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BEFORE THE ARIZONA CORPORATION COMMISSION

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COMMISSIONERS

JEFF HATCH-MILLER, Chairman  
WILLIAM A. MUNDELL  
MARC SPITZER  
MIKE GLEASON  
KRISTIN K. MAYES

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AZ CORP COMMISSION  
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IN THE MATTER OF THE APPLICATION OF ARIZONA-AMERICAN WATER COMPANY, AN ARIZONA CORPORATION, FOR A DETERMINATION OF THE CURRENT FAIR VALUE OF ITS UTILITY PLANT AND PROPERTY AND FOR INCREASES IN ITS RATES AND CHARGES BASED THEREON FOR UTILITY SERVICE BY ITS PARADISE VALLEY DISTRICT

DOCKET NO. W-01303A-05-0405

IN THE MATTER OF THE APPLICATION OF ARIZONA-AMERICAN WATER COMPANY, INC., AN ARIZONA CORPORATION, FOR APPROVAL OF AN AGREEMENT WITH THE PARADISE VALLEY COUNTRY CLUB

DOCKET NO. W-01303A-05-0910

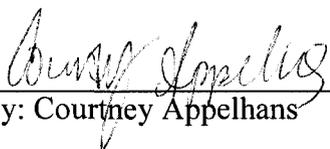
**ARIZONA-AMERICAN'S  
NOTICE OF FILING  
OPENING BRIEF**

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Arizona-American Water Company hereby files its Opening Brief in the above-referenced matters.

**RESPECTFULLY SUBMITTED** on May 5, 2006.

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**OPENING BRIEF OF ARIZONA-AMERICAN WATER COMPANY**

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1 **I. INTRODUCTION**

2 There are relatively few issues remaining in this case. Only two issues are left between  
3 Arizona-American and Staff. Staff's proposed level of rate-case expense is inconsistent with  
4 levels the Commission has recently found to be reasonable in cases of similar complexity and  
5 duration. Also, Staff's return-on-equity calculation fails to compensate investors for Arizona-  
6 American's rate-friendly capital structure.

7 RUCO's issues are more numerous. RUCO's rate-case expense allowance is based on a  
8 tiny case from several years ago that bears little resemblance to this case, which involves, among  
9 other things, multi-million-dollar investments for arsenic remediation and public safety.

10 RUCO's ROE determination also fails to compensate investors for Arizona-American's rate-  
11 friendly capital structure.

12 RUCO also strives to substitute its own judgment for that of the residents and elected  
13 representatives of the Town of Paradise Valley. To that end, RUCO opposes rate recovery in  
14 any manner for new infrastructure investment designed to protect the lives and property of  
15 Town residents.

16 RUCO also takes a number of positions that are contrary to Commission precedent,  
17 sound public policy, or both, such as its opposition to water-conservation rates. Some are just  
18 head-scratchers: why would any public agency oppose recovering the potentially life-saving  
19 expense of providing ice to employees who work in the hot Arizona sun?

20 Overall, the evidence supports a modest rate increase for the Paradise Valley Water  
21 District of 8.43%.

22 **II. PROCEDURAL HISTORY**

23 On June 3, 2005, as amended on June 17, 2005, Arizona-American Water Company  
24 ("Arizona-American" or the "Company") filed with the Arizona Corporation Commission  
25 ("Commission") an application for a determination of the current fair value of its utility plant and

1 property and for increases in its rates and charges for utility service based thereon for utility  
2 service by its Paradise Valley, Water District.

3 On July 18, 2005, the Commission's Utilities Division Staff ("Staff") filed a letter stating  
4 that the Company's application met the sufficiency requirements set forth in A.A.C. R14-2-103,  
5 and classifying the Company as a Class A utility.

6 On August 1, 2005, the Residential Utility Consumer Office ("RUCO") filed an  
7 Application to Intervene, which was granted by Procedural Order issued August 15, 2005.

8 On December 22, 2005, Arizona-American filed with the Commission an application for  
9 approval of an agreement with Paradise Valley Country Club ("PVCC"), which would allow  
10 PVCC a 15-percent discount from the Company's standard turf rates (Docket No. W-01303A-05-  
11 0910). The Commission's Utilities Division Staff ("Staff") filed a Staff Report recommending  
12 approval of the application, and stating that Staff has no objection to consolidation of the above-  
13 captioned dockets. On December 16, 2005, PVCC filed an Application to Intervene, which was  
14 granted by Procedural Order issued January 4, 2006. By Procedural Order issued February 28,  
15 2006, Docket Nos. W-01303A-05-0910 and W-01303A-05-0405 were consolidated.

16 As scheduled by Procedural Order issued August 15, 2005, the hearing in these matters  
17 commenced on March 27, 2006, before Administrative Law Judge Teena I. Wolfe ("Judge  
18 Wolfe"). The hearing continued on March 28, March 29, and April 3, 2006. Judge Wolfe set  
19 May 5, 2006, as the date for submitting opening briefs in these matters, and May 26, 2006, for  
20 submitting closing briefs. Arizona-American submits its opening brief in compliance with that  
21 schedule.

1 **III. RATE BASE**

2 **A. POSITIONS OF PARTIES**

3 **1. ARIZONA-AMERICAN**

4 Staff and Arizona-American have made a number of adjustments through the case. Staff  
5 and Arizona-American now agree that the rate base for the Paradise Valley Water District is  
6 \$14,412,903.<sup>1</sup>

7 **2. STAFF**

8 As just discussed, Staff also supports a rate base of \$14,412,903.<sup>2</sup>

9 **3. RUCO**

10 After several adjustments, RUCO's final recommended rate base is \$10,809,498. The  
11 Company will discuss each of these adjustments in the next section.

12 **B. RUCO's RATE BASE ISSUES**

13 **1. Post Test-Year Plant**

14 In Mr. Dorf's Direct Testimony, he recommended that \$3,018,867 in post-test-year plant,  
15 designed to improve fire-flows in Paradise Valley, be included in rate base.<sup>3</sup> Staff verified that  
16 the plant entered service in 2005. "Staff is recommending inclusion of the fire flow projects to  
17 encourage improvements in public fire safety and minimize the deferral of costs to future  
18 periods."<sup>4</sup>

19 Arizona-American accepted this adjustment. Initially, the Company also wished to  
20 include in rate base additional paid, post-test year invoices in the amount of \$105,164 associated  
21 with this plant.<sup>5</sup> However, assuming that the Commission approves some version of Staff's

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<sup>1</sup> Staff Post Hearing Exhibit S-15, p. 2.

<sup>2</sup> *Id.*

<sup>3</sup> Dorf Direct, pp. 4-5.

<sup>4</sup> *Id.*, p. 5.

<sup>5</sup> Reiker Rebuttal, pp. 8-9.

1 High-Block-Use Surcharge to fund fire-flow projects, the Company will be able to recover these  
2 costs from surcharge funds.

3 Arizona-American also placed an additional fire-flow project (Nauni Valley Drive) in  
4 service in October 2005 and requested its cost of \$420,755 be included in rate base.<sup>6</sup> Staff  
5 opposed this request. Arizona-American now accepts that Staff's position, based on Staff's  
6 assurance that this project will be eligible for recovery through funds generated by the fire-flow  
7 surcharge(s).<sup>7</sup>

8 As discussed below, RUCO is totally opposed to recovery of fire-flow/public safety  
9 investment under any circumstances.. Thus, its rate base calculation did not recognize the  
10 \$3,018,867 investment in new public-safety infrastructure.

11 **2. Cash Working Capital**

12 Arizona-American has reviewed Staff's working capital testimony,<sup>8</sup> and accepts its  
13 proposed \$0 cash working-capital allowance.

14 **3. Gain On Sale of Land**

15 Arizona-American and Staff agree on the treatment of the gain associated with the sale of  
16 a parcel of land on Casa Blanca Road – customers should share 50% of the after-tax gain of  
17 \$481,680.84.<sup>9</sup> The customers should receive this refund over three years through a surcredit.<sup>10</sup>

18 RUCO would instead require the Company to pay the capital-gains taxes associated with  
19 the sale and then share the *pre-tax* gain with customers.<sup>11</sup> RUCO admits that its proposed  
20 treatment is inconsistent with Commission precedent.<sup>12</sup>

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<sup>6</sup> *Id.*, p. 20

<sup>7</sup> 3 Tr. 427-28.

<sup>8</sup> Dorf Direct, p. 6.

<sup>9</sup> *Id.*, pp. 7-8; Reiker Rejoinder, p. 5.

<sup>10</sup> *Id.*

<sup>11</sup> Coley Direct, pp. 7-8.

<sup>12</sup> Coley Surrebuttal, p 5.

1 RUCO witness Coley believes that RUCO's gain-sharing proposal is equitable because  
2 ratepayers have allegedly provided the funds to pay the capital gains taxes.

3 Q (by Mr. Layton). Mr. Coley, do ratepayers actually pay taxes on the refunded  
4 gain or are you referring to the company paying taxes?

5 A. Ratepayers provide the taxes through rates to pay it.

6 Q. So are you saying that the ratepayers directly pay those taxes or is the  
7 company paying those taxes?

8 A. The company directly pays them but with the ratepayers' money.<sup>13</sup>

9 However, funds to pay capital-gains taxes are actually provided by the purchaser, as further  
10 cross-examination by the Company revealed.

11 Q. Let's say hypothetically, we will use your car example, except we will make it  
12 a piece of land. Two partners go in together, buy a piece of land. The cost is  
13 \$500,000. They hold it for a period of time greater than a year, sell it  
14 ultimately for a million and a half dollars. What would be the amount of the  
15 gain before tax?

