies, for example, have shortened the
4		economic lives of Verizon Florida's current investments and have
5		allowed cable TV, interexchange, wireless, and VoIP companies to
6		compete efficiently to offer local exchange service. Advances in these
7		technologies further threaten Verizon Florida's heavy investment in
8		landline telecommunications equipment and facilities.
9		
10	Q.	IS VERIZON FLORIDA ABLE TO COMPETE ON EQUAL TERMS
11		WITH ITS COMPETITORS?
12	A.	No. As the incumbent LEC, Verizon Florida has the unique obligation to
13		incur the large capital expenditures required to provide
14		telecommunications services to customers in Florida. Indeed, under the
15		TELRIC standard, Verizon Florida is assumed to build and operate a
16		telecommunications network, using the most efficient technology, to
17		satisfy the entire demand for telecommunications services.
18		Competitors, on the other hand, are able to serve customers in Florida
19		without necessarily making any investment in network facilities. Thus,
20		Verizon Florida bears the considerable risks associated with a large
21		sunk investment in a telecommunications network, while its competitors
22		are free to enter and exit the market without incurring any fixed or sunk
23		costs. The additional risks Verizon Florida incurs when it makes large
24		sunk investments in the telecommunications network disadvantages
25		Verizon Florida relative to competitors who do not have to invest in

1   network facilities.

2

3   In addition, Verizon Florida has the unique obligation to make significant

4   investments in the technology and software needed to provide

5   unbundled network elements to competitors.   Verizon Florida's

6   competitors, however, have no obligation to lease UNEs from Verizon

7   Florida for more than one month at a time. Indeed, many of Verizon

8   Florida's competitors are in the process of developing their own facilities

9   for providing local exchange service to Verizon Florida's most profitable

10   customers. Thus, Verizon Florida faces the considerable risk that its

11   investments in the technology and software needed to provide

12   unbundled network elements to competitors will not be recovered, and is

13   therefore at an additional cost disadvantage relative to its competitors.

14

15 Q. **HOW DOES REGULATION AFFECT THE RISK OF VERIZON**

16   **FLORIDA?**

17 A. Verizon Florida's UNE rates are regulated under the FCC's TELRIC cost

18   standard, which, as described above, requires Verizon Florida to provide

19   UNEs to its competitors at rates that will likely not permit Verizon Florida

20   an opportunity to recover its investment in network facilities. Thus,

21   regulation greatly increases the risk that Verizon Florida will be unable

22   to earn the competitive market cost of capital that is to be established in

23   this proceeding.

24

25

1   Q.   HOW DOES THE CANCELABLE NATURE OF VERIZON FLORIDA'S

2   LEASE CONTRACT WITH CLECS AFFECT ITS RISK?

3   A.   As a facilities-based provider, Verizon Florida makes large, long-lived,

4   sunk investments in the network facilities required to offer UNEs to

5   CLECs. However, Verizon Florida's forward-looking investment in the

6   network facilities required to offer UNEs to CLECs will not be recovered

7   if CLECs cancel their lease and move to other facilities or cancel their

8   lease and renew at lower rates when rates are reset under the TELRIC

9   standard. Thus, the cancelable nature of the CLECs' contract in a world

10   where rates are determined under the TELRIC standard virtually

11   guarantees that Verizon Florida will not earn a fair rate of return on its

12   investment.

13

14 V.   ESTIMATE OF THE WEIGHTED AVERAGE COST OF

15   CAPITAL FOR USE IN UNE COST STUDIES

16 Q.   HOW DID YOU CALCULATE THE WEIGHTED AVERAGE COST OF

17   CAPITAL THAT YOU RECOMMEND FOR USE IN VERIZON

18   FLORIDA'S FORWARD-LOOKING COST STUDIES?

19 A.   I calculated the weighted average cost of capital to be used in Verizon

20   Florida's forward-looking cost studies in two steps. First, I estimated the

21   competitive market cost of capital by analyzing the market-based

22   percentages of debt and equity in the capital structures of competitive

23   firms, the market cost of debt, and the market-required rate of return on

24   an equity investment in a large sample of companies with less than

25   average risk operating in the competitive market environment required

1   by the FCC's forward-looking economic cost standard.   Second, I

2   estimated the additional return, or risk premium, required to compensate

3   Verizon Florida for the unique risk of having to make large sunk

4   investments in the telecommunications facilities required to provide

5   UNEs, while their customers have the option to cancel their lease

6   contract on a monthly basis.

7

8   **A. TARGET CAPITAL STRUCTURE**

9 Q. **HOW DID YOU DETERMINE AN APPROPRIATE TARGET CAPITAL**

10   **STRUCTURE FOR USE IN VERIZON FLORIDA'S FORWARD-**

11   **LOOKING COST STUDIES?**

12 A. To determine an appropriate target capital structure for use in Verizon

13   Florida's forward-looking cost studies, I examined capital structure data

14   for both my proxy group of S&P Industrials and a group of

15   telecommunications companies with incumbent local exchange

16   subsidiaries.   I examined the most current available data for these

17   companies, and I also reviewed data for the past five years.

18

19 Q. **WHAT ARE THE AVERAGE MARKET VALUE CAPITAL**

20   **STRUCTURES OF THE S&P INDUSTRIALS AND THE**

21   **TELECOMMUNICATIONS COMPANIES WITH INCUMBENT LOCAL**

22   **EXCHANGE OPERATIONS?**

23 A. Table 4 below shows the average year-end market value capital

24   structures of the S&P Industrials and the telecommunications

25   companies, including BellSouth, SBC, and Verizon, for the five-year

1 period 1999 through 2003. These data show that both groups on

2 average generally have market value capital structures that contain 75%

3 or more equity.

<div align="center">

Table 4

Capital Structure of the S&P Industrials

and Telecommunications Companies at Year End

($ in Millions)

</div>

		S&P Industrials			Telecom Companies		
		Market	Total	Percent	Market	Total	Percent
	YE	Value	Debt	Equity	Value	Debt	Equity
11	1999	3,799,210	444,837	90%	349,250	48,260	88%
12	2000	3,490,345	490,609	88%	373,828	76,589	83%
13	2001	3,494,838	628,818	85%	331,916	88,579	79%
14	2002	2,809,641	746,691	79%	244,352	86,872	74%
15	2003	3,410,328	850,720	80%	235,050	74,876	76%
16	Total	17,004,362	3,161,674	84%	1,534,396	375,176	80%

17

18 Q. **DO THE TOTAL DEBT DATA SHOWN IN TABLE 4 INCLUDE**

19 **SHORT-TERM DEBT?**

20 A. No. My proxy companies primarily use short-term debt to finance

21 working capital requirements, including investment in inventories and

22 receivables. Short-term debt is generally not used to finance

23 investments in long-term assets such as Verizon Florida's investment in

24 telecommunications network facilities. In addition, working capital is not

25 included in the investment component of UNE costs. Thus, it would not

1   be appropriate to include short-term debt in the capital structure when

2   calculating the weighted average cost of capital for use in UNE cost

3   studies.

4

5 Q. **WHAT IS YOUR RECOMMENDED CAPITAL STRUCTURE FOR USE**

6   **IN VERIZON FLORIDA'S FORWARD-LOOKING COST STUDIES?**

7 A. I recommend the use of a market value capital structure in forward-

8   looking economic cost studies in Florida because a market value capital

9   structure is the only capital structure that is consistent with the forward-

10   looking economic cost principles adopted by the FCC and this

11   Commission. Market value capital structures are always forward looking

12   because investors look only to the future to determine the value of their

13   stocks and bonds. Unlike a market value capital structure, a book value

14   capital structure is based on the embedded or historical costs of Verizon

15   Florida's assets. As the FCC states: "Embedded costs are the costs

16   that the incumbent LECs carry on their accounting books that reflect

17   historical purchase prices, regulatory depreciation rates, system

18   configurations, and operating procedures." [*Local Competition Order* ¶

19   632.] Furthermore, the FCC has specifically stated that UNE rates

20   cannot be based on embedded or historical costs. (See, for example,

21   the *Local Competition Order* at ¶ 673: "In this section, we describe this

22   forward-looking, cost-based pricing standard in detail. ...[W]e address

23   potential cost measures that ***must not be included in a TELRIC***

24   ***analysis, such as embedded (or historical) costs.***" (Emphasis

25   added.))

1   As demonstrated by the information provided above in Table 4, a

2   reasonable target market value capital structure for Verizon Florida

3   contains 25% debt and 75% equity. Thus, I recommend that a capital

4   structure containing 25% debt and 75% equity be used to calculate

5   Verizon Florida's weighted average cost of capital.

6

7   **B. COST OF DEBT**

8 Q. **HOW DID YOU MEASURE THE MARKET COST OF DEBT**

9   **INVESTMENTS?**

10 A. I used the 6.15% average yield to maturity on Moody's A-rated industrial

11   bonds for April 2004, as reported in the Mergent Bond Record. This

12   estimate is conservative because it does not include the flotation costs

13   that must be paid to issue the debt securities required to finance the

14   building of local exchange facilities on a forward-looking basis.

15

16 Q. **DID YOU INCLUDE THE INTEREST RATE ON SHORT-TERM DEBT**

17   **IN YOUR ESTIMATE OF THE MARKET COST OF DEBT FOR USE IN**

18   **UNE COST STUDIES?**

19 A. No. As noted above, short-term debt should not be included in the

20   capital structure component of the cost of capital used in UNE cost

21   studies because Verizon Florida uses short-term debt primarily to

22   finance working capital, and working capital is not included in the

23   investment component of UNE cost studies.

24

25   **C. COST OF EQUITY**

1   Q.   **HOW DID YOU MEASURE THE MARKET COST OF AN EQUITY**

2   **INVESTMENT IN VERIZON FLORIDA?**

3   A.   I applied the DCF Model to the S&P Industrials.

4

5   Q.   **WHY DID YOU APPLY THE DCF MODEL TO THE S&P**

6   **INDUSTRIALS?**

7   A.   A proper definition of the cost of capital for use in Verizon Florida's

8   forward-looking cost studies is based on the assumption that the market

9   for local exchange services is competitive. As previously noted, the

10   FCC stated in the *Local Competition Order* that it sought to establish

11   UNE pricing rules that simulate conditions in a competitive marketplace.

12   In the *Triennial Review Order*, the FCC reiterated its intention that the

13   cost of capital in UNE cost studies must reflect the risks of operating in

14   competitive markets. However, at the present time, there are no

15   publicly-traded companies that have built telecommunications networks

16   solely for the purpose of providing unbundled network elements in a

17   competitive market. Since the S&P Industrials are a large, well-known

18   sample of publicly- traded companies operating in competitive markets, I

19   believe the S&P Industrials are the best available proxy for determining

20   the cost of capital component of UNE cost studies.

21

22   Q.   **HOW DOES THE FORWARD-LOOKING RISK OF INVESTING IN THE**

23   **FACILITIES REQUIRED TO PROVIDE UNBUNDLED NETWORK**

24   **ELEMENTS UNDER THE TELRIC STANDARD COMPARE TO THE**

25   **FORWARD-LOOKING RISK OF INVESTING IN THE S&P**

1   INDUSTRIALS?

2 A.   The forward-looking risk of investing in the facilities required to provide

3   unbundled network elements in Florida under the TELRIC standard is

4   significantly greater than the forward-looking risk of investing in the S&P

5   Industrials. As I noted above, the risk of investing in the facilities to

6   provide unbundled network elements depends on operating leverage,

7   demand uncertainty, rapidly changing technology, the regulatory

8   environment, and the nature of the contract between the firm and its

9   customers. The degree of operating leverage required to provide

10   facilities-based telecommunications services far exceeds the average

11   degree of operating leverage required to provide the goods and services

12   offered by companies in the S&P Industrials because the average

13   industrial company has a much lower investment in long-term fixed

14   assets than the average telecommunications company.

15

16   The demand for telecommunications services is also becoming

17   increasingly uncertain as competitors attract customers by offering

18   comparable service at lower rates and new technologies allow

19   customers to bypass wireline networks. On a forward-looking basis,

20   demand uncertainty in the telecommunications industry is equal to that

21   of the S&P Industrials.

22

23   In addition, Verizon Florida faces a regulatory environment that requires

24   it to provide UNEs to its competitors at rates that very likely will not allow

25   it to cover the cost of its investment in network facilities, including the

1   cost of capital. I am unaware of any companies in the S&P Industrials—

2   with the exception of the ILECs—that are required to provide services to

3   their competitors at below-cost rates so that these competitors can

4   directly compete in the same retail markets.

5

6   Furthermore, the lease contract between Verizon Florida and its

7   competitors requires that Verizon Florida make large sunk investments

8   to build telecommunications network facilities while its competitors are

9   able to cancel their UNE lease contract with Verizon Florida at any time

10   or renew their lease at lower rates when rates are reset. The financial

11   community recognizes that cancelable operating leases are significantly

12   more risky for the lessor than non-cancelable financial leases. These

13   factors—high operating leverage, demand uncertainty, rapidly changing

14   technology, the regulatory environment, and the cancelable nature of

15   the CLECs' operating lease—make the risk of investing in the facilities

16   required to provide unbundled network elements greater than the risk of

17   investing in the S&P Industrials.

18

19   Finally, wireline telecommunications is a high-technology business that

20   is particularly sensitive to the risks of rapidly changing technology.

21   Indeed, advances in broadband and wireless technologies raise the

22   possibility that a major portion of telecommunications traffic will bypass

23   the ILECs' wireline networks altogether. At the least, Verizon Florida

24   faces the prospect of investing millions of dollars in new

25   telecommunications technologies that may later be superseded by more

1		advanced technologies. The forward-looking technology risk of
2		investing in the facilities to provide unbundled network elements
3		certainly exceeds the technology risk of the average company in the
4		S&P Industrials.
5		
6	Q.	HAVE YOU INCLUDED THESE DIFFERENCES IN RISK IN YOUR
7		ESTIMATE OF VERIZON FLORIDA'S COST OF CAPITAL?
8	A.	In general, I have not attempted to quantify the differences in risk in my
9		estimate of Verizon Florida's cost of capital. I identify these differences
10		here to indicate that my estimate of Verizon Florida's cost of capital is
11		conservative. However, as described below, I have quantified one
12		element of the differences in risk, namely, the differential risk arising
13		from the CLEC's option to cancel their lease contract with Verizon
14		Florida or to renew at lower rates when rates are reset.
15		
16	Q.	WHAT DCF RESULT DID YOU OBTAIN FROM YOUR APPLICATION
17		OF THE DCF MODEL TO THE S&P INDUSTRIALS?
18	A.	As shown in Attachment A, I obtained a market-weighted average DCF
19		cost of equity of 13.46% for the S&P Industrials.
20		
21		D. WEIGHTED AVERAGE COST OF CAPITAL
22	Q.	WHAT IS YOUR ESTIMATE OF VERIZON FLORIDA'S OVERALL
23		WEIGHTED AVERAGE COST OF CAPITAL, WITHOUT
24		CONSIDERING THE UNIQUE RISKS OF THE UNE REGULATORY
25		AND OPERATING ENVIRONMENT?

1	A.		I estimate Verizon Florida's overall weighted average cost of capital,
2			without considering the unique risks of the UNE regulatory and
3			operating environment, to be 11.64%. This estimate is based on a
4			6.15% market cost of debt, a target market value capital structure
5			containing 25% debt and 75% equity, and a cost of equity of 13.46%
6			(see Table 5).

7

Table 5

8

Weighted Average Cost of Capital

9

Using 25% Debt/75% Equity Capital Structure

	Source of Capital	Cost Rate	Percent	Weighted Cost
10				
11	Debt	6.15%	25.00%	1.54%
12	Equity	13.46%	75.00%	10.10%
13	Weighted Average Cost of Capital			11.64%

14

15 **E. REQUIRED RISK PREMIUM**

16 Q. HAVE YOU BEEN ABLE TO QUANTIFY THE IMPACT OF THE FCC'S

17   TELRIC STANDARD ON THE APPROPRIATE COST OF CAPITAL

18   FOR USE IN UNE COST STUDIES?

19 A. Yes. I have been able to estimate the risk premium Verizon Florida

20   requires to compensate for the risk of providing UNEs under the TELRIC

21   standard, rather than under the simple competitive market standard I

22   assumed when I prepared my 11.64% estimate of the appropriate cost

23   of capital for use in UNE cost studies. However, this estimate is

24   conservative because some risks are still not captured by my risk

25   premium analysis.

1 Q. HOW DID YOU ESTIMATE THIS REQUIRED RISK PREMIUM?

2 A. I estimated this required risk premium by: (1) recognizing the difference

3 between a non-cancelable financial lease and a cancelable operating

4 lease; (2) obtaining data from Verizon Florida on its forward-looking

5 investment, operating expenses, and depreciation for the network

6 required to provide UNEs in Florida; (3) using a standard methodology

7 for valuing the CLECs' option to cancel their lease one month at a time;

8 and (4) comparing the required rate of return on a financial lease for

9 Verizon Florida's network to the required rate of return on a cancelable

10 operating lease for this network.

11

12 Q. WHAT IS THE DIFFERENCE BETWEEN A NON-CANCELABLE

13 FINANCIAL LEASE AND A CANCELABLE OPERATING LEASE?

14 A. The financial literature distinguishes two types of leases. The financial

15 lease is a long-term, non-cancelable, fixed rate lease, whose term is

16 approximately equal to the expected economic life of the leased

17 property. The fixed lease payments in a financial lease contract must be

18 sufficient to cover the original cost of the property, as well as the

19 operating expenses. The operating lease, on the other hand, is a

20 cancelable lease, that has an expected term much less than the

21 expected economic life of the leased property. Under the operating

22 lease, the lessee has the option to cancel the lease at short notice. The

23 cancellation feature of the operating lease increases the risk that

24 revenues will be insufficient to allow the lessor to pay operating

25 expenses and earn a fair rate of return on investment. The lease

1		payments on an operating lease must therefore be larger than the lease
2		payments on a financial lease to compensate for this additional risk.
3		
4	Q.	WHY IS THE DISTINCTION BETWEEN A NON-CANCELABLE
5		FINANCIAL LEASE AND A CANCELABLE OPERATING LEASE
6		IMPORTANT FOR THE PURPOSE OF ESTIMATING THE
7		APPROPRIATE COST OF CAPITAL FOR USE IN UNE COST
8		STUDIES?
9	A.	The distinction is important because the typical UNE contract under the
10		TELRIC standard is a cancelable operating lease rather than a non-
11		cancelable financial lease, and Verizon Florida's investment risk is
12		significantly higher for a cancelable operating lease than for a non-
13		cancelable financial lease. If the Commission does not properly
14		recognize the higher risk Verizon Florida faces under the TELRIC
15		standard because CLECs can renew their leases at lower rates
16		whenever new technologies become available, UNE rates will not send
17		correct economic signals to market participants. In particular, CLECs
18		will be encouraged to lease UNEs rather than build their own facilities,
19		even if they could build and operate a telecommunications network more
20		efficiently than the incumbent LEC, and the incumbent will have no
21		incentive to make additional investments in the network. Thus, the
22		goals of the Telecommunications Act—to encourage real competition for
23		telecommunications service and investment in new technologies and
24		services—will not be achieved.
25		

1 Q. **WHY DO CANCELABLE OPERATING LEASES INVOLVE**
2   **SIGNIFICANTLY HIGHER RISK FOR VERIZON FLORIDA?**

3 A. Verizon Florida's network investment is large, long-lived, and largely

4   sunk once the investment is made. If CLECs are able either to cancel

5   their lease altogether or renew at lower rates whenever new, lower-cost

6   technologies become available, Verizon Florida's revenues will decline,

7   but its investment and operating expenses will remain the same. Thus,

8   under the UNE regime and TELRIC standard, the risk that Verizon

9   Florida will not be able to earn a fair return on its investment is very

10   high. Indeed, it is fair to say that under the UNE regime and TELRIC

11   standard, Verizon Florida is virtually certain to earn a rate of return on

12   investment that is significantly less than its market cost of capital.

13

14 Q. **DOES YOUR REGULATORY RISK PREMIUM DEPEND ENTIRELY**
15   **ON THE POSSIBILITY THAT CLEC CUSTOMERS WILL LEAVE**
16   **VERIZON FLORIDA'S NETWORK AFTER THEY BUILD THEIR OWN**
17   **FACILITIES?**

18 A. No. Verizon Florida faces considerable residual value risk under the

19   TELRIC standard whether or not CLEC customers continue to lease

20   Verizon Florida's facilities. In practice, the TELRIC standard has been

21   applied to periodically reset rates at successively lower prices based on

22   state commissions' views of the costs of a hypothetical network using

23   the most efficient technology currently available. Under this standard,

24   Verizon Florida suffers an economic loss every time rates are reset to

25   reflect a new lower cost technology, even if all CLEC customers

1   continue to be served from Verizon Florida's facilities. Thus, Verizon

2   Florida faces a significant risk of earning less than its cost of capital

3   under the TELRIC standard whether or not competitors build their own

4   facilities. The cost of capital premium for TELRIC risk is associated with

5   the CLEC's option to obtain network services at a lower cost every time

6   a new technology arrives and rates are lowered.