16 A. You said 500,000 initially?

17 Q. Right.

18 A. It would be a million dollar gain.

19 Q. And where did the funds come from for that million dollar gain?

20 A. It came from whoever purchased the property had the gain.

21 Q. The purchaser provided the million dollars gain, correct?

22 A. Yes.

23 Q. Okay. And then the taxes, the capital gains tax would be owed on that million  
24 dollar gain, correct?

25 A. That's correct.<sup>14</sup>

26 **4. Plant Held for Future Use**

27 Staff and RUCO both originally recommended that two back-up submersible pumps,  
28 motors, and a transformer for the Company's Well No. 17 be excluded from rate base in the

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<sup>13</sup> 2 Tr. 371.

<sup>14</sup> 2 Tr. 373-74.

1 amount of \$132,682.<sup>15</sup> Mr. Reiker pointed out that the Commission had twice before found the  
2 equipment to be used and useful and included it in rate base.<sup>16</sup> Staff further considered the issue  
3 and ultimately included the \$132,682 in its rate base calculation.<sup>17</sup> Mr. Dorf acknowledged the  
4 Commission's prior treatment. He said further:

5           The Company also indicated that, in fact, one of the back up pumps included  
6 in this account was used for a repair to well number 16 during the test year. Since  
7 the Company had actually used the equipment, Staff will no longer recommend its  
8 adjustment to remove the equipment from rate base.

9           Because the Company has used this equipment, Staff recommends that the  
10 Company transfer the equipment from Plant Held for Future use to its appropriate  
11 Uniform System of Accounts ("USOA") capital account and use its authorized  
12 rates to depreciate the equipment.<sup>18</sup>

13 **IV. OPERATING INCOME**

14 **A. POSITIONS OF PARTIES**

15 **1. ARIZONA-AMERICAN**

16 Arizona-American and Staff agree that total test-year revenues at present rates are  
17 \$5,079,195.<sup>19</sup>

18 Arizona-American's calculated pre-tax, test-year operating expenses were \$3,725,261.  
19 Staff noted a \$4,306 error in Arizona-American's calculation.<sup>20</sup> The Company accepts Staff's  
20 correction and now calculates pre-tax, test-year operating expenses to be \$3,720,955.

21 Pre-tax operating income is now \$1,358,240. After-tax operating income is \$866,762.  
22

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<sup>15</sup> Dorf Direct, pp. 3-4; Coley Direct, p. 6.

<sup>16</sup> Reiker Rebuttal, pp. 6-7.

<sup>17</sup> Dorf Surrebuttal, p. 3.

<sup>18</sup> *Id.*

<sup>19</sup> S-15, p. 3.

<sup>20</sup> S-15, p. 3, note B.

1                   **2.     STAFF**

2                   Staff's calculated pre-tax operating expenses to be \$3,689,911, just \$31,044 less than the  
3 Company's calculation. The difference arises solely from Staff's \$100,611 reduction to test-year  
4 rate case expense. Amortized over three years, this reduction reduces operating expenses by  
5 31,044. Staff's final after-tax, test-year operating income calculation is \$886,714. This is  
6 \$22,597 more than Arizona-American calculates.

7                   **3.     RUCO**

8                   RUCO proposed a number of adjustments to Arizona-American's and Staff's final  
9 position. As a consequence, RUCO's final recommended after-tax operating income was  
10 \$1,035,400. The Company will take up each proposed adjustment in the next section.

11                   **B.     OPERATING INCOME ISSUES**

12                   **1.     Rate Case Expense**

13                   The parties agree on a three-year amortization but disagree on the amount of recoverable  
14 rate-case expense. Arizona-American recommends recovery of \$301,832 in rate case expense,<sup>21</sup>  
15 Staff would allow \$208,700 and RUCO just \$73,179.

16                   Approximately \$158,000 of the Company's requested rate case expense are costs  
17 associated with retaining Drs. Kolbe and Vilbert from the Brattle Group concerning return on  
18 equity. Staff would allow only \$79,134 of that expense.<sup>22</sup> RUCO does not make any specific  
19 adjustments. As discussed below, the substance of the Brattle Group's testimony is that the  
20 Commission has been using a flawed method to adjust returns on equity for differences in capital  
21 structure. This method is inconsistent with modern financial theory and discourages companies  
22 from financing projects with low-cost, tax-shielded debt. It has also been providing windfall  
23 returns for companies with little or no debt in their capital structures.

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<sup>21</sup> Broderick Rebuttal, p. 2; and Exhibit TMB-1.

<sup>22</sup> Igwe Direct, p. 10.

1           Because of the importance of the ROE issue, Arizona-American had no choice but to  
2 retain outside experts to address the matter. At the time it made the filing, the Company had no  
3 internal expertise on the subject. Also, because this was an issue of first impression for the  
4 Commission, and one that has implications for all future Commission rate cases, the Company  
5 retained the foremost experts in the field of how to properly adjust returns on equity for  
6 differences in capital structures. As further discussed below, the Brattle Group has authored  
7 numerous scholarly articles on the subject of returns on equity in a regulatory setting and  
8 testified before regulatory agencies throughout the world on rate-of-return methodologies.

9           Because of the importance of the issue and that it had not been considered before,  
10 Arizona-American wanted to thoroughly present the issue, which required two witnesses, one to  
11 explain the methodology and one to apply it. And for maximum credibility, senior members of  
12 the firm were needed. However, retaining two of the acknowledged experts in the field is  
13 expensive.

14           The only other difference with Staff is over the costs associated with Arizona-American's  
15 cost-of-service and rate-design witness. The Company is asking for \$42,677, while Staff would  
16 allow just \$28,677.<sup>23</sup> Clearly there are significant costs associated with preparing the cost-of-  
17 service and rate-design schedules—the most extensive schedules in a rate case—and associated  
18 testimony. The \$42,677 amount is reasonable.

19           RUCO took a different approach. Rather than examining each expense for  
20 reasonableness, RUCO proposed to cap rate-case expenses at an arbitrary level of \$73,139.<sup>24</sup>  
21 This amount was based on the allowed rate case expense in Paradise Valley Water's last rate  
22 case, grossed up for inflation.<sup>25</sup> These two cases are not remotely comparable.

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<sup>23</sup> Igwe Direct, pp. 9-11.

<sup>24</sup> Moore Direct, pp. 9-12.

<sup>25</sup> *Id.*, p. 11.

1 Paradise Valley Water's last rate case was filed in 1998 in Docket No. W-01303A-98-  
2 0507.<sup>26</sup> That case could hardly have been simpler. Staff and the Company settled their issues  
3 and RUCO had only two issues: post-test year plant; and a surcharge associated with the use of  
4 the Company's Central Arizona Water Project water. Most tellingly, cost of capital—including  
5 return on equity—was not an issue. As a result, there was only one day of hearings. The final  
6 order totals just 13 pages, including schedules and a service list.

7 The present case has been far more complicated and contentious. Arizona-American  
8 prepared and filed 22 separate testimony documents.<sup>27</sup> Discovery was extensive and hearings  
9 took four days. As already discussed, cost of capital was a major issue in this case. There were  
10 also two other major issues in this case. Arizona-American asked for an ACRM to recover over  
11 \$20 million in arsenic-remediation facilities.<sup>28</sup> Arizona-American also proposed investing over  
12 \$16 million in fire-flow projects.<sup>29</sup> Also, as will be discussed, RUCO has taken a number of  
13 questionable positions that required significant time and effort to rebut.

14 On the stand, RUCO could not defend its arbitrary amount of rate case expense:

15 Q. Cost of capital for Paradise Valley is based on the cost of capital of the parent  
16 corporation, Arizona-American, right?

17 A. I believe so.

18 Q. Cost of capital testimony would be basically the same regardless of how many  
19 districts were involved in the case, correct?

20 A. Correct.

21 Q. To the extent that there are policy issues, you would have to have the policy  
22 witness or two regardless of whether you had a single witness, I mean a single  
23 district or multiple districts, correct?

24 A. Correct.

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<sup>26</sup> See Decision No. 61831, dated July 20, 1999.

<sup>27</sup> Ten direct witnesses; eight rebuttal witnesses; and four rejoinder witnesses.

<sup>28</sup> Exhibit A-7, p. 6

<sup>29</sup> Exhibit D to Exhibit A-7.

- 1 Q. In terms of time, would you agree with the proposition that responding to data  
2 requests takes a significant amount of time, employee time in a case?  
3 A. Yes.  
4 Q. Do you know how many data requests that RUCO sent the company in this  
5 case? Let me make it: Would you accept subject to check that RUCO sent 11  
6 sets of data requests to the company in this case?  
7 A. I would accept that, yes.  
8 Q. And would you accept subject to check that there were a total of 112 data  
9 requests that were responded to by the company –  
10 A. Yes.  
11 Q. from RUCO?  
12 A. Subject to check, I guess.  
13 Q. And did you review some of those, the responses that the company provided?  
14 A. Yes, I have seen them all.  
15 Q. And some of those were quite lengthy and involved significant spreadsheets  
16 on CD ROMs and various other large documents?  
17 A. I don't know if the word large is correct, but yes, there was quite a bit of  
18 documentation.  
19 Q. And at the same time, the company had to respond to data requests for the  
20 Staff as well?  
21 A. Correct. And there were a significant number of data requests from Staff as  
22 well. Let me ask you before, did RUCO receive copies of the Staff data  
23 requests at well?  
24 A. Yes.  
25 Q. And there were a significant number of Staff requests as well?  
26 A. Yes.  
27 Q. The company still had to prepare and file the required A through H schedules  
28 for this district, correct?  
29 A. Correct.  
30 Q. And the company still had to prepare and file direct testimony, rebuttal  
31 testimony, and rejoinder testimony, correct?  
32 A. Yes.  
33 Q. And we are on the second day of what looks to be a hearing that will continue  
34 on into the third day, is that correct?