7

8 Q.   **DO FINANCIAL MARKET PARTICIPANTS RECOGNIZE THAT**

9   **CANCELABLE OPERATING LEASES INVOLVE SIGNIFICANTLY**

10   **HIGHER RISK THAN NON-CANCELABLE FINANCIAL LEASES?**

11 A.   Yes.   The higher risk of cancelable operating leases is widely

12   recognized in the financial community. Examples of such recognition

13   include:

14   • Car lessors require significantly higher monthly lease payments on

15   short-term operating leases than on longer-term financial leases.

16   • Wireless service providers offer lower rates for customers who are

17   willing to sign longer-term contracts.

18   • Independent power producers can only obtain financing to build new

19   electric generation facilities if they can prove they have long-term

20   purchase power agreements with utilities that commit utilities to

21   purchasing power from the IPP at fixed rates over the life of the

22   generation facilities. Without such agreements, the risks of building

23   new generation facilities are simply too high to justify investment.

24   • Bond rating agencies consider interstate pipeline companies to have

25   lower business risk if they have long-term, fixed-rate contracts for

71

1   pipeline capacity.

2

3   Q.   WHY DOESN'T VERIZON FLORIDA ENCOURAGE ITS CUSTOMERS

4   TO SIGN LONG-TERM FINANCIAL LEASE CONTRACTS RATHER

5   THAN SHORT-TERM OPERATING LEASE CONTRACTS FOR

6   TELECOMMUNICATIONS SERVICES?

7   A.   Verizon Florida can only encourage its customers to sign long-term

8   financial lease contracts by offering them a discount from current UNE

9   rates. However, Verizon Florida cannot reasonably be expected to offer

10   discounts for longer-term leases if the additional risk premium for

11   shorter-term leases is not reflected in the cost of capital input used in

12   UNE cost studies. One objective of my testimony is to rectify the

13   situation where a cost of capital appropriate only for long-term leases is

14   applied to short-term leases.

15

16 Q.   CAN YOU PROVIDE ANY REAL WORLD EXAMPLES OF THE RISKS

17   OF   MAKING   HUGE   FIXED   INVESTMENTS   IN   A

18   TELECOMMUNICATIONS   NETWORK   WHEN   DEMAND   IS

19   UNCERTAIN AND TECHNOLOGICAL CHANGE IS RAPID?

20 A.   Yes. Over the last several years, companies such as WorldCom, Global

21   Crossing, Qwest, Teligent, Allegiance, Covad, Rythms, Level 3,

22   Metromedia Fiber Network, Williams Communications, McLeodUSA and

23   others   have   invested   billions   of   dollars   in   constructing

24   telecommunications networks both here and abroad. These companies

25   have found that telecommunications demand was not as large as they

1		had originally forecast, and advances in technology may soon make
2		some parts of their networks obsolete. As a result, these companies
3		have lost anywhere from 80% to 100% of their market value as investors
4		have come to realize that these networks were built on overly optimistic
5		demand and cost forecasts. The companies and their investors are now
6		aware of the enormous risk of making high-cost, fixed investments in
7		new telecommunications technology.
8		
9	Q.	WHAT METHODOLOGY DID YOU USE TO VALUE THE CLECS'
10		ABILITY TO CANCEL OR RENEW THEIR UNE LEASE AT LOWER
11		RATES?
12	A.	I used the binomial option pricing methodology described in an article by
13		Copeland and Weston, "A Note on the Evaluation of Cancellable
14		Operating Leases," published in the Summer 1982 issue of *Financial*
15		*Management* and provided as Attachment B. This methodology is
16		widely employed by financial analysts to value the options that are
17		traded in financial markets and is more flexible than its predecessor, the
18		Black-Scholes model. It is based on the assumptions that (1) the value
19		of the underlying asset can either increase or decrease at discrete
20		points in time, and (2) lessees can exercise the option to renew the
21		lease at lower rates or cancel altogether once they observe the new
22		value of the underlying asset. In the context of my analysis of regulatory
23		risk, the binomial option pricing methodology is conservative because it
24		assumes that the value of the network can either increase or decrease,
25		whereas, under TELRIC, the value of the network is likely only to

1   decrease as new lower-cost technologies become available.

2

3 Q.   DOES YOUR METHODOLOGY APPLY EVEN IF THE CLECS
4   CONTINUE TO LEASE UNES FROM VERIZON FLORIDA AND
5   NEVER BUILD THEIR OWN NETWORK FACILITIES?

6 A.   Yes. Under the TELRIC standard, CLECs are able to achieve the
7   benefits of new lower cost technologies whether or not they choose to
8   build their own facilities. If CLECs continue leasing UNEs, my
9   methodology can best be thought of as a way to estimate the value
10   CLECs receive by having the option to renew their lease at a lower
11   lease payment whenever rates are reset.

12

13 Q.   PLEASE DESCRIBE IN MORE DETAIL YOUR METHODOLOGY FOR
14   CALCULATING THE REGULATORY RISK PREMIUM ASSOCIATED
15   WITH THE UNE REGIME AND THE TELRIC STANDARD.

16 A.   I estimated this regulatory risk premium in several steps. First, I used
17   the same forward-looking investment, operating expenses, depreciation,
18   and asset lives presented by Verizon Florida in this proceeding.

19

20   Second, I calculated the minimum lease payments that would allow
21   Verizon Florida to recover the TELRIC cost of its network investment,
22   pay its operating expenses and taxes, and earn a fair rate of return on
23   its network investment under the assumption that CLECs cannot renew
24   at lower rates or cancel their lease of network facilities. In short, the
25   lease payments in this step were calculated as if the CLECs' lease

74

1   contract with Verizon Florida were a financial lease rather than an

2   operating lease.

3

4   Third, I calculated the market value of the CLECs' option to renew their

5   lease at lower rates using the binomial option pricing methodology noted

6   above and described in the Copeland and Weston article provided in

7   Attachment B.

8

9   Fourth, using the value of the CLECs' option as an input, I calculated the

10   minimum lease payment that would allow Verizon Florida an opportunity

11   to recover the forward-looking cost of its network investment, pay its

12   operating expenses and taxes, and earn a fair rate of return on its

13   network investment when regulators periodically lower UNE rates to

14   reflect the cost of new, lower-cost technologies and CLECs can renew

15   their lease contract at these lower rates.

16

17   Finally, from this information, I calculated the regulatory risk premium

18   required to compensate Verizon Florida for some of the additional risk

19   they incur under the UNE regime and the TELRIC standard.

20

21 Q. PLEASE DESCRIBE THE DATA YOU OBTAINED FROM VERIZON

22   FLORIDA.

23 A. The data I obtained from Verizon Florida are shown in Attachment C.

24   The data show that Verizon Florida would have to invest approximately

25      $3.7 billion to reconstruct its telecommunications network in Florida

1			using the most efficient technology currently available, that its annual
2			operating expenses would be approximately $205 million, and that the
3			average life of this network would be approximately 22 years.
4			

5 Q. HOW DID YOU CALCULATE THE MINIMUM LEASE PAYMENTS

6   THAT WOULD ALLOW VERIZON FLORIDA TO RECOVER THE

7   TELRIC COST OF ITS NETWORK INVESTMENT, PAY ITS

8   OPERATING EXPENSES AND TAXES, AND EARN A FAIR RATE OF

9   RETURN ON ITS NETWORK INVESTMENT, UNDER THE

10   ASSUMPTION THAT THE CLECS SIGN A NON-CANCELABLE

11   FINANCIAL LEASE FOR THE USE OF VERIZON FLORIDA'S

12   NETWORK FACILITIES?

13 A. I calculated the lease payments by equating the present value of the

14   cash inflows under the lease to the present value of Verizon Florida's

15   cash outflows for investments, operating expenses, and taxes.

16   Specifically, the calculation of the lease payments was made using the

17   equation:

18

$$I = \sum_{t=1}^{T} \frac{(1-\tau_c)(L_t - O_t) + \tau_c D_t}{(1 + ATWACC)^t} + \frac{MV}{(1 + ATWACC)^T} \quad (1)$$

19   where:

20   I   —   investment in the network on total network

21   basis,

22   τ_c =   composite corporate tax rate,

23   L_t =   monthly lease payment,

24   D_t =   monthly depreciation amount,

25   O_t =   monthly operating expense,

1		T	=	number of months in life of asset,
2		MV	=	salvage value of asset, and
3		ATWACC	=	after-tax weighted average cost of capital.

4

5 Using the data shown in Attachment C and my estimate of Verizon

6 Florida's after-tax weighted average cost of capital, Equation (1) can be

7 solved for the unknown monthly lease payments, L_t. [The after-tax

8 weighted average cost of capital reflects the tax deductibility of interest.

9 Thus, for example, if the interest rate is 7% and the tax rate is 50%, the

10 after-tax weighted average cost of capital will reflect 3.5% interest.]

11

12 **Q. WHY DID YOU USE VERIZON FLORIDA'S AFTER-TAX WEIGHTED**

13 **AVERAGE COST OF CAPITAL TO DISCOUNT LEASE CASH FLOWS**

14 **IN YOUR ANALYSIS?**

15 A. I used Verizon Florida's after-tax weighted average cost of capital to

16 discount lease cash flows because it best reflects the financing mix and

17 cost rates that Verizon Florida would need to use to finance its

18 investment in the facilities required to provide UNEs. Since CLECs use

19 the leasing of UNEs as a substitute for building and owning their own

20 telecommunications facilities (or of using other alternative facilities or

21 technologies), the after-tax weighted average cost of capital provides

22 correct economic signals for the lease versus build decision.

23

24 **Q. SOME ECONOMISTS SUGGEST THAT A FINANCIAL LEASE IS A**

25 **SUBSTITUTE FOR DEBT FINANCING RATHER THAN FOR A MIX**

1		OF DEBT AND EQUITY FINANCING AS YOU HAVE ASSUMED. IN
2		THIS APPLICATION, WHY IS IT APPROPRIATE TO ASSUME A MIX
3		OF DEBT AND EQUITY FINANCING RATHER THAN PURE DEBT
4		FINANCING?
5	A.	In this application it is appropriate to assume a mix of debt and equity
6		financing because a company investing approximately $8.7 billion to
7		reconstruct Verizon Florida's network in Florida could never finance this
8		investment entirely with debt. Even if CLECs sign a financial lease that
9		requires them to purchase UNEs at a fixed rate for the entire life of the
10		network, there is no guarantee that CLECs could fulfill their contract.
11		Indeed, Verizon Florida would still face the considerable risk that CLECs
12		would default on their lease payments due to bankruptcy. Verizon
13		Florida could only reduce its investment risk through a mix of debt and
14		equity financing. A financial lease is really a substitute for owning an
15		asset and is only a substitute for debt financing if the lessee could
16		realistically finance the asset with debt if they did not lease the asset. In
17		the case of a telecommunications network investment, it is simply
18		unrealistic to assume that either the CLEC or Verizon Florida could
19		finance ownership of the network entirely with debt.
20		
21	Q.	IS IT EVER APPROPRIATE TO CONSIDER A FINANCIAL LEASE AS
22		A SUBSTITUTE FOR DEBT FINANCING?
23	A.	Yes. For relatively small purchases such as automobiles, the financially
24		secure consumer can finance the purchase entirely with debt. Thus, a
25		financial lease in this instance is a substitute for debt financing.