- 1 A. Yes.
- 2 Q. And based on -- well, let me ask you before, were you in the hearing room  
3 earlier today when the Administrative Law Judge set a briefing schedule in  
4 this case?
- 5 A. Yes.
- 6 Q. And the company would still have to file a closing, an initial brief and closing  
7 brief, is that correct?
- 8 A. Yes.
- 9 Q. And the company will still have to attend and participate at the Commission's  
10 open meeting on this application, correct?
- 11 A. Yes.
- 12 Q. Now, at the time the company filed this case -- well, let me back up, a little  
13 foundation. Are you aware that Arizona-American was subject to a three-year  
14 rate filing moratorium?
- 15 A. Arizona-American?
- 16 Q. Yes.
- 17 A. Yes.
- 18 Q. And that the company requested particularly that it be allowed to file a rate  
19 case for its Paradise Valley district, is that correct?
- 20 A. Correct.
- 21 Q. And that was in order for the Commission, or the stated reason was that the  
22 Commission could then approve an ACRM for the Paradise Valley district, is  
23 that correct?
- 24 A. Correct.
- 25 Q. That was a substantial investment represented by the arsenic facilities, is that  
26 correct?
- 27 A. Correct. They were requesting a mechanism.
- 28 Q. And you have, in order to get an ACRM approved -- let me back up. The  
29 company, to support its ACRM, sponsored both rate testimony and  
30 engineering testimony in this case, is that correct?
- 31 A. Yes.<sup>30</sup>

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<sup>30</sup> 2 Tr. 350-56.

1 Arizona-American's rate case expenses are not out-of-line with recent Commission cases.  
2 The following table contrasts recent awards in two water-utility cases with Arizona-American's  
3 request in this case:

4 **Table A – Recent Allowed Rate Case Expenses**

Utility	Decision No.	Year	Allowed Rate Case Expense	Major Issues	Hearing Days
Arizona-American Water (PV Rate Case)	N/A	2006	\$302,000 (Requested)	1. ACRM – \$23.5 million 2. Fire-Flow Projects - \$16 million 3. ROE/Leverage Effect	4
Arizona Water – Western Division	68302	2005	\$250,000	CAP Recovery Mechanism	6
Chaparral City Water	68176	2005	\$285,000 <sup>31</sup>	1. Plant Expansion 2. Adjuster 3. ROE	4

5 Based on the complex issues in this case, the number of testimony documents, the  
6 amount of discovery, the length of the hearing, and the need to file two post-hearing briefs,  
7 \$302,000 is a reasonable rate-case expense.

8 **2. Labor and Pension Expenses**

9 RUCO would disallow the expenses associated with an arsenic-plant operator, who was  
10 hired after the test year concluded.<sup>32</sup> Mr. Biesemeyer explained the need for this employee:

11 He attends the weekly meetings on the progress of the Arsenic Plant in Paradise  
12 Valley. He is currently learning about the operations of the other Arsenic  
13 Treatment Plants that are coming on line in the Central Division in preparation for  
14 the start-up phase of the Paradise Valley plant. He is working with the Network  
15 and Production employees in Paradise Valley to familiarize himself with the  
16 entire district. He will help out in running pump stations, tanks, and wells – what  
17 we refer to as the water plant. We are re-piping the system so that water will flow  
18 from the Miller Road Treatment Facility into the new Arsenic Treatment Plant

<sup>31</sup> Rate case expense was not an issue in the Chaparral City Water case. The parties accepted the Company's filed amount of \$285,000. Please see Exhibit A to this Brief.

<sup>32</sup> Labor expense - \$41,603; associated pension expense - \$2,205. Moore Surrebuttal, pp. 7-10.

1 and then out to the distribution system. Our new Arsenic Plant Operator will take  
2 part in the operational testing for the new arsenic plants coming on line in the  
3 Central Division, including one that comes on in May that will be similar to the  
4 Paradise Valley Plant. He will gain valuable knowledge and training for the  
5 proper operations and maintenance of the plant through this experience. We felt it  
6 was critical to his learning to hire this position as quickly as possible to get him as  
7 much experience as possible in learning this new technology.<sup>33</sup>

8 Although this employee was hired post-test year, it is fair to include his employment  
9 expense for recovery in this case. The Paradise Valley arsenic treatment facility will enter  
10 service in 2006. It would have been imprudent for the Company to postpone hiring and training  
11 a new employee until 2006 to operate a multi-million-dollar plant using new technology. Hiring  
12 the employee in 2005 gave him the opportunity to rapidly move up the learning curve through  
13 hands-on experience with the Company's other arsenic-treatment facilities.

14 Through an approved ACRM, Arizona-American will have the opportunity to recover  
15 much of its investment and certain capitalized O&M expenses associated with the Paradise  
16 Valley arsenic-treatment facility. However, recovery of labor expense required to operate the  
17 facility would normally have to wait until Arizona-American's next Paradise Valley general rate  
18 case, presently scheduled to be filed in 2010.<sup>34</sup> Assuming the Commission issues an order in that  
19 case in 2011, the result would be that the Company would be unable to recover the costs  
20 associated with this employee—an employee required by an unfunded federal mandate—for six  
21 years. Given these equities, and the Commission's policy to encourage water utilities to make  
22 the necessary financial commitments to satisfy the federal arsenic mandate, it is certainly fair to  
23 include the costs of this employee in rates beginning this year. Staff recognized these equities  
24 and RUCO should have too.

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<sup>33</sup> Biesemeyer Rebuttal, pp. 2-3. In referring to the "Central Division" Mr. Biesemeyer was discussing the new arsenic-treatment facilities in Arizona-American's Agua Fria Water and Sun City West Water Districts.

<sup>34</sup> Stephenson Direct, p. 20.

1                   **3.     Depreciation Expense**

2                   Arizona-American and Staff agree on total rate base and the corresponding depreciation  
3                   expense. As discussed above, RUCO would reject rate-base treatment for approximately \$3  
4                   million in fire-flow investment, along with the corresponding depreciation expense. The  
5                   remaining depreciation difference is caused by RUCO's unorthodox gain-sharing method  
6                   associated with the sale of the Casa Blanca Road parcel.<sup>35</sup> As previously discussed, both RUCO  
7                   adjustments should be rejected, along with the associated depreciation-expense adjustments.

8                   **4.     Tax Expense**

9                   a.     Property Taxes

10                  RUCO would reduce property-tax expense by \$44,561,<sup>36</sup> based on a methodology which  
11                  the Commission has repeatedly rejected.<sup>37</sup> "RUCO's calculation methodology, which uses only  
12                  historical revenues, unfairly and unreasonably understates property tax expenses and is therefore  
13                  inappropriate for ratemaking purposes."<sup>38</sup>

14                  RUCO would also offset property tax expense by \$56,844, based on its belief that  
15                  Motorola should reimburse Arizona-American for property taxes associated with the Miller Road  
16                  Treatment Facility ("MRTF").<sup>39</sup> This is wrong for at least three reasons.

17                  First, Arizona-American owns the MRTF, so property taxes are generally the Company's  
18                  responsibility. It is true that Motorola reimburses the Company for operating expenses  
19                  associated with the MRTF, but Motorola does not agree that property taxes (assessed on  
20                  revenues) should be reimbursable and has in fact never made reimbursements for property

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<sup>35</sup> This was the site of the Company's former operations center.

<sup>36</sup> Moore Direct, pp. 22-25.

<sup>37</sup> See Decision No. 68176, dated September 30, 2005 and Decision No. 68302, dated November 14, 2005. Copies of the relevant portions of these decisions were attached to Reiker Rebuttal as Rebuttal Exhibit JMR-RB-8.

<sup>38</sup> Decision No. 68302, p. 28.

<sup>39</sup> Moore Direct, p. 21.

1 taxes.<sup>40</sup> Therefore, any offset based on a hypothetical Motorola reimbursement would be  
2 speculative and inappropriate.

3 Second, even in the unlikely event that Motorola could be persuaded to make a  
4 reimbursement, the \$56,844 amount is grossly overstated. If the MRTF were separately assessed  
5 by the Department of Revenue, \$14,000 is the best estimate of the taxes that would be owed.<sup>41</sup>

6 Third, the method used by the Company and Staff to calculate property taxes is based on  
7 *adjusted* test-year revenues. Therefore, property taxes are already implicitly reduced by the  
8 proper amount, so any further adjustment would be improper.

9 b. **Payroll Taxes**

10 RUCO proposes to reduce payroll-tax expense (\$4,295) associated with the new arsenic  
11 facility operator.<sup>42</sup> As discussed above, the labor expense for this employee should be recovered,  
12 along with the associated payroll-tax expense.

13 5. **Administrative and General Expenses**

14 Based on its post-hearing comparisons, RUCO proposes a total reduction in allocated  
15 A&G of \$53,372. Arizona-American will next discuss each component of the proposed  
16 reduction.

17 a. **Annual Incentive Program**

18 RUCO initially proposed to disallow all of Arizona-American's annual-incentive  
19 program ("AIP") expense.<sup>43</sup> In his rebuttal testimony, Mr. Townsley discussed the AIP at length  
20 and explained why RUCO's position was wrongheaded.<sup>44</sup> Based on Mr. Townsley's testimony,

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<sup>40</sup> Reiker Rebuttal, p. 39

<sup>41</sup> Reiker Rejoinder, pp. 9-10.

<sup>42</sup> RUCO Post-hearing Comparison, Schedule RLM-3, Adjustment 11.

<sup>43</sup> Moore Direct, pp. 26-29.

<sup>44</sup> Townsley Rebuttal, pp. 9-18.

1 RUCO reconsidered its initial position, but still proposes to disallow the majority (\$12,796) of  
2 the allocated AIP expense.<sup>45</sup>

3 As passionately explained by Mr. Townsley, RUCO's proposed AIP disallowance is still  
4 wrongheaded.

5 [T]he Company's Annual Incentive Plan benefits customers, both short term and  
6 long term. Rather than re-arguing all of these reasons once again, let me simply  
7 say that *the Company's Annual Incentive Plan is a component of its overall*  
8 *employee compensation, which allows it to compete for employees in a tight*  
9 *Arizona labor market.* If this plan were eliminated the Company would need to  
10 raise base salaries in order to be competitive in the market. Basically, RUCO  
11 witness *Moore argues that he would rather include these costs in rates as base*  
12 *salaries instead of using the same dollars to provide additional benefits to*  
13 *customers* by clearly focusing employees on goals that improve the utility's  
14 ability to deliver high quality customer service. *This makes no sense to me, nor*  
15 *should it to this Commission.* I strongly urge the Commission to include the  
16 Annual Incentive Plan costs in our rates.<sup>46</sup>

17 There is little to add. The Phoenix labor market for skilled workers is extremely  
18 competitive. Employees, both present and potential, consider the AIP to be part of the entire  
19 compensation package. If the AIP were discontinued, to be competitive in the market, Arizona-  
20 American would have to raise salaries by the amount of the discontinued AIP opportunities for  
21 each pay grade. Annual salary expense would remain the same, but the Company would lose a  
22 valuable means of aligning individual performance with corporate and customer goals. As Mr.  
23 Townsley said: "This makes no sense to me, nor should it to this Commission."<sup>47</sup>

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<sup>45</sup> Moore Surrebuttal, pp. 19-21.

<sup>46</sup> Townsley Rejoinder, p. 5 (emphasis added).

<sup>47</sup> *Id.*

1                                   b.        Reorganizing/Downsizing Expenses

2           Neither Staff nor the Company accept RUCO's proposed disallowance of what RUCO  
3 claims to be \$42,441 in so-called Employee relocation costs.

4                                   c.        Ice

5           This is perhaps RUCO's most bizarre proposed disallowance.<sup>48</sup> The amount is small  
6 (\$161), but it is consistent with many of the extreme positions that RUCO takes in this case.

7           Arizona-American purchases ice and distributes it to its employees to keep water samples  
8 cool and to prevent field workers from becoming overheated in the hot Arizona sun.<sup>49</sup> To justify  
9 a disallowance, Mr. Moore included this necessary, potentially life-saving expense with:  
10 "Liquor, Coffee, Water, ..., Smoothies, Bagels, Donuts, Subs, etc."<sup>50</sup> It takes a hard heart to  
11 lump ice for field-workers in the same category as smoothies and donuts. Every truck  
12 transporting work crews in the Valley also carries a large cooler of ice water.

13           Mr. Biesemeyer explained why ice must be supplied:

14           This ice is used to keep water samples at the proper temperature until it can be  
15 shipped to the laboratories for testing. The ice is also used to cool down the water  
16 in the large igloo thermoses that the utility workers put on the end of their trucks  
17 to keep the outdoor workers hydrated. Certainly, both uses of ice must be allowed  
18 as necessary operating expenses.<sup>51</sup>

19           On cross-examination RUCO witness Moore even conceded the need for ice:

20           Q. Do you agree with Mr. Biesemeyer that ice is needed to refrigerate laboratory  
21 samples?

22           A. I have no proof either way that it is, say, an ADEQ requirement. I would take  
23 him at his word if it is required. I would say it is the quantity of ice that is  
24 required that would be the contentious part.

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<sup>48</sup> Moore Surrebuttal, p. 23.

<sup>49</sup> Biesemeyer Rebuttal, p. 3.

<sup>50</sup> Moore Surrebuttal, p. 23.

<sup>51</sup> Biesemeyer Rebuttal, p.3.

1 Q. Okay. Do you agree with Mr. Biesemeyer that ice is needed to keep  
2 fieldworkers cool in the hot Arizona sun?

3 A (after recess). Yes.

4 Q. And you wouldn't seriously jeopardize the health and perhaps even lives by  
5 not providing them ice, would you?

6 A. No.<sup>52</sup>

7 Yet, after being given every opportunity to reconsider this position, RUCO still advocates  
8 eliminating ice expense.<sup>53</sup>

9 RUCO appears to have lost its way. Positions like this one evidence an attitude that only  
10 rates matter. Even if the Town of Paradise Valley wants to pay for investments to protect the  
11 health and safety of its residents, RUCO stands alone in stubborn opposition. Even though ice is  
12 needed to protect employees from possible death in the Arizona sun and to refrigerate water  
13 samples, RUCO mocks the expense as akin to buying donuts and smoothies. RUCO should  
14 reconsider these and other extreme positions.

15 d. **Other**

16 RUCO would disallow another \$127 associated with Paradise Valley's share of costs  
17 associated with indoor plant maintenance and other items. Indoor plants beautify the workplace,  
18 take in carbon dioxide, and expel oxygen. These plants must be maintained and the cost is  
19 clearly not excessive. This proposed disallowance should also be rejected.

20 V. **COST OF CAPITAL**

21 A. **CAPITAL STRUCTURE AND COST OF DEBT**

22 1. **CAPITAL STRUCTURE**

23 The parties agree that Arizona-American's capital structure for the test year was  
24 comprised of 36.7% equity and 66.3% debt.

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<sup>52</sup> 2 Tr. 347-48

<sup>53</sup> RUCO Post Hearing Comparizon, Schedule RLM-4, line 68.

1                   **2.       COST OF DEBT**

2                   The parties agree that Arizona-American's cost of debt for the test year was 5.42%.

3                   **B.       COST OF EQUITY**

4                   **1.       ARIZONA-AMERICAN'S POSITION**

5                   a.       Introduction

6                   Arizona-American presented its cost-of-equity testimony through two witnesses from the  
7 Brattle Group: Dr. Lawrence Kolbe and Dr. Michael Vilbert. Dr. Kolbe reviewed the  
8 fundamental principals of financial economics that support the Brattle Group analyses and Dr.  
9 Vilbert then applied these principles to calculate Arizona-American's cost of equity.

10                  b.       Equitable Leverage Compensation

11                  Dr. Kolbe earned his Ph.D. in Economics from the Massachusetts Institute of  
12 Technology.<sup>54</sup> Dr. Kolbe first served as an Air Force officer, and then with several financial  
13 consulting firms, before co-founding the Brattle Group.<sup>55</sup> At the Brattle Group, Dr. Kolbe has  
14 performed extensive research in financial economics and is the coauthor of three books and  
15 numerous articles.<sup>56</sup> These include two 2005 articles on how to properly measure equity return  
16 as capital structure varies: *The Effect of Debt on the Cost of Equity in a Regulatory Setting*;<sup>57</sup>  
17 and *Measuring Return on Equity Correctly*.<sup>58</sup> Copies of these articles are attached to this Brief  
18 for the Judge's convenience as Exhibits B and C, respectively.

19                  Dr. Kolbe's methodology for calculating the effects of debt on the cost of equity will be  
20 referred to as "Equitable Leverage Compensation." The need for Equitable Leverage  
21 Compensation is based on 50 years of financial research including that of several Nobel Prize

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<sup>54</sup> Kolbe Direct, Appendix A, p. 1.

<sup>55</sup> *Id.*

<sup>56</sup> *Id.*

<sup>57</sup> Edison Electric Institute, January 2005, attached as Exhibit B

<sup>58</sup> Public Utilities Fortnightly, August 2005, attached as Exhibit C.

1 winners.<sup>59</sup> As developed by two of those Nobel Prize winners, Modigliani and Miller, the basic  
2 premise is known as Modigliani and Miller's Proposition II: *The expected rate of return on the*  
3 *common stock of a levered firm increases in proportion to the debt-equity ratio (D/E) expressed*  
4 *in market values ...*<sup>60</sup> Or, as put by Dr. Kolbe: "*There's no magic in financial leverage.*"<sup>61</sup> Put  
5 another way, the market value of a firm is independent of the equity ratio over a wide range of  
6 percentages. Therefore, the cost of capital recovered from customers should be constant over a  
7 large range of equity ratios.

8 The best example of why debt levels don't generally matter is the home-mortgage  
9 example offered by Dr. Kolbe in his direct testimony.<sup>62</sup> The market value of a home does not  
10 vary depending on whether it is owned outright (100% equity), or financed initially with 80%  
11 debt. However, the returns on investment increase (positively or negatively) in direct proportion  
12 to the amount of debt used to finance the home. A simplified version of Dr. Kolbe's example  
13 follows:

14 Assume two identical homes, with initial values of \$200,000. Homeowner A pays cash  
15 for his home. This is 100% equity financing. Homeowner B puts 40% (\$80,000) down and  
16 finances the remaining 60% of her home.