1 Q. **WHAT ARE THE DIFFERENCES BETWEEN A CONSUMER'S**

2   **DECISION TO INVEST IN AN AUTOMOBILE AND VERIZON**

3   **FLORIDA'S DECISION TO INVEST IN A TELECOMMUNICATIONS**

4   **NETWORK IN FLORIDA?**

5 A. The differences between the consumer's decision to invest in an

6   automobile and Verizon Florida's decision to invest in a

7   telecommunications network relate to: (1) the size of the investment;

8   (2) the ability to sell the investment in the case of financial difficulties;

9   and (3) the risk of default on the financial contract. In the case of the

10   automobile investment, the amount of the investment typically is small

11   relative to the lessee's wealth; the asset is relatively easy to sell if the

12   lessee defaults on his contract; and the likelihood of default is relatively

13   small. In contrast, Verizon Florida's investment in its network in Florida

14   represents its entire wealth; it would be difficult to sell the network if the

15   CLECs as lessees were to default on their contracts; and the likelihood

16   of the CLECs' default under a financial lease would be high.

17

18 Q. **WHAT CONCLUSIONS DO YOU DRAW FROM YOUR ANALYSIS OF**

19   **THESE DIFFERENCES?**

20 A. I conclude that a financial lease is really a substitute for owning an

21   asset, and that it is only a substitute for debt financing if the lessee could

22   realistically finance the asset with debt if they did not lease the asset. In

23   the case of an automobile, it is realistic to assume that a customer can

24   finance ownership of the asset with debt. However, in the case of a

25   telecommunications network investment, it is simply unrealistic to

1   assume that either the CLEC or Verizon Florida could finance ownership

2   of the network entirely with debt.

3

4 Q.   HOW DID YOU CALCULATE THE MINIMUM LEASE PAYMENT THAT

5   VERIZON FLORIDA WOULD HAVE TO CHARGE IF THE CLECS

6   HAVE AN OPTION TO RENEW THEIR UNE LEASE AT LOWER

7   RATES WHEN NEW LOWER-COST TECHNOLOGIES BECOME

8   AVAILABLE?

9 A.   I calculated this minimum lease payment by equating the present value

10   of the lease cash inflows to the sum of the present value of Verizon

11   Florida's cash outflows for network investment, operating expenses, and

12   taxes; and the value of the option to renew the lease at lower rates

13   when rates are reset. Specifically, the calculation of the lease payment

14   in this scenario was made using the equation:

15
$$I = \sum_{t=1}^{T} \frac{(1-\tau_c)(L_t - O_t) + \tau_c D_t}{(1 + ATWACC)^t} + \frac{MV}{(1 + ATWACC)^T} - P_A \quad (2)$$

16   where P_A is the value of the option to cancel, calculated according to

17   Copeland/Weston, and the remaining variables are defined as in

18   Equation (1).

19

20 Q.   HOW DID YOU CALCULATE THE REGULATORY RISK PREMIUM

21   REQUIRED TO COMPENSATE VERIZON FLORIDA FOR THE

22   ADDITIONAL RISK THEY INCUR BECAUSE CLECS CAN CANCEL

23   THEIR LEASES AND REGULATORS CAN LOWER UNE RATES AT

24   ANY TIME?

25 A.   I calculated this regulatory risk premium by substituting the value of the

80

1		lease payments (obtained from the previous step) into Equation (1) and
2		solving for the after-tax weighted average cost of capital. The required
3		regulatory risk premium is the difference between the required rate of
4		return on the cancelable operating lease and the required rate of return
5		on the financial lease. Using the Verizon Florida data, the regulatory
6		risk premium is 2.56%.
7		
8	Q.	DOES THIS RISK PREMIUM FULLY REFLECT THE RISKS
9		ASSOCIATED WITH THE UNE REGIME AND THE ACCOMPANYING
10		TELRIC PRICING STANDARD?
11	A.	No. My risk premium only reflects the additional regulatory risk
12		associated with the regulators' option to lower UNE rates at any time to
13		reflect the lower cost of a hypothetical network using the then-most
14		efficient available technology and the CLECs' option to cancel. It does
15		not reflect all of the risks associated with the TELRIC pricing standard,
16		such as the optimistic revenue, expense, and investment assumptions
17		that are frequently used in implementing the TELRIC standard. In
18		addition, my regulatory risk premium does not reflect the risk that under
19		the TELRIC standard Verizon Florida will be unable to recover the actual
20		costs it incurs in building and operating its network.
21		
22	Q.	WHAT IS THE QUANTITATIVE IMPACT OF TELRIC RISK ON THE
23		APPROPRIATE COST OF CAPITAL FOR USE IN TELRIC COST
24		STUDIES?
25	A.	My studies indicate that TELRIC risk increases the cost of capital by

1   2.56%. If the cost of capital input in Verizon Florida's TELRIC cost

2   studies does not include this regulatory risk premium, Verizon Florida

3   will not have an opportunity to earn a fair rate of return on its network

4   investment. Furthermore, if this risk premium is not included in the cost

5   of capital input, Verizon Florida will have no incentive to invest in

6   network facilities and CLECs will have no incentive to invest in their own

7   facilities to offer local exchange service. Thus, without this risk

8   premium, UNE rates will not send correct economic signals to

9   incumbent LECs and CLECs.

10

11 Q.   **IS THE METHODOLOGY YOU USED TO ESTIMATE THE TELRIC**

12   **RISK PREMIUM THE SAME AS THE METHODOLOGY YOU**

13   **RECOMMENDED IN VERIZON FLORIDA'S RECENT FLORIDA**

14   **COLLOCATION PROCEEDING?**

15 A.   Yes, it is.

16

17 Q.   **DID THE COMMISSION STAFF CRITICIZE YOUR METHODOLOGY**

18   **FOR ESTIMATING THE REQUIRED RISK PREMIUM IN THAT**

19   **PROCEEDING?**

20 A.   Yes. The Staff criticized my application of the Copeland and Weston

21   article, claiming that Copeland and Weston: (1) specified that the

22   relevant cost of capital in lease analysis should be the before-tax cost of

23   debt, while I estimated my risk premium based on Verizon Florida's

24   overall before-tax cost of capital; (2) assumed that the leased equipment

25   would be leased again if the original lease is cancelled, whereas they

1   claim that I assumed that it will not be leased again; and (3) calls for an

2   estimate of the volatility in the value of the network, whereas I used a

3   measure of the volatility of Verizon Communication's stock price.

4

5   Q.   DID YOU EXPLAIN WHY YOU USED THE OVERALL AFTER-TAX

6   COST OF CAPITAL RATHER THAN THE BEFORE-TAX COST OF

7   DEBT?

8   A.   Yes. On page 60 of my direct testimony in that proceeding and above in

9   this testimony, I used the after-tax weighted average cost of capital to

10   discount lease cash flows because it best reflects the financing mix and

11   cost rates that Verizon Florida would need to use to finance its

12   investment in the facilities required to provide UNEs. Since CLECs use

13   the leasing of UNEs as a substitute for building and owning their own

14   telecommunications facilities (or of using other alternative facilities or

15   technologies), the after-tax weighted average cost of capital provides

16   correct economic signals for the lease versus build decision. As I also

17   explained, I did not use the before-tax cost of debt in my analysis

18   because, while it may be reasonable to assume 100 percent debt

19   financing for the purpose of leasing automobiles, it is inappropriate to

20   assume 100 percent debt financing for investments in Verizon Florida's

21   network because Verizon Florida could not finance its investment in

22   network facilities entirely with debt.

23

24   Q.   WAS THE FLORIDA STAFF CORRECT WHEN THEY STATED THAT

25   YOU ASSUMED THAT VERIZON'S NETWORK WOULD NOT BE

1   **LEASED AGAIN IF THE CLEC CANCELLED ITS LEASE?**

2 A.   No. I simply assumed that the value of the ILECs' network will be highly

3   uncertain at the time the CLECs cancel their lease. The uncertainty in

4   the value of the ILECs' network may arise because CLECs cancel their

5   lease in order to leave the ILECs' facilities altogether, or it may arise

6   because the ILECs will have to re-lease network capacity at lower rates

7   when rates are reset to reflect the allegedly lower cost of new

8   technologies. My model definitely does not assume that the ILECs have

9   no opportunity to lease their network once the CLECs cancel. (As a

10   practical matter, it is peculiar that Florida Staff failed to acknowledge

11   that Verizon Florida faces lease cancellation risk in view of the evidence

12   presented by Verizon Florida that nearly two-thirds of the 698 collocation

13   arrangements provided to CLECs were cancelled and not leased again.

14   Clearly, Verizon Florida had no opportunity to earn its cost of capital on

15   its investment in those arrangements.) If Verizon's network were leased

16   again when rates were reset, the value of the network would be highly

17   uncertain because the UNE lease rate could be significantly less than

18   the rate that would be required to allow Verizon to recover its initial

19   investment in the network at the time UNE rates were first set.

20

21 Q.   **THE FLORIDA STAFF ALSO CRITICIZED YOUR RISK PREMIUM**

22   **ANALYSIS ON THE GROUNDS THAT YOU USED THE VOLATILITY**

23   **OF VERIZON COMMUNICATIONS' STOCK PRICE AS AN ESTIMATE**

24   **OF THE VOLATILITY IN THE VALUE OF THE NETWORK. WHY DID**

25   **YOU USE THE VOLATILITY OF VERIZON COMMUNICATIONS'**

1   STOCK PRICE TO ESTIMATE THE VOLATILITY IN THE VALUE OF

2   THE NETWORK?

3 A. I used stock price volatility because: (1) the data required to estimate

4   stock price volatility is readily available, while the data required to

5   estimate the volatility in the value of the network is not; and (2) I

6   recognized that stock price volatility may well be a conservative

7   measure of the volatility in the future value of the network. Verizon's

8   stock price volatility may well be a conservative estimate of the volatility

9   in the value of the network because Verizon Communications is less

10   risky than a stand-alone UNE provider due to its ability to diversify its

11   regulatory and technology risks; and my model assumes that UNE rates

12   are based on accurate estimates of the ILEC's forward-looking

13   economic costs, whereas CLECs have often recommended rates based

14   on unrealistic assumptions about the levels of efficiency available if

15   ILECs could instantaneously reconstruct their network every time UNE

16   rates are reset.