17 We will assume that five years later, each home is worth \$300,000. At that point, each  
18 homeowner would expect a \$100,000 return upon selling the home.<sup>63</sup> For Homeowner A, his  
19 percentage return would be \$100,000 on a \$200,000 investment, or 50%. For Homeowner B, she  
20 would expect a return of \$100,000 on her \$80,000 investment, or 125%. Of course there is no  
21 such thing as a free lunch – if the home's value had declined by \$50,000 over that five-year

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<sup>59</sup> Kolbe Rebuttal, p. 9.

<sup>60</sup> Brealey and Myers, *Principles of Corporate Finance* (6<sup>th</sup> Ed.), p. 481.

<sup>61</sup> Kolbe Direct, p. 33.

<sup>62</sup> *Id.*, pp. 34-47.

<sup>63</sup> Ignoring taxes and commissions.

1 period, Investor A would have a \$50,000 paper loss on his \$200,000 investment, or 25%.  
2 Investor B would also be out \$50,000 on paper, but on her \$80,000 investment would suffer a  
3 62.5 % loss. But it is important to recognize that the market value of each home is still identical,  
4 regardless of the amount of mortgage debt or the investors paper gains or losses.

5 Equitable Leverage Compensation is based on this simple understanding – as the amount  
6 of debt (leverage) increases, investors demand a correspondingly higher return on equity to  
7 compensate for the increased risk associated with more debt. However, the overall value of the  
8 investment remains constant. Therefore, the cost of capital to be recovered from customers  
9 should be constant over a large range of equity ratios.

10 c. **Application of Equitable Leverage Compensation**

11 Dr. Vilbert earned his Ph.D. in Financial Economics from the Wharton School of the  
12 University of Pennsylvania.<sup>64</sup> He joined the Brattle Group in 1994 after a long career as an Air  
13 Force officer, where he served as a fighter pilot, intelligence officer, and professor of finance at  
14 the Air Force Academy.<sup>65</sup> At the Brattle Group, Dr. Vilbert has specialized as an expert in cost-  
15 of-capital, financial planning, and valuation.

16 Dr. Vilbert calculated an expected return on equity for Arizona-American that utilized the  
17 Equitable Leverage Compensation method discussed by Dr. Kolbe. He first used a number of  
18 different financial methodologies— single and multi-stage discounted cash flow (“DCF”),  
19 Capital Asset Pricing Model (“CAPM”) and Empirical CAPM—to calculate returns of equity  
20 under various assumptions for a water company sample and then for a gas company sample.<sup>66</sup>

21 Dr. Vilbert was extremely thorough. He applied each methodology to his water-company  
22 sample and then to his gas-company sample.

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<sup>64</sup> Vilbert Direct, Appendix A, p. 1.

<sup>65</sup> *Id.*

<sup>66</sup> Vilbert Direct, Appendix C.

1 The following table summarizes just some of his results for the water-company sample:

2 **Table B – ROE Estimates: Water Company Sample**

<b>Method</b>	<b>ROE Estimate</b>	<b>Reference<sup>67</sup></b>
Simple DCF	10.8%	Table MJV-7, Panel A
Multi-Stage DCF	9.0%	Table MJV-7, Panel B
CAPM using long-term risk-free rate.	8.2%	Table MJV-9, Panel A
ECAPM (0.5% adjustment) using long-term risk-free rate.	8.4%	Table MJV-9, Panel A
ECAPM (1.5% adjustment) using long-term risk-free rate.	8.4%	Table MJV 9, Panel A
CAPM using short-term risk-free rate.	7.2%	Table MJV-9, Panel B
ECAPM (1.0% adjustment) using short-term risk-free rate.	7.7%	Table MJV-9, Panel B
ECAPM (2.0% adjustment) using short-term risk-free rate.	8.1%	Table MJV 9, Panel B
ECAPM (3.0% adjustment) using short-term risk-free rate.	8.6%	Table MJV 9, Panel B

3 The next table summarizes Dr. Vilbert's estimated returns on equity for the gas-utility  
4 sample:

5 **Table C – ROE Estimates: Gas Company Sample**

<b>Method</b>	<b>ROE Estimate</b>	<b>Reference<sup>68</sup></b>
Simple DCF	9.6%	Table MJV-18, Panel A
Multi-Stage DCF	9.4%	Table MJV-18, Panel B
CAPM using long-term risk-free rate.	8.5%	Table MJV-20, Panel A
ECAPM (0.5% adjustment) using long-term risk-free rate.	8.7%	Table MJV-20, Panel A
ECAPM (1.5% adjustment) using long-term risk-free rate.	9.2%	Table MJV-20, Panel A
CAPM using short-term risk-free rate.	7.7%	Table MJV-20, Panel B
ECAPM (1.0% adjustment) using short-term risk-free rate.	8.1%	Table MJV-20, Panel B

<sup>67</sup> All references are to Vilbert Direct, Appendix C tables, excluding Southwest Water and York Water.

<sup>68</sup> All references are to Vilbert Direct, Appendix C tables, excluding Keyspan Corporation and York Holdings.

<b>Method</b>	<b>ROE Estimate</b>	<b>Reference<sup>68</sup></b>
ECAPM (2.0% adjustment) using short-term risk-free rate.	8.5%	Table MJV 20, Panel B
ECAPM (3.0% adjustment) using short-term risk-free rate.	8.9%	Table MJV 20, Panel B

1 Dr. Vilbert's next step was to compute the After Tax Weighted Average Cost of Capital  
2 ("ATWACC") for each sample, starting with the weighted value for each of equity estimates and  
3 including the weighted value of debt and preferred stock (if any). The ATWACC formula  
4 follows:

$$5 (ROE) * (Equity Ratio) + (Preferred Equity Cost) * (P. Equity Ratio) + (Debt Cost) * (Debt Ratio)$$

6 For the Water Company Sample (excluding Southwest Water and York Water) the resulting  
7 ATWACCs ranged from 5.9 to 8.2%.<sup>69</sup> For the Gas Company Sample (excluding Keyspan  
8 Corporation and York Holding) the resulting ATWACCs ranged from 5.8 to 7.0%.<sup>70</sup>

9 As discussed above, the final step in applying Equitable Leverage Compensation is to  
10 compute Arizona-American's required ROE so that the Company's ATWACC equals that of the  
11 sample's ATWACC. Arizona-American's actual equity ratio and debt cost are plugged into the  
12 ATWACC equation, which yields the ROE required by investors. For the water-company  
13 sample (excluding Southwest Water and York Water) the resulting ROE estimates for Arizona-  
14 American ranged from 10.2 to 16.5%.<sup>71</sup> For the gas-company sample (excluding Keyspan  
15 Corporation and York Holding) the resulting ATWACCs ranged from 10.1 to 13.3%.<sup>72</sup>

16 To fall within the mid-point of the water-company ATWACC range, Dr. Vilbert's ROE  
17 point estimate for Arizona-American was 12.5 percent. Based on the gas-company sample the

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<sup>69</sup> Vilbert Direct, Appendix C, Tables MJV-8 and MJV-11.

<sup>70</sup> Vilbert Direct, Appendix C, Tables MJV-19 and MJV-22.

<sup>71</sup> Vilbert Direct, Appendix C, Tables MJV-8 and MJV-11.

<sup>72</sup> Vilbert Direct, Appendix C, Tables MJV-19 and MJV-22.

1 Company's ROE point estimate was 12 percent. Based on Dr. Vilbert's analysis, Arizona-  
2 American is requesting a 12 percent ROE.

3 **2. STAFF'S POSITION**

4 Staff presented its testimony through Dennis Rogers, a Public Utilities Analyst for the  
5 Commission's Utilities Division. Mr. Rogers applied the DCF and CAPM methods and  
6 estimated that the industry ROE was 9.8%.<sup>73</sup> Mr. Rogers then added 60 basis points (0.6%) to  
7 his base estimate to compensate for Arizona-American's greater leverage than his sample  
8 utilities.<sup>74</sup> This yielded Staff's final recommended ROE for Arizona-American of 10.4%.

9 **3. RUCO'S POSITION**

10 RUCO's ROE testimony was presented by William Rigsby, a Public Utilities Analyst for  
11 RUCO. Based on his DCF analysis, Mr. Rigsby calculated that the required ROE for his sample  
12 group was 9.5%.<sup>75</sup> To this figure, Mr. Rigsby added 50 basis points (0.5%) to adjust for  
13 Arizona-American's greater leverage.<sup>76</sup> Therefore, RUCO's final ROE recommendation was  
14 10.0%.

15 **4. DISCUSSION**

16 As applied to a regulated utility company, investors (debt and equity) expect to earn the  
17 same overall return on rate base over a wide-range of debt on the books. For that to happen, the  
18 allowed return on equity must be adjusted up or down in proportion to the amount of debt on the  
19 firm's books. If regulators do not correctly make this adjustment, then some companies may  
20 have their allowed cost of capital set too high and others too low. If the cost of capital is set too  
21 high, customers will pay more than needed to compensate investors. If the cost of capital is set

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<sup>73</sup> Rogers Direct, p. 34.

<sup>74</sup> *Id.*, pp. 34-35.

<sup>75</sup> Rigsby Direct, p. 32.

<sup>76</sup> *Id.*, p. 32-34.

1 too low, investors will not be properly compensated for the risk borne by their invested capital  
 2 and they will be reluctant to invest additional capital.

3 To their credits, both Staff and RUCO recognize that some adjustment was needed to the  
 4 Company's allowed return on equity to attempt to compensate investors for a higher leverage  
 5 risk. Staff added 0.6% to its ROE estimate to compensate Arizona-American for its more highly  
 6 levered capital structure.<sup>77</sup> RUCO added 0.5% to its base ROE estimate for the same reason.<sup>78</sup>  
 7 The traditional methods used by both Staff and RUCO to adjust for leverage do go part way  
 8 toward recognizing the effects of leverage on investor expectations. However, they do not go far  
 9 enough.

10 Based on recent decisions, the Commission has been over-compensating investors in low-  
 11 leverage utilities and under-compensating investors in high-leverage utilities. The following  
 12 table summarizes eight recent Commission ROE determinations and compares those  
 13 determinations to the parties' positions in this case.

14 **Table D – Recent ACC Overall Cost of Capital Awards**

Utility	Decision	Year	% Equity	% Return	% P'fd Equity	% ST Return	Debt	Return	After-tax Return	% LT Debt	Return	After-tax Return	After-tax WACC
AAW RUCO		2006	36.70%	10.00					0.00	63.30%	5.42	3.28	5.75%
AAW Staff		2006	36.70%	10.40					0.00	63.30%	5.42	3.28	5.89%
AAW Requested		2005	36.70%	12.00					0.00	63.30%	5.42	3.28	6.48%
Southwest Gas	68487	2005	40.00%	9.50	5.00%	8.20			0.00	55.00%	7.61	4.60	6.74%
Pineview Water	67989	2005	51.00%	8.90					0.00	49.00%	5.43	3.29	6.15%
APS	67744	2005	55.00%	10.25					0.00	45.00%	5.80	3.51	7.22%
Chapparal City	68176	2005	58.73%	9.30					0.00	41.27%	5.10	3.09	6.74%
AZ Water Eastern	66849	2004	66.20%	9.20		5.60%	4.00		2.42	28.00%	8.46	5.12	7.66%
AZ Water Western	68302	2005	73.40%	9.10					0.00	26.60%	8.40	5.08	8.03%
Las Quintas Serenas	67455	2005	100.00%	8.10					0.00	0.00%	0.00	0.00	8.10%
Rio Rico Utilities	67279	2004	100.00%	8.70					0.00	0.00%	0.00	0.00	8.70%

15 Table D shows that the overall weighted cost of capital awarded in the last eight major  
 16 Commission rate cases ranged from 6.15% to 8.7%. What this means is that Rio Rico Utilities'  
 17 customers were paying \$8,700 to the company's investors for \$100,000 in rate base, but

<sup>77</sup> Rogers Direct, p. 34.

<sup>78</sup> Rigsby Direct, pp. 32-34.

1 Pineview Water's customers were paying just \$6,150 to that company's investors for \$100,000  
2 in rate base.

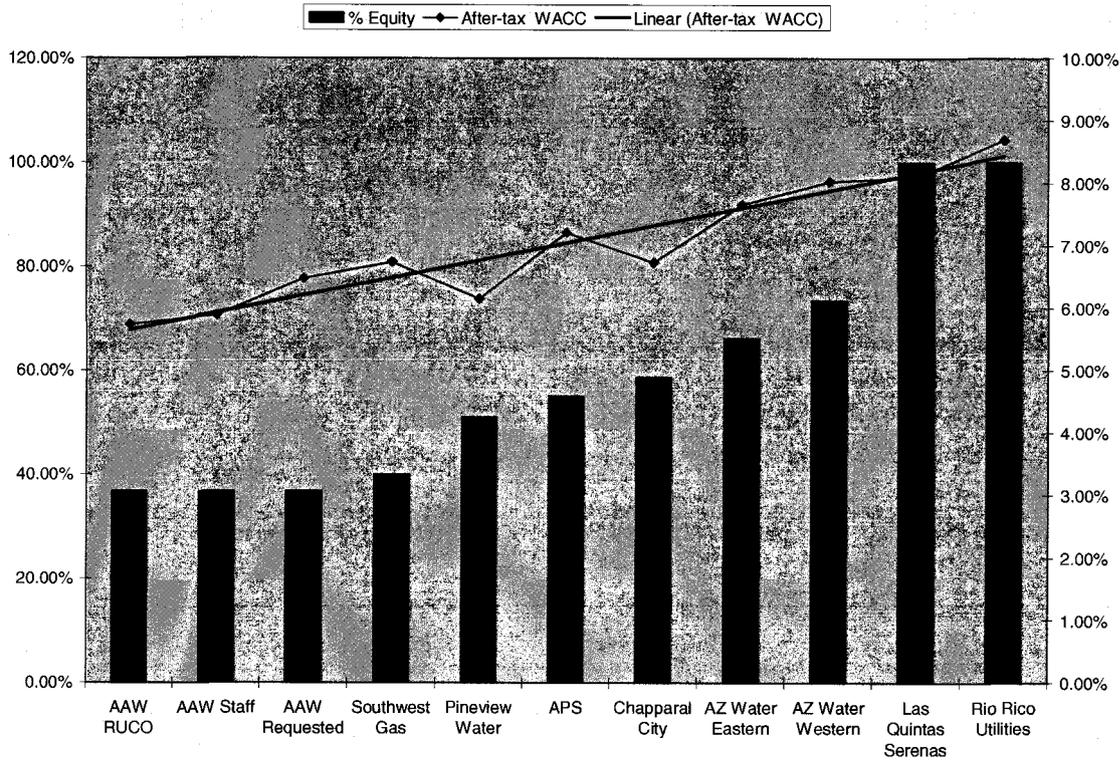
3 Arizona-American's request is at the extreme low end of the range. The Company is  
4 requesting investor compensation of just \$6,480 per \$100,000 in rate base. Staff's method would  
5 provide compensation of only \$5,890 per \$100,000 in rate base—well below the lowest cost of  
6 capital awarded by the Commission in recent years. RUCO would push overall compensation to  
7 investors even lower—down to just \$5,750 per customer.

8 Arizona-American is the largest water utility in the State. Compared to the largest gas  
9 and electric utilities in the state, Southwest Gas Corporation (“Southwest Gas”) and Arizona  
10 Public Service Company (“APS”), Arizona-American's requested investor compensation falls  
11 well short of their awards. Southwest Gas's investors receive \$6,740 for every \$100,000  
12 invested in rate base—\$260 more than the Company's request. APS's investors do much better;  
13 they receive \$7,220 for every \$100,000 invested in rate base—\$740 more than Arizona-  
14 American's investors. All three companies face massive investment obligations to satisfy the  
15 incredible growth in their service territories. In addition, Arizona-American has been forced by  
16 new federal mandates to invest over \$45 million for new arsenic remediation facilities, while its  
17 customers are demanding massive new infrastructure investments to satisfy new fire-flow  
18 requirements. There is simply no reason that investors should be compensated more for  
19 investing in one of Arizona-American's peer utilities.

20 The following chart highlights data from Table D:

1

**Chart A – Equity Ratios Versus Overall Returns**



2

The red bars in Chart A order the equity ratios from lowest to highest for the companies in the last eight Commission rate cases. The left vertical axis shows the equity ratio for each company. The blue line displays the overall authorized cost of capital for each company, including RUCO's, Staff's, and Arizona-American's positions in this case. The right vertical axis displays the return percentages. Finally, the black line is a linear trend-line to show the trend of the overall cost-of-capital awards as equity ratios increase. Based on fifty years of financial research, this trend-line should be flat over the range of equity ratios on Chart A, with a small decline beginning as equity ratios approach 100%.<sup>79</sup>

10

However, Table D and Chart A show instead that there is magic with leverage at the Commission. The trend line rises smoothly toward the right. The greater a company's equity,

11

<sup>79</sup> Because of differences in embedded debt costs the actual line will still be bumpy, but the trend should be flat.

1 the greater is its overall return. Put another way, the greater a company's equity, the greater the  
2 allowed return on capital and the greater the corresponding customer revenue requirement.

3 Interest on debt is tax free, so the revenue requirement associated with a dollar of debt  
4 investment is substantially lower in today's markets than for a dollar of equity investment.  
5 Companies should be *encouraged*, within reason, to borrow funds rather than finance new  
6 investments with equity. However, because the Commission rewards companies with higher and  
7 higher returns as equity ratios increase, Arizona companies are reluctant to issue low-cost debt.

8 Arizona-American's 36.7% equity ratio is balanced with 63.3% of low-cost debt.  
9 Because of the tax shield, the actual cost to customers of this debt is only 3.28%. This is a  
10 tremendous benefit to customers. But there is an associated cost to investors. Just as in the  
11 home mortgage examples, higher debt ratios mean that actual equity returns will be much more  
12 variable. This additional financial risk requires a higher allowed equity cost to attract investors  
13 willing to carry low-cost debt.

14 The Commission's goal should be to balance overall allowed returns so that customers  
15 are indifferent to whether a company finances its investments with debt or equity. The trend line  
16 for allowed returns should be flat, not sloping upward as more and more equity is added and low-  
17 cost debt avoided. Equitable Leverage Compensation ensures that result.

18 Equitable Leverage Compensation is mathematically equivalent to another method the  
19 Commission already uses to adjust for leverage—a hypothetical capital structure. The  
20 Commission uses hypothetical capital structures to set the allowed overall return on rate base for  
21 both Tucson Electric Power and Southwest Gas.<sup>80</sup>

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<sup>80</sup> See direct testimony of Staff witness James J. Dorf in Docket No. E-0933A-04-0408, dated June 24th, 2005, and direct testimony of Staff witness Stephen G. Hill in Docket No. G-01551A-04-0876, dated July 26, 2005, as well as previous rate case dockets for Tucson Electric Power Company and Decision No. 68487, dated February 23, 2006 (Southwest Gas Corporation.).