17

18 Q. WHAT IS YOUR CONCLUSION REGARDING THE COST OF

19   CAPITAL APPROPRIATE FOR USE IN UNE COST STUDIES IN

20   FLORIDA?

21 A. I conclude that the appropriate weighted average cost of capital for use

22   in UNE cost studies in Florida is 14.19%. My recommended weighted

23   average cost of capital is based on my 11.64% estimate of the weighted

24   average cost of capital without considering the risk that Verizon Florida

25   incurs when CLECs have the option to cancel their lease on a monthly

1   basis and on my 2.56% estimate of the required risk premium to

2   compensate Verizon Florida for the regulatory risk that rates will be set

3   to reflect the cost of the most efficient technology available and CLECs

4   can renew their lease at lower rates when new lower-cost technologies

5   become available.

6

7 Q.   DOES THIS CONCLUDE YOUR TESTIMONY?

8 A.   Yes, it does.

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Company	Price	Dividend	Growth	Cost of Equity
3M Co	84.80	1.44	11.7%	13.71%
Abbott Laboratories	42.34	1.04	11.9%	14.82%
Adobe Systems Inc.	41.59	0.05	13.5%	13.64%
Air Products & Chemicals Inc	51.40	0.92	9.8%	11.88%
Alberto-Culver Co	45.96	0.40	12.8%	13.84%
Altria Group Inc	55.73	2.72	8.8%	14.50%
Anheuser-Busch Cos Inc	51.41	0.88	11.0%	13.01%
Apache Corp	43.50	0.24	11.9%	12.55%
Applera Corp Applied Biosys	19.42	0.17	10.6%	11.62%
Archer-Daniels-Midland Co	17.25	0.24	10.7%	12.33%
Avery Dennison Corp	63.49	1.48	10.9%	13.65%
Avon Products	80.44	1.12	12.9%	14.56%
Bard (C.R.) Inc	104.08	0.92	12.5%	13.55%
Bausch & Lomb Inc	63.33	0.52	13.6%	14.59%
Baxter International Inc	32.50	0.58	11.2%	13.30%
Becton Dickinson & Co	51.27	0.60	12.4%	13.79%
Black & Decker Corp	58.88	0.84	11.2%	12.88%
Boeing Co	42.61	0.68	10.2%	12.06%
Burlington Resources Inc	65.68	0.60	11.1%	12.17%
Carnival Corp	44.48	0.50	13.4%	14.75%
Caterpillar Inc	80.88	1.48	11.1%	13.26%
Cendant Corp	24.34	0.28	13.7%	15.08%
Cigna Corp	64.68	1.32	10.4%	12.79%
Circuit City Stores Inc	11.92	0.07	13.7%	14.40%
Clorox Co/De	50.97	1.08	9.6%	12.07%
Coca-Cola Co	51.64	1.00	10.6%	12.87%
Coca-Cola Enterprises	25.55	0.16	13.2%	13.95%
Colgate-Palmolive Co	55.88	0.96	10.4%	12.41%
Cooper Industries Ltd	56.96	1.40	9.2%	12.05%
Crane Co	32.61	0.40	11.0%	12.44%
CVS Corp	37.17	0.23	12.1%	12.83%
Dana Corp	20.92	0.48	11.6%	14.32%
Danaher Corp	94.10	0.10	15.0%	15.13%

Company	Price	Dividend	Growth	Cost of Equity
Darden Restaurants Inc	23.53	0.08	12.8%	13.20%
Deere & Co	71.04	0.88	11.1%	12.56%
Delphi Corp	10.16	0.28	11.3%	14.56%
Dover Corp	40.76	0.60	12.7%	14.46%
Du Pont (E I) De Nemours	43.78	1.40	10.2%	13.96%
Eaton Corp	59.11	1.08	11.0%	13.15%
Ecolab Inc	29.06	0.32	12.1%	13.41%
Electronic Data Systems Corp	19.34	0.60	10.3%	13.95%
Emerson Electric Co	61.14	1.60	9.8%	12.86%
Engelhard Corp	29.73	0.44	10.5%	12.23%
First Data Corp	44.34	0.08	14.5%	14.72%
Fluor Corp	38.33	0.64	12.6%	14.59%
Fortune Brands Inc	76.45	1.20	12.0%	13.86%
Gap Inc	22.52	0.09	14.1%	14.58%
General Electric Co	30.83	0.80	10.2%	13.24%
General Mills Inc	47.42	1.10	10.0%	12.71%
General Motors Corp	47.55	2.00	7.2%	12.03%
Gillette Co	39.60	0.65	10.3%	12.22%
Goodrich Corp	29.04	0.80	9.8%	13.02%
Grainger (W W) Inc	52.00	0.74	10.9%	12.57%
Halliburton Co	30.71	0.50	11.0%	12.91%
HCA Inc	40.62	0.08	12.6%	12.83%
Hershey Foods Corp	85.69	1.58	10.1%	12.25%
Hewlett-Packard Co	21.72	0.32	11.1%	12.83%
Hilton Hotels Corp	17.12	0.08	14.5%	15.06%
Home Depot Inc	36.52	0.28	12.5%	13.41%
Honeywell International Inc	34.88	0.75	9.3%	11.79%
Illinois Tool Works	83.96	0.96	12.8%	14.16%
IMS Health Inc	24.89	0.08	14.0%	14.39%
Ingersoll-Rand Co Ltd	68.85	0.74	10.7%	11.96%
ITT Industries Inc	78.99	0.68	12.7%	13.72%
Johnson & Johnson	52.34	0.96	12.7%	14.89%
Johnson Controls Inc	57.36	0.90	13.2%	15.08%
Jones Apparel Group Inc	37.44	0.32	11.3%	12.30%

Company	Price	Dividend	Growth	Cost of Equity
KB Home	74.88	1.00	13.0%	14.60%
Kellogg Co	41.16	1.01	9.2%	12.05%
Kerr-McGee Corp	49.89	1.80	7.8%	11.95%
Limited Brands Inc	20.68	0.40	11.5%	13.79%
Liz Claiborne Inc	36.85	0.22	11.1%	11.80%
Lockheed Martin Corp	46.95	0.88	11.0%	13.21%
Marriott Intl Inc	45.41	0.30	14.1%	14.90%
Masco Corp	29.57	0.64	12.2%	14.78%
Mattel Inc	17.97	0.40	9.4%	11.99%
Maytag Corp	29.83	0.72	8.9%	11.69%
McCormick & Co	33.79	0.56	10.3%	12.24%
McGraw-Hill Companies	78.52	1.20	11.6%	13.41%
Microsoft Corp	26.29	0.16	11.1%	11.81%
Molex Inc	31.51	0.10	14.7%	15.08%
Motorola Inc	18.54	0.16	11.1%	12.11%
New York Times Co -Cl A	45.80	0.58	11.0%	12.49%
Newell Rubbermaid Inc	24.13	0.84	10.7%	14.81%
Nike Inc -Cl B	74.94	0.80	13.2%	14.48%
Nordstrom Inc	37.84	0.44	12.8%	14.19%
Northrop Grumman Corp	99.37	1.60	11.5%	13.40%
Nucor Corp	63.23	0.84	13.0%	14.59%
Omnicom Group	80.43	0.90	11.8%	13.12%
Pall Corp	23.80	0.36	11.6%	13.39%
Parker-Hannifin Corp	57.46	0.76	12.0%	13.57%
Penney (J C) Co	35.07	0.50	10.8%	12.47%
Pepsi Bottling Group Inc	29.15	0.04	11.5%	11.66%
Pepsico Inc	54.54	0.64	11.4%	12.78%
Pfizer Inc	36.53	0.68	12.8%	15.03%
PPG Industries Inc	60.69	1.76	8.6%	11.95%
Praxair Inc	37.51	0.60	10.6%	12.47%
Procter & Gamble Co	105.34	1.82	10.5%	12.52%
Pulte Homes Inc	51.26	0.20	13.3%	13.77%
RadioShack Corp	32.13	0.25	11.2%	12.11%
Reebok International Ltd	39.53	0.30	13.6%	14.51%

Company	Price	Dividend	Growth	Cost of Equity
RJ Reynolds Tobacco Hldgs	61.81	3.80	6.6%	13.67%
Sigma-Aldrich	56.24	0.68	10.8%	12.22%
Snap-On Inc	33.22	1.00	11.0%	14.56%
Stanley Works	44.03	1.04	10.3%	13.07%
Tektronix Inc	31.87	0.16	14.0%	14.60%
Textron Inc	55.36	1.30	11.6%	14.38%
TJX Companies Inc	25.16	0.14	14.4%	15.07%
Tribune Co	49.64	0.48	11.6%	12.74%
Tyco International Ltd	28.63	0.05	11.7%	11.91%
United Technologies Corp	87.77	1.40	10.9%	12.77%
Unocal Corp	37.68	0.80	10.9%	13.40%
Viacom Inc -Cl B	40.38	0.24	14.3%	15.02%
Vulcan Materials Co	47.44	1.04	10.0%	12.56%
Wal-Mart Stores	58.15	0.36	13.8%	14.54%
Wendy's International Inc	40.49	0.48	12.6%	14.01%
Wrigley (Wm) Jr Co	60.58	0.88	11.3%	13.01%
Wyeth	39.04	0.92	9.6%	12.34%
Market Weighted Average				13.46%

Source: Standard & Poor's Compustat Database. Price is average of April 2004 high and low prices. Dividend is the annual dividend rate as reported by Compustat. Growth rate is the I/B/E/S mean estimate of long-term growth rate as reported by Compustat.

Notes: In applying the DCF Model to the S&P Industrials, I included in the DCF analysis only those companies in the S&P Industrial group which have a reported stock price, pay a dividend, have a positive growth rate, have at least three analysts' long-term growth estimates, and have at least one common share outstanding. I also eliminated those 25% of companies with the highest and lowest DCF results.

Notation:

d_0	=	Quarterly dividend (annual dividend divided by 4).
P_0	=	Average of the monthly high and low stock prices April 2004.
FC	=	Flotation costs expressed as a percentage of gross proceeds (5 percent).
g	=	I/B/E/S mean forecast of future earnings growth April 2004.
k	=	Cost of equity using the quarterly version of the DCF Model as shown by the formula below:

$$k = \left[\frac{d_0(1+g)^{\frac{1}{4}}}{P_0 - FC} + (1+g)^{1/4} \right]^4 - 1$$

A Note on the Evaluation of Cancellable Operating Leases

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■ Many central theoretical issues on long-term leasing were settled by Miller and Upton [8], Lewellen, Long and McConnell [6], and Myers, Dill and Bautista [9].[1] Issues of clarification and implementation can be found in Levy and Sarnat [5]. The following paper extends the analysis of lease contracts to include cancellable operating leases.