1 Here is an illustrative example:<sup>81</sup>

2 Proxy group averages:

3	Equity ratio	60%
4	ATWACC	7.0%
5	Debt cost	6.0%
6	Tax rate	39.5%

7 ROE?

8  $0.6(\text{ROE}) + 0.4*6.0*(1-0.395) = 7.0\%$

9  $0.6(\text{ROE}) + 1.452 = 7.0\%$

10  $\text{ROE} = (7.0 - 1.452)/.6\%$

11  $\text{ROE} = 9.247\%$

12 Equitable Leverage Compensation uses the ATWACC to derive the required ROE for a  
13 utility with a 40% equity ratio and a 5.5% embedded debt cost.

14	Equity ratio	40%
15	ATWACC	7.0%
16	Debt cost	5.5%
17	Tax rate	39.5%

18 ROE?

19  $0.4(\text{ROE}) + 0.6*5.5*(1-0.395) = 7.0\%$

20  $0.4(\text{ROE}) + 1.996 = 7.0\%$

21  $\text{ROE} = (7.0 - 1.996)/.4\%$

22  $\text{ROE} = 12.51\%$

---

<sup>81</sup> The following simplified examples assume that the market value of the company's debt equals its book value. In actual application, we would need to adjust the revenue requirement for the difference between book and market value.

1           If we apply this same ATWACC to an assumed \$100,000 of rate base, then the required  
2 overall return is \$7,000 – including the 12.51% ROE.

3           If we had instead used a hypothetical capital structure (with a 60% equity ratio) to set the  
4 required return for that same utility the calculation would proceed as follows:

5           ROE?

6                      $0.6(\text{ROE}) + 0.4*5.5*(1-0.395) = 7.0\%$

7                      $0.6(\text{ROE}) + 1.331 = 7.0\%$

8                      $\text{ROE} = (7.0 - 1.331)/.6\%$

9                      $\text{ROE} = 9.448\%$

10           By using the hypothetical capital structure, the required return on equity has dropped over  
11 300 basis points (12.51% to 9.448%). However, the required overall return is still exactly \$7,000  
12 for each \$100,000 in rate base.

13           Equitable Leverage Compensation also demonstrates that a utility with very little debt  
14 requires a correspondingly lower return on equity. Let's look at a utility with an 80% equity  
15 ratio and the same debt cost and rate base as in the previous two examples.

16           Equity ratio	80%
17           ATWACC	7.0%
18           Debt cost	5.5%
19           Tax rate	39.5%

20           ROE?

21                      $0.8(\text{ROE}) + 0.2*5.5*(1-0.395) = 7.0\%$

22                      $0.8(\text{ROE}) + 0.6655 = 7.0\%$

23                      $\text{ROE} = (7.0 - 0.6655)/0.8\%$

24                      $\text{ROE} = 7.918\%$

25           However, the overall required return on \$100,000 in rate base would still be exactly \$7,000.

1 Commission Staff has been encouraging Arizona-American to increase its equity ratios.  
2 However, Staff's recommended ROE in this case is well below what modern financial theory  
3 requires to fairly compensate Arizona-American's investors. As Dr. Kolbe is fond of saying:  
4 "You can't push on a rope."<sup>82</sup> A commission can pull in investors if a company's ROE's is set at  
5 level that compensates them for the risk of the investment—including the financial risk of  
6 increased leverage.

7 A too-low allowed ROE is counterproductive – it actually makes it more difficult for the  
8 Company to generate retained earnings to increase equity. A too-low ROE also makes a  
9 company extremely reluctant to take on discretionary investments. This is exactly the position  
10 that Arizona-American is in. It is actually shedding equity through losses and can no longer  
11 invest in discretionary projects without obtaining pre-approval and assurance of minimal  
12 regulatory lag.

13 The Commission has the opportunity, by setting the Company's allowed ROE at a level  
14 sufficient to compensate investors for the financial risk associated with higher leverage, to help  
15 the Company to begin to regain financial health. This is only fair; Arizona-American's  
16 customers benefit from the Company's ability to continue to borrow large amounts of low-cost,  
17 tax-shielded debt. Arizona-American's equity investors make those borrowings possible by their  
18 willingness to assume the associated financial risk. Their reward should be commensurate with  
19 that risk.

## 20 VI. RATE INCREASE

21 Based on the Company's proposed adjustments, Paradise Valley's adjusted test year  
22 operating income is \$866,762, and its adjusted test year original cost rate base ("OCRB") is  
23 \$14,412,903. Multiplying the Company's proposed 7.84 percent rate of return by the OCRB  
24 produces required operating income of \$1,129,527. This is \$262,765 more than the Company's

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<sup>82</sup> Kolbe Direct, p. 13.

1 test year adjusted operating income. Multiplying the deficiency by the gross revenue conversion  
2 factor of 1.6286 results in an increase in revenues of \$427,939, or an 8.43 percent net increase  
3 over test year adjusted revenues.

4 **VII. RATE DESIGN**

5 **A. GENERAL RATE DESIGN**

6 Staff witness Carlson succinctly and accurately described the proposed general rate  
7 design in this case.

8 The Company's Paradise Valley District currently has a conservation-type rate  
9 design, in that it has no gallons included in its base rates and has three-tier  
10 inverted block commodity rates. Its Mummy Mountain acquisition does carry  
11 1,000 gallons included in the minimum and only a single-tier commodity rate but  
12 the Company is changing this situation (and Staff concurs) by consolidating the  
13 rate designs and eliminating the Mummy Mountain, non-conservation rates.

14  
15 The Company's proposed rates and Staffs recommended rates are quite similar in  
16 this case because it is a continuation of the rate design policies previously ordered  
17 by this Commission. Staff has adopted and recommends very similar rates and  
18 identical tier levels to those proposed by the Company. The difference in the  
19 actual commodity rates is caused by Staffs adjustment to a lower revenue  
20 requirement.

21  
22 The Company did not request any increases in its miscellaneous service charges  
23 and Staff concurs. The Company did not itemize, but requested increases in the  
24 Service Line and Meter Installation Charge. Staff set the increase at the mid-point  
25 of the Staff recommended range for each meter size.<sup>83</sup>

26 Arizona-American agrees that any differences between its and Staff's general rate design  
27 are driven solely by differences in revenue requirement.

28 RUCO recommends no changes to existing rate design.<sup>84</sup>

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<sup>83</sup> Carlson Direct, pp. 2-3.

<sup>84</sup> Coley Direct, p. 5.

1           **B.     HIGH BLOCK USAGE SURCHARGE**

2           To promote water conservation, Arizona-American initially proposed two surcharges on  
3 usage in the residential high block (greater than 80,000 gallons).<sup>85</sup> Any funds generated by the  
4 high-block surcharges would be treated as contributions.<sup>86</sup>

5           Staff later proposed a simplified high-block surcharge of \$2.15 for all high-block  
6 consumption.<sup>87</sup> Staff agreed that funds generated by the high-block surcharge should be treated  
7 as contributions, but further recommended that these funds be dedicated to fund fire-flow  
8 investments. As more fully explained in the next section, this proposal is acceptable to Arizona-  
9 American.

10          RUCO opposes the high-block surcharge in any form.<sup>88</sup> Generally, RUCO's opposition  
11 is based on its opposition to the Paradise Valley fire-flow investments. In the next section, of  
12 this brief, Arizona-American responds fully to RUCO's wrong-headed opposition to the fire-  
13 flow investments. All the Company will add in this section, is that RUCO is also opposing the  
14 water conservation that the high-block surcharge is designed to promote.

15       **VIII.   FIRE-FLOW INVESTMENTS**

16           **A.     PRUDENCE OF FIRE-FLOW INVESTMENTS**<sup>89</sup>

17          The Town of Paradise Valley ("Town") asked Arizona-American to upgrade its system to  
18 improve the ability to fight fires in the town. The Town became concerned about the fire-flow  
19 capabilities of the water systems servicing the Town in 2002 after a lightning strike ignited a  
20 blaze, destroying a large home. News investigation into the fire raised concerns about the  
21 adequacy of fire flow during fire fighting operations.

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<sup>85</sup> Stephenson Direct, pp. 34-35.

<sup>86</sup> *Id.*

<sup>87</sup> Carlson Direct, pp. 3-4.

<sup>88</sup> Diaz Cortez Direct, pp. 11-14; Diaz Cortez Surrebuttal, pp. 8-11.

<sup>89</sup> This section, see generally Biesemeyer Direct, pp. 3-6

1           In April 2003, Arizona-American spoke to the Town Council Water Committee about the  
2 capacity of Arizona-American's system. Arizona-American discussed how Commission  
3 regulations only require a minimum pressure at the meter, with no specific standards for fire  
4 flow. To address the gap between reality and what was desired by the Town, Arizona-American  
5 proposed forming a working group of its customers to address the issue with the community.

6           In July 2003, Arizona-American, working with the Town, formed the Paradise Valley  
7 Water Users Group (Users Group), with representation from throughout the community and  
8 Arizona-American's customer base, including representatives from areas in Scottsdale and  
9 unincorporated Maricopa County.