For expositional purposes lease contracts can be divided into two broad categories: 1) pure financial leases and 2) operating leases. Pure financial leases are assumed to be perfect substitutes for debt capital because they are not cancellable without-bankruptcy and they are fully amortized. On the other hand, operating leases are riskier from the lessor's point of view because they may be cancelled at the option of the lessee and cannot (by law) be fully amortized.

The first part of the paper provides a brief review of the analysis of pure financial leases. The second part solves the problem of evaluating cancellable operating leases by using the Cox, Ross and Rubinstein [2] binomial option pricing method. From the lessor's point of view a cancellable operating lease is equivalent to a pure financial lease minus an American put option with a (non-stochastic) declining exercise price. The expected rate of return on a cancellable lease is shown to be higher than the rate on a pure financial lease.

The Analysis of Pure Financial Leases

Pure financial leases are assumed to be perfect substitutes for debt. The lessee takes the before-tax rental rate, L_t, as an input in making a comparison between leasing and borrowing. The analysis involves the following differential cash flows:

a. A cash saving amounting to the dollar amount of the investment outlay, I, which the firm does not have to incur if it leases.

b. A cash outflow amounting to the present value of the after-tax lease dollars which must be paid out, $PV[(1 - \tau_c)L_t]$.

[1] The distinction between long-term and short-term leases is not trivial. Short-term leases such as hotel room rentals are probably more efficient than buying for a day simply because of transaction cost differences. However, the effect of such frictions is minimized for long-lived contracts.

c. The present value of the opportunity cost of the lost depreciation tax shield, $PV(\tau_c dep_t)$.

d. The present value of the *change* in the interest tax shield on debt which is displaced by lease financing, $PV[\tau_c\Delta(rD_t)]$, where D_t is the remaining principal of displaced debt in period t, and r is the coupon rate.

These four terms, when discounted at the proper rate, give the net present value (NPV) of the lease contract to the lessee. If the NPV (to lessee) > 0 the lease will be accepted.

$$NPV\text{ (lessee)} = I - PV[(1-\tau_c)L_t] \\ - PV[\tau_c dep_t] - PV[\tau_c\Delta(rD_t)] \quad (1)$$

Because this definition of cash flows explicitly includes the tax shield of displaced debt in the numerator of the present value equation, the cash flows should be discounted at the before-tax cost of capital. The before-tax cost of *debt* capital, k_J, is relevant because the lease contract is a perfect substitute for debt. It has the same risk. Therefore, we have

$$NPV\text{ (lessee)} = \\ I - \sum_{t=1}^{N} \frac{(1-\tau_c)L_t + \tau_c dep_t + \tau_c\Delta(rD_t)}{(1 + k_J)^t} \quad (2)$$

If correct, this approach should show the lessee to be indifferent to the contract (*i.e.*, NPV (lessee) = 0) when the lessor's minimum lease fee is substituted into the equation. The computation is fairly cumbersome because the displaced tax shield, $\tau_c\Delta(rD_t)$, changes each period.

Myers, Dill and Bautista [9] and Levy and Sarnat [5] have shown that an equivalent approach is to account for the interest tax shield by discounting at the after-tax cost of debt and eliminating the third term from the numerator of the righthand side of Equation (2). For constant lease payments, Equations (2) and (3) are equivalent.

$$NPV\text{ (lessee)} = I - \sum_{t=1}^{N} \frac{(1-\tau_c)L_t + \tau_c dep_t}{[1+(1-\tau_c)k_J]^t} \quad (3)$$

Note that from the lessor's point of view k_J is the lending rate on debt capital. It is the lessor's weighted average cost of capital, WACC (lessor), grossed up by the lessor's effective marginal tax rate.[2]

$$k_J = \frac{WACC\text{(lessor)}}{(1 - \tau_c)} \quad (4)$$

Therefore, when discounting the cash flows of Equation (3) from the lessor's point of view, we have

$$NPV\text{(to lessor)} = -I \\ + \sum_{t=1}^{N} \frac{L_t(1-\tau_c) + \tau_c dep_t}{(1 + WACC)^t} \quad (5)$$

where WACC(lessor) = $(1-\tau_c)k_J$. The equivalence of Equations (3) and (5) demonstrates that the financing decision is the same from either the lessee's or lessor's point of view. Also, it is worth mentioning that the lessee's indifference to the contract will result only when all terms in Equations (3) and (5) are symmetrical. Especially important are the effective tax rates of the lessor and lessee. Lewellen, Long and McConnell [6] have shown that with different effective tax rates for the lessor and lessee the lease may have positive net present values for both parties.

The Evaluation of Operating Lease Contracts

Operating leases are different from pure financial leases in two important ways. First, and most important, they may be cancelled at the option of the lessee. From the point of view of the lessee, capital employed under operating lease contracts becomes a variable cost (rather than a fixed cost) because the lease may be terminated (sometimes requiring a penalty to be paid) and the leased asset may be returned whenever economic conditions worsen. This is like having equipment that can be laid off. From the lessor's point of view, operating leases are obviously riskier than financial leases. A financial lease, like a loan, is secured by all of the firm's assets. An operating lease is not. The second difference between operating and financial leases is that operating leases enable the lessor to capture the salvage value of the asset.

The duration of an operating lease is usually several years on business office equipment, computers, buildings, and trucks. The contracts are not renegotiated during their term. However, they can usually be cancelled at the option of the customer (sometimes with and sometimes without penalty). For example, the wording in an IBM contract is: ''. . . the customer may, at any time after installation, discontinue a processor complex unit upon three months prior written notice, or discontinue any other machine or any field removable feature or request a field removable down-

grade upon one month's written notice" [subject to the payment of termination charges].

What are the sources of risk to a lessor who contemplates extending an operating lease? We shall discuss two categories of risk. The first category of risk reflects fluctuations in the economic value of the asset over time. These changes in value result from the uncertain economic rate of depreciation of the asset and from general price level and interest rate uncertainty. The economic rate of depreciation is determined by the value of the asset in alternative uses and from the competition of substitutes. Changes in value will reflect obsolescence as well as physical deterioration. This may be termed *replacement cost risk*. The uncertainty of the salvage value of the asset is a special case of this first category of risks related to the economic value of the asset. Our intent is to define replacement cost risk as the generic term for fluctuations in the economic value of the asset resulting from uncertainties such as obsolescence costs and unanticipated changes in the general price level and interest rates.

A second category of risk relates to the characteristics of the lessee and we shall argue that they are of no special concern to the lessor. (The reason is discussed below.) Related to the performance of the lessee is a *revenue risk*. This is the risk that the lease will be cancelled because the lessee's revenues from the asset fall enough so that the present value of the lease payments exceeds the present value of continued use of the asset.

Another source of risk related to the behavior of the lessee is the *risk of default*. Default is an involuntary breach of the lease contract. It is common to both financial leases and operating leases. Therefore, we shall assume that the lessor's lending rate, k_d, is already adjusted to compensate for default risk.

The usual approach to the operating lease problem is to separate each of the different components of risky cash flow and discount them at the "appropriate" risk-adjusted discount rate.[3] The type of formula often used is:

NPV(to lessee) =

$$I - \sum_{t=1}^{N} \frac{L_t(1-\tau_c)}{(1+k_d^*)^t} - \sum_{t=1}^{N} \frac{\tau_c dep_t}{(1+k_d^*)^t}$$
$$- \tau_i I - \frac{MV}{(1+k_i)^N} + \frac{t_g(MV-BV)}{(1+k_i)^N} - \sum_{t=1}^{N} \frac{O_t}{(1+k_2)^t}$$

(6)

where $k_d^* = (1 - \tau_c)k_d$ = the after-tax cost of debt capital;

$\tau_i I$ = the investment tax credit forgone by the lessee;

MV = the salvage value (market value) of the asset when the lease contract expires in year N;

k_i = the risk-adjusted after-tax discount rate "appropriate" to salvage risk;

$t_g(MV-BV)$ = the capital gains tax on the difference between the salvage value and the book value;

O_t = the value of operating maintenance in period t;

k_2 = the risk-adjusted after-tax discount rate "appropriate" to the maintenance costs.

While this approach is useful in pointing out the different risks that exist, the practitioner is forced to use ad hoc rules of thumb when attempting to estimate the various risk-adjusted discount rates needed to solve Equation (6).[4] Another approach is suggested below.

Of the types of risk mentioned above, only replacement cost risk (including salvage value risk) and default risk are borne by the lessor. Default risk is compensated in the lending rate, k_d, and shall not be discussed. Revenue risk is irrelevant to the lessor because it is borne by the lessee when he makes his investment decision. To show why this is so, assume for the moment that the replacement cost and salvage value of the asset are known with certainty. Still, the lessee may cancel an operating lease if the present value of the after-tax operating cash flow from his use of the leased asset falls below the present value of the future lease obligations. Even so, the lessor will be indifferent to the cancellation because, given no uncertainty about the replacement or salvage value of the asset, a lease contract can always be constructed so that the replacement value of the asset is equal to the value of the remaining lease payments. The payoffs to the lessor are:

Payoff to lessor (given no replacement cost risk)

$$= \begin{cases} PV \text{ (lease payments)} & \text{if NPV (project)} \geq 0 \\ PV \text{ (asset)} & \text{if NPV (project)} > 0; \end{cases}$$

Given no replacement cost uncertainty a contract can be written so that

$$PV \text{ (lease payments)} = PV \text{ (asset)}$$

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[3]For example, see [10].

[4]Maintenance contracts for leased assets are separable from the lease contract itself and can be priced separately. Therefore, we ignore maintenance cost cash flows when we discuss the operating lease contract.

for any point in time. Thus, the lessor is indifferent to revenue uncertainty.[5]

. Given the irrelevance of revenue uncertainty, we can proceed to discuss the effect of uncertain replacement costs (including uncertain salvage value). Exhibit 1 shows how the market value of the leased asset may change over time. The downward-sloping solid line is the expected decline in the asset's value due to anticipated inflation, wear and tear, and obsolescence. Note that the value of the asset is expected to decline from I_0 to $E(\$I_T)$ over the life of the contract, T years. The expected salvage value is $E(I_T)$. It is reasonable to assume that the value of the asset never falls below zero. Given replacement cost uncertainty, the actual value of the asset at any time $t^* \leq T$ may be greater or less than expected. The particular situation illustrated at t^* in Exhibit 1 shows that if the value of the asset, MV_{t^*}, falls far enough below its expected value, $E(MV_t)$, then the lessee can improve his position by cancelling the lease, returning the leased asset, and leasing a more efficient replacement to do the same job at lower cost. The option to terminate the lease is an American put held by the lessee. The value of the put will be implicit in the lease fees.[6]

The present value of the relevant American put, P_A, is derived in Appendix A following the assumption of a binomial stochastic process. (Cf. Cox, Ross and Rubinstein [2]). The expected replacement cost of the asset is assumed to decline in a straight line at the rate

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[5]This point is also made in Miller and Upton [8]. Implicitly, it is understood that if the original lease is cancelled the lessor immediately places the equipment on lease again.

[6]Ex ante, the lessor will be seen to charge for possible actions by the lessee under alternate states of nature (captured in the ex ante probability distribution). Ex post, of course, the asset may decline in value so that the lessee will return the asset. The lessor then must either a) sell the asset at market value or b) lease it again at a lower rate. Both possibilities are reflected in the price of the American put in the ex ante analysis. (see Equation 7).

Exhibit 1. Replacement Cost Uncertainty
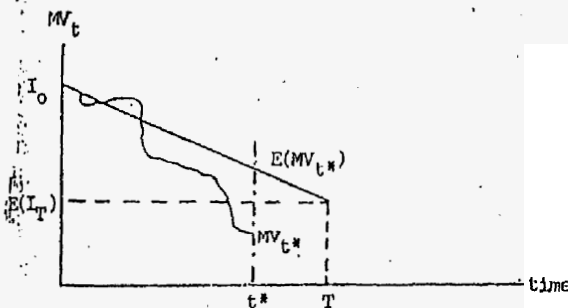
$(1-\theta)$ in each period. For convenience, we assume that the lease contract is written so that the present value of the remaining lease fees is equal to the expected replacement value of the asset in each time period. Hence the option is written at-the-money.

If the lease contract is written so that the exercise price of the implied put declines at a rate slower than the expected economic depreciation, then the probability of cancellation increases. If there are any significant transactions costs such as installation and removal and resale expenses, then frequent cancellation is undesirable. The opposite situation occurs when the exercise price declines faster than expected economic depreciation. The likelihood of early exercise decreases and so does the implied value of the cancellation feature. If there are costs to negotiating the terms of the cancellation feature, then the value of the cancellation option must exceed negotiation costs. There may well be an optimal relationship between the rate of decline in the exercise price and the expected economic depreciation of the asset. No matter what it is, Equation (7) will provide a numerical solution for the value of the American put implied in the cancellation clause. Modifications in this assumption do not materially alter the form of the option pricing equation. The exercise price, X, for the American put written on the replacement cost of the asset is the present value of the lease payments represented by the solid line in Exhibit 1. Since the lease payments include repayment of the expected economic depreciation of the asset, $(1-\theta)$ $E(MV_t)$, we have to price the value of an American put for a case in which the exercise price declines at a non-stochastic rate equal to the expected decline in the value of the asset (analogous to a non-stochastic dividend payment). The present value of the American put is:[7]

$$P_A = MAX \{X-V, [pP_d + (1-p) P_u] \div r_f\} \quad (7)$$

where

$$P_d = MAX \{\theta X-d\theta \ V, [pP_{dd} + (1-p) \ P_{ud}] \div r_f\};$$
$$P_u = MAX \{\theta X-u\theta \ V, [pP_{ud} + (1-p) \ P_{uu}] \div r_f\};$$
$$p = \frac{(u-1) - (r_f-1)/\theta}{u - d}, (1-p) = \frac{(r_f-1)/\theta + (1-d)}{u - d}.$$

Equation (7) may be solved iteratively in order to provide a numerical solution for any American put option where the exercise price on the option declines at a non-stochastic rate equal to the ex ante expected decline in the value of the asset. If the depreciation rate $(1-\theta)$ is zero, then Equation (7) reduces exactly to the

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[7]The notation used in Equation (7) is detailed in the appendix.

numerical solution of an American put with constant exercise price, derived by Cox, Ross and Rubinstein [2]. As the anticipated economic life of the asset becomes shorter (*i.e.*, as it depreciates faster), the value of the put decreases relative to its counterpart — an American put with fixed exercise price. The put implied by the lease's cancellation clause differs from a regular American put because its exercise price decreases at a predetermined rate. Because the decreasing exercise price is linked to the anticipated rate of economic depreciation, it follows that the put is worth less as the expected life of the underlying asset is shorter.

The effect of the put on the lease fees will be to increase them with 1) greater uncertainty in the replacement cost of the leased asset, 2) decreases in the risk-free discount rate, and 3) a lower expected rate of depreciation over the life of the lease contract. The first two effects are obvious and the third effect makes sense when one realizes that we are talking about the marginal change in lease fees caused by the cancellation option. The level of lease fees will decrease as the expected rate of economic depreciation decreases, but the cancellation option has greater cost to the lessor as the life of the asset increases.

An American put written on a lease contract and modeled as in Equation (7) will capture the value of the cancellation clause in an operating lease. The value of the put will depend on the following variables:

$$P_A = f\ (\overset{+}{I}, \overset{+}{\sigma^2_{MV}}, \overset{-}{r_f}, \overset{\pm}{T}, \overset{+}{X}, \overset{+}{\theta}) \tag{8}$$

where   I = the initial cost of the leased asset;
   σ^2_{MV} = the instantaneous variance of the market value of the asset (for annual binomial outcomes $u = e^\sigma$, where σ is the annual standard deviation of asset returns);
   r_f = one plus the risk-free rate for assets of maturity T;
   T = the number of time periods before the option expires;
   X = the initial exercise price of the option (X = I);
   $1-\theta$ = the annual rate of anticipated straight-line depreciation in the value of the asset.

The sign of the partial derivative of the value of the put with respect to each of the variables is given above Equation (8).

The following numerical example shows how the lessor will increase his required lease payments if a lease contract is cancellable. Assume that a $10,000 asset is expected to have a three-year economic life and depreciate an equal amount each year (*i.e.*, $\theta = .667$). However, its value may be 50 percent higher or lower than expected at the end of a given year (*i.e.*, $u = 1.50, d = .667, \sigma = .405$). The lessor has a tax rate of 40 percent and will write a two year lease.[a] If the lease contract were a strict financial lease, it would require a 10 percent before-tax rate of return (*i.e.*, $k_d = 10\%$). The salvage value is uncertain and requires a 16% risk-adjusted rate of return. For simplicity we ignore capital gains taxation on the salvage value and investment tax credits. Using our prior definitions of the variables we can write the competitive present value of a non-cancellable lease to the lessor as follows:

$$0 = -I + \sum_{i=1}^{2} \frac{(1-\tau_c)L_i + \tau_c dep_i}{[1+(1-\tau_c)k_d]^i}$$

$$+ \frac{E(MV)_t}{(1+k_s)^2}. \tag{9}$$

Substituting in the appropriate values, and solving for the competitive lease fee we have

$$0 = -10,000 + \sum_{i=1}^{2} \frac{(1-.4)L_i + .4(3333)}{[1-(1-.4).10]^i}$$

$$+ \frac{3333}{(1.16)^2}$$

$0 = -10,000 + .6L_i PVIF_a\ (6\%, 2\ yrs.)$
    $+ .4(3333)PVIF_a\ (6\%, 2\ yrs.) + 3333(.743)$
$0 = -10,000 + .6L_i(1.833) + .4(3333)(1.833)$
    $+ 3333(.743)$
$L_i = \$4,619$

Next, we want to determine the competitive lease payments assuming that the above contract is a cancellable operating lease. Equation (9) must be modified by subtracting the present value of the American put option. The new valuation equation is

$$0 = -I + \sum_{i=1}^{2} \frac{(1-\tau_c)L'_i + \tau_c dep_i}{(1+(1-\tau_c)k_d)^i}$$

$$+ \frac{E(MV)_t}{(1+k_s)^2} - P_A. \tag{10}$$

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[a]For simplicity we will assume that the lessor and the lessee have the same effective tax rate. Differential tax rates do not affect the value of the cancellation clause.

The value of the put (per dollar value of the asset) is given in Exhibit A-4 as .085. Solving for the operating lease fee we have

$$0 = -10,000 + \sum_{t=1}^{2} \frac{(1-.4)L'_t + .4(3333)}{(1+(1-.4).10)^t}$$

$$+ \frac{3333}{(1.16)^2} - .085(10,000)$$

$$0 = -10,000 + .6L'_t (1.833) + .4(3333)(1.833)$$

$$+ 3333(.743) - 850$$

$$L'_t = \$5,392$$

The lease fee has increased considerably to reflect the extra risk of possible early cancellation of the operating lease.

If a lessee takes the lease fee as an input and tries to compute an internal rate of return (IRR) on the contract without considering the American put, then there will be a considerable upward bias in the IRR. Using the above lease fee the computation would be

$$0 = 1 - \sum_{t=1}^{2} \frac{(1-\tau_c)L'_t + \tau_c dep_t}{(1+IRR)^t} - \frac{E(MV)}{(1+k_t)^2}$$

$$0 = 10,000 + \sum_{t=1}^{2} \frac{(1-.4)(5392) + .4(3333)}{(1+IRR)^t}$$

$$- \frac{3333}{(1.16)^2}$$

$$0 = 10,000 - 4568.4 PVIF_a (IRR\%, 2 \text{ yrs.})$$

$$- 2476$$

$$PVIF_a (IRR\%, 2 \text{ yrs.}) = \frac{-7524}{-4568.4} = 1.647$$

$$IRR \cong 14\%$$

The management of the lessee firm would be mistaken to compare the 14 percent before-tax rate of return with the 10 percent before-tax cost of debt capital. The two rates are not comparable because the cancellable operating lease is riskier than its non-cancellable financial lease counterpart.

Frequently the lease may be cancelled only if a lump-sum penalty, F, is paid to the lessee. The penalty reduces the value of the cancellation clause for the lessee. Numerically, the effect of the penalty can be estimated by subtracting the fee from the exercise price in Equation (7). This is shown below where P^*_A is the present value of the cancellation clause given a cancellation fee, F:

$$P^*_A = MAX\{(X-F)$$

$$-V,[pP_d + (1-p)P_u] \div r_f\}$$

where

$$P_d = MAX\{(0X-F)$$

$$-d\theta V,[pP_{dd} + (1-p)P_{ud}] \div r_f\};$$

$$P_u = MAX\{(0X-F)$$

$$-u\theta V,[pP_{ud} + (1-p)P_{uu}] \div r_f\};$$

$$p = \frac{(u-1) - (r_f-1)/\theta}{u-d},$$

$$(1-p) = \frac{(r_f-1)/\theta + (1-d)}{u-d}$$

Summary

If the lease is a pure financial lease, it is a perfect substitute for debt and we show that the appropriate discount rate for the leasing cash flows (before interest charges) is the after-tax cost of debt capital. On the other hand, if the lease contract is a cancellable operating lease, it is not a perfect substitute for debt capital and some higher discount rate is appropriate. This rate may be obtained by first computing the present value of an American put with an exercise price that declines at the same rate as the expected decline in the market value of the leased asset. The declining exercise price is necessary so that at any time the expected value of the future lease payments is equal to the expected market value of the depreciating asset. An example shows that the internal rate of return on an operating lease will be greater than on the comparable pure financial lease. However, the apparent higher internal rate reflects the value of the put included in the cancellation clause of an operating lease.

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Appendix A. Derivation of the Price of an American Put Option Where the Exercise Price Declines at a Non-stochastic Rate Equal to the Expected Decline in the Asset's Value

Let V be the current value of an asset that is expected to decline in value in a straight-line fashion at the rate of $(1-\theta)$ percent per time period. The value of the asset at the end of one period will be $u\theta V$ (where $u > 1$) with probability α and $d\theta V$ (where $d = 1/u$) with probability $1-\alpha$. Thus, changes in the value of the asset are described by a binomial process. Furthermore, the asset pays a "dividend" of $(1-\theta)V$ with certainty. Exhibit A-1 shows the one-period payoffs from holding the asset.

**Exhibit A-1.** One-Period Asset Payoffs
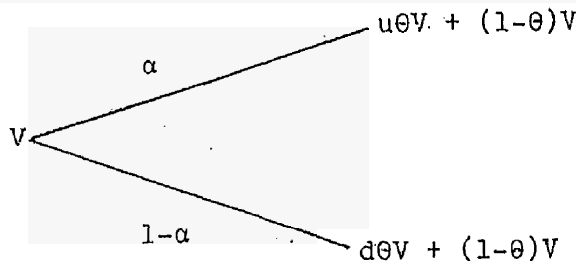
A put option written on the asset has the payoffs shown in Exhibit A-2.

Exhibit A-2. One-Period Put Option Payoffs
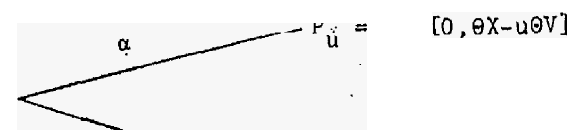
Note that the exercise price, X, has declined by an amount exactly equal to the certain dividend, $(1-\theta)V$, assuming that the option is written at the money, i.e., if $V = X$. A riskless hedge can be created by purchasing a fraction, γ, of the risky asset and buying one put written on the asset. The one-period payoffs of the hedge portfolio are given in Exhibit A-3.

Exhibit A-3. One-Period Payoffs on the Hedge Portfolio
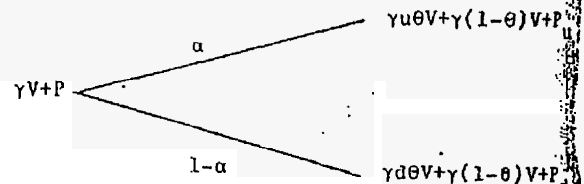
In order to prevent riskless arbitrage we require that one plus the one-period **risk-free** rate, r_f, lie between the up and down movements in the binomial process, i.e., $d<r_f<u$. In order to find the ratio, γ, which creates a riskless hedge, equate the end-of-period payoffs from the hedge portfolio

$$\gamma u\theta V + \gamma(1-\theta)V + P_u = \gamma d\theta V + \gamma(1-\theta)V + P_d \quad (A-1)$$

where

$$\gamma = \frac{P_d - P_u}{\theta V(u-d)}.$$

Note that since $P_u<P_d$, we are long in the risky asset, i.e., $\gamma>0$. Next, use the fact that the hedge portfolio must earn the risk-free rate to write

$$r_f(\gamma V + P) = \gamma u\theta V + \gamma(1-\theta)V + P_u. \quad (A-2)$$

Substituting in the value of γ and solving for P, we have

$$P =$$

$$\frac{P_d\left[\dfrac{(r_f-1)/\theta + (1-d)}{u-d}\right] + P_u\left[\dfrac{(u-1) - (r_f-1)/\theta}{u-d}\right]}{r_f}$$

$$(A-3)$$

Now, let

$$p = \frac{(u-1) - (r_f-1)/\theta}{u-d} \quad \text{and}$$

$$(1-p) = \frac{(r_f-1)/\theta + (1-d)}{u-d}.$$

Then formula (A-3) becomes

$$P = [pP_d + (1-p)P_u] \div r_f.$$

Note that $p + (1-p) = 1$. Furthermore, if $\theta = 1$, so that the asset does not depreciate, then our formula A-3 is identical to that of Cox, Ross and Rubinstein [2].

the economic value of the asset is expected to decline, then $\theta<1$ and we also require that $\theta>(r_f-1)/(u-1)$ in order that $0\leq p\leq 1$. In other words, the asset cannot be expected to depreciate so rapidly that riskless arbitrage becomes possible.

If the put is an American put, P_A, we must allow for the possibility that the put may be exercised early. Therefore, the pricing equation (A-3) for the one-period put must be rewritten as

$$P_A = MAX\{X-V, [pP_d + (1-p)P_u] \div r_f\}. \quad (A-4)$$

If $r_f>1$ (and it is), it is certainly possible that early exercise may be optimal.[9] Suppose that V is sufficiently low so that $X>uV>dV$. In this event, $P_d = \theta X - d\theta V$ and $P_u = \theta X-u\theta V$. Substituting these values into (A-4) we have

$$P_A = MAX\{X-V, [p(\theta X-d\theta V)$$
$$+ (1-p)(\theta X-u\theta V)] \div r_f\}$$
$$= MAX\{X-V, \frac{\theta X}{r_f} - \theta V [p\frac{d}{r_f} + (1-p)\frac{u}{r_f}]\}.$$

Early exercise is advantageous whenever

$$X-V > \frac{\theta X}{r_f} - \theta V [p\frac{d}{r_f} + (1-p)\frac{u}{r_f}].$$

Substituting in the values of p and $(1-p)$ this condition becomes

$$\theta < \frac{r_f X-V}{X-V}$$

and since we know that $X>V$ and $r_f>1$, early exercise will be optimal if $\theta<1+\frac{X(r_f-1)}{X-V}$. This shows that for $r_f>1$, $\theta<1+\frac{X(r_f-1)}{X-V}$ and V sufficiently low, it pays the put-holder to exercise his put early to receive X-V. There is always a critical value for the underlying risky asset V* such that if $V<V^*$ the put should be exercised immediately.

From equation (A-4) we can move one period back to derive the value of a two-period American put:

$$P_A = MAX\{X-V, [pP_d + (1-p)P_u] \div r_f\} \quad (A-5)$$

where

$$P_d = MAX\{\theta X-d\theta V, [pP_{dd} + (1-p)P_{ud}] \div r_f\}(A-6)$$
$$P_u = MAX\{\theta X-u\theta V, [pP_{ud} + (1-p)P_{uu}] \div r_f\}$$

and at the expiration date,

$$P_{dd} = MAX\{0, (2\theta-1)X-d^2(2\theta-1)V\} \quad (A-7)$$
$$P_{ud} = MAX\{0, (2\theta-1)X-ud(2\theta-1)V\}$$
$$P_{uu} = MAX\{0, (2\theta-1)X-u^2(2\theta-1)V\}.$$

Equations A-5 through A-7 may be solved iteratively in order to compute the exact current value of a two-period American put. For example, the value of A-7 determines the value of A-6 which in turn determines the value of A-5.

Exhibit A-4 compares the prices of a "regular" two-period American put and a two-period American put written on the value of an asset which declines at the rate of 33 percent per year. Note that the options are assumed to be written at-the-money because we assume that an operating lease can be cancelled even at the first instant by returning the equipment at its initial market value. The price of the put written on the asset with depreciating value is always less than the price of the corresponding American put written on the same asset without depreciation. Thus we see that the value of the "special" American put whose value has been derived in this appendix is a function of six parameters.

$$P_A = f(V,X,r_f,T,\sigma_v,\theta). \quad (A-8)$$

The first five parameters are the usual Black-Scholes parameters and have the usual partial derivatives. In addition, the expected depreciation of the asset is relevant and $\delta P_A/\delta\theta>0$.

Exhibit A-4. American Put Comparison

r_f	u	Prices of Two-Period "Regular" American Puts			
		1.3	1.5	1.7	1.9
1.1		.079	.145	.202	.251
1.3		*	.061	.143	.212
1.5		*	*	.049	.092
1.7		*	*	*	.041

r_f	u	Prices of Two-Period American Puts on an Asset which Declines in Value			
		1.3	1.5	1.7	1.9
1.1		.040	.085	.124	.157
1.3		*	.009	.048	.080
1.5		*	*	†	.023
1.7		*	*	*	†

Assumptions:
1. X = V = 1.0, i.e., the lease option is written at-the-money
2. θ = .667, assumes three-year straight-line depreciation
3. u = 1/d, assumes proportional up and down movements in value, V.
4. The exercise price on the option decreases at the rate (1-θ) percent per period.
*When the condition $d<r_f<u$ is violated, there is no option price because of riskless arbitrage opportunities.
†The condition $0>(r_f-1)/(u-1)$ is violated.

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[9] If the option is written at-the-money, exercise at the beginning of the first period will not be optimal. However, for any later time period V may be low enough to make early exercise optimal.

Analysis of Florida Total Product Forward-Looking Network Investment and Operating Expenses

Line No.	Forward-Looking Investment	Florida-Specific	Life	Expenses
1	212100 SUPPORT INVESTMENTS	$610,896,842	33	$0
2	221200 DIGITAL SWITCH	$432,871,846	12	$70,165,655
3	222000 OPERATOR EQUIPMENT	$0	10	$0
4	223200 CIRCUIT EQUIPMENT –DIGITAL	$496,618,041	8	$30,598,775
5	235100 PUBLIC- COIN	$0	0	$0
6	236200 OTHER TERMINAL EQUIP, DIGITAL	$0	8	$0
7	241100 POLES	$22,695,697	30	$12,807,117
8	242110 AERIAL CABLE- COPPER	$216,821,324	16	$16,510,313
9	242120 AERIAL CABLE- FIBER	$1,982,472	20	$43,646
10	242210 UNDERGROUND CABLE- COPPER	$312,102,793	17	$2,569,103
11	242220 UNDERGROUND CABLE- FIBER	$10,750,259	20	$85,646
12	242310 BURIED CABLE-COPPER	$981,811,200	18	$58,862,678
13	242320 BURIED CABLE- FIBER	$33,801,722	20	$1,208,106
14	244100 CONDUIT	$476,435,131	50	$433,221
15	269030 RTU Fees	$70,490,076	3	$11,425,974
16	Total Forward-looking Investments	$3,667,277,403	22.2	$204,710,235

Source of data: Verizon