10           The Users Group met on four occasions from July through October 2003. Arizona-  
11 American hired Dr. Marty Rozelle, President of the Rozelle Group, Ltd., as facilitator, and  
12 Brown & Caldwell Engineering Company as engineering and water-modeling experts for the  
13 Users Group. The Users Group reviewed water modeling results for the Paradise Valley Water  
14 District, listened to the community's concerns, set priorities for making improvements, and then  
15 reviewed and endorsed a Fire Flow Improvement Plan (FFIP) proposed by Arizona-American.  
16 The Users Group determined that Arizona-American should observe the following priorities in  
17 making improvements:

- 18           • Make improvements in those areas with the smallest amount of existing fire flow  
19           (less than 500 gallons per minute (gpm) first, 500-1000 gpm second, and 1000-1500  
20           gpm third); and
- 21           • Make improvements in order of cost effectiveness as measured by a ratio of cost per  
22           customer impacted. The lower the cost per individual impacted, the higher the  
23           priority. The thought was that by doing the most cost effective projects first, a larger  
24           number of people would be impacted per dollar spent and the higher cost projects that  
25           impacted only a few individuals would be scheduled later in the FFIP.

1           Based on the Users Group's priorities, Arizona American developed a six-year, \$15.5  
2 million, FFIP that incorporated all the Users Group's priorities, along with a cost-effective  
3 means of staging and grouping projects. Totaling the FFIP with arsenic treatment facility  
4 investments (estimated at that time at over \$15 million), plus \$7.5 million in other estimated  
5 system improvements, Arizona-American initially estimated that the total rate impact by 2010,  
6 after all investments are complete, would be 89%.

7           Arizona-American briefed the Town Council Water Committee on November 4, 2003,  
8 and the full Paradise Valley Town Council on December 18, 2003, on the User Group's findings  
9 and the FFIP. These briefings included the Company's estimated 89% rate impact. Both the  
10 Committee and the Town Council were impressed with the findings and the FFIP.

11           The Town is urging the Company to complete the projects as quickly as possible.<sup>90</sup> The  
12 Town understands there are upcoming rate increases associated with both the fire-flow  
13 improvement and arsenic-removal facility.<sup>91</sup> Both the City of Phoenix and Berneil Water  
14 Company have also begun projects to improve fire flows within the Town at the Town's  
15 request.<sup>92</sup>

16           Company Engineer Joseph Gross described the proposed investments needed to satisfy  
17 the Town's request.<sup>93</sup>

18           The Paradise Valley Public-Safety Improvements result from a comprehensive  
19 study that the firm of Brown & Caldwell, completed in 2004, of distribution  
20 system improvements needed to improve fire-flow capacity throughout the  
21 Paradise Valley Water District. Brown & Caldwell proposed a six-phase plan  
22 of improvements for a total cost of \$15.6 million. To provide adequate water

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<sup>90</sup> Letter from Town Manager, admitted as Exhibit A-29. A copy of Exhibit A-29 is attached for convenience as Exhibit D to this Brief.

<sup>91</sup> *Id.*

<sup>92</sup> *Id.*

<sup>93</sup> Gross Direct, pp. 6-8.

1 storage capability for meeting residential fire flow requirements of 1500  
2 gallons per minute for two hours, a second 1.5 million gallon reservoir is also  
3 planned at the site of the arsenic removal facility in 2006. The cost of this  
4 reservoir is estimated at \$750,000. Since the need for additional storage  
5 capacity had been identified in an internal comprehensive planning study in  
6 1999, it was not further addressed by the Brown & Caldwell study. Exhibit C  
7 provides a location map of the service area, which shows the location of the  
8 major facilities. Exhibit D includes a table with project descriptions, phasing  
9 plan, and cost estimates to include the reservoir.

10 ...

11 Phase I, referred to as the Jackrabbit/Invergordon Water Main Replacement  
12 Project, consisted of replacing one-half mile of six-inch asphalt concrete pipe  
13 with 16-inch ductile iron pipe on Invergordon Road from Jackrabbit to  
14 McDonald. In addition, the project included replacing one mile of four-inch  
15 asphalt concrete pipe with 24-inch ductile-iron pipe on Jackrabbit Road from  
16 Invergordon Road to Scottsdale Road. These capital plant additions were  
17 completed and placed into service in March 2005, and are currently being  
18 utilized to serve existing customers within the Paradise Valley District. The  
19 total cost for these plant additions was \$1,818,226.04.

20  
21 Another project is currently under construction and will be in service in 2005.  
22 It consists of pipeline replacements in McDonald Drive, between 44th Street  
23 and Tatum Boulevard. This project appears in Exhibit D as Project 8, and was  
24 originally scheduled in 2007. The Town of Paradise Valley is currently  
25 relocating a large section of Tatum Boulevard, and asked the Company to  
26 coordinate our pipeline replacement with this project. To accommodate the  
27 Town's construction schedule, and because of repeated pipeline breaks this  
28 past winter, we decided to install this section of pipeline during 2005. The  
29 current construction cost is estimated at \$667,000. The remainder of Project 8  
30 will be constructed in 2007.

31 Exhibit D to Mr. Gross's direct testimony details the entire planned fire-flow investment  
32 for the Paradise Valley Water District.

1 Staff reviewed the proposed investments and recommended that \$3,018,867 in completed  
2 projects be included in rate base.<sup>94</sup> “Staff is recommending inclusion of the fire flow project to  
3 encourage improvement in public fire safety and minimize the deferral of costs to future  
4 periods.”<sup>95</sup>

5 RUCO was the only party to oppose fire-flow projects in the Town.

6 Q (by Mr. Marks). In fact, your testimony states that you don't believe fire flow  
7 investments should be recoverable from customers at all, is that correct?

8 A (by Ms. Diaz Cortez). Correct.<sup>96</sup>

9 This was RUCO's position even though:

- 10 • The Town requested the fire-flow improvements;<sup>97</sup>
- 11 • The Town asked all three water utilities serving the town (Arizona-American; Berneil  
12 Water Company; and the City of Phoenix) to make fire-flow improvements;<sup>98</sup>
- 13 • The decision to request the fire-flow investments was the result of a collaborative,  
14 grass-roots process;<sup>99</sup>
- 15 • The Town cannot legally fund the fire-flow improvements;<sup>100</sup>
- 16 • The Town and its residents are aware of the rate increases needed to fund the fire-  
17 flow improvements;<sup>101</sup>

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<sup>94</sup> Dorf Direct, p. 5.

<sup>95</sup> *Id.*

<sup>96</sup> 3 Tr. 451.

<sup>97</sup> Diaz Cortez Direct, p. 2; Exhibit A-29.

<sup>98</sup> Exhibit A-29.

<sup>99</sup> Diaz Cortez Direct, pp. 2-3; Exhibit A-29; Biesemeyer Direct, pp. 3-6.

<sup>100</sup> Exhibit A-29; 4 Tr. 542-44.

<sup>101</sup> Biesemeyer Direct, p. 5; Exhibit A-29

- 1           • The fire-flow improvements will enable the Paradise Valley infrastructure to support  
2           the Uniform Fire Code's requirement to provide a minimum flow of 1500 gallons per  
3           minute;<sup>102</sup>
- 4           • Scottsdale and County residents served by Arizona-American will also benefit from  
5           the system improvements, although few will actually pay for them through  
6           surcharges;<sup>103</sup> and
- 7           • The fire-flow improvements will protect the lives and properties of residential  
8           customers.

9           RUCO's opposition to these important investments is difficult to fathom. The projects  
10          were requested and supported by residential customers; they will protect the lives and properties  
11          of residential customers; and residential customers are willing to pay for the improvements. In  
12          the face of RUCO's adamant objection to the fire-flow improvements, the fair question is: *Whom*  
13          *does RUCO represent in this case?* Arizona-American hopes that RUCO will evaluate the  
14          public interest in this case and reconsider its opposition to the fire-flow improvements.

15           **B. RECOVERY OF FIRE-FLOW INVESTMENTS**

16          Arizona-American originally sought to recover its fire flow investments through a series  
17          of surcharges, each to go into effect after a corresponding phase of the investment enters  
18          service.<sup>104</sup> Staff proposed instead that the funds generated by the proposed high-block surcharge  
19          be used as contributions to pay for fire-flow projects.<sup>105</sup>

20          Arizona-American accepted Staff's proposal, but pointed out that the money generated by  
21          the high-block surcharge would not be adequate to timely fund the scheduled fire-flow

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<sup>102</sup> Exhibit A-29; Q (by Mr. Marks) Anyway, focusing on residential customers, the standard is designed to protect the lives and properties of residential customers, is it not? A (by Ms. Diaz Cortez). Yes.

<sup>103</sup> Exhibit A-27; 1 Tr. 114-15; 2 Tr. 291-96.

<sup>104</sup> Stephenson Direct, pp. 20-33.

<sup>105</sup> Carlson Direct, p. 4.

1 projects.<sup>106</sup> As a consequence, the Company recently delayed two major fire-flow projects  
2 scheduled for 2006,<sup>107</sup> and stated that it would have to “recast its multi-year plans and schedules  
3 in Paradise Valley.”<sup>108</sup>

4 In response to Arizona-American’s concerns over the delays that would result if fire-flow  
5 projects were to be funded solely from High-Block surcharge revenues, Staff prepared and filed  
6 Exhibit S-9, titled “Alternative Fire-Flow Surcharge.” Staff did not recommend this alternative,  
7 but offered it as an alternative if the Commission believes a surcharge is appropriate.<sup>109</sup> Under  
8 the Staff alternative proposal, a second phase, effective October 1, 2007, would increase the  
9 High-Block surcharge from \$2.15 to \$3.15 per 1,000 gallons. On that same date, a new “Public  
10 Safety’ surcharge of \$1.00 per 1,000 gallons would go into effect for second-tier residential  
11 customers and first-tier commercial customers. Staff estimates that the initial High Block  
12 surcharge would generate approximately \$1.7 million annually, with the Public Safety  
13 surcharges adding another \$1.8 million each year.<sup>110</sup>

14 Arizona-American believes that, due to the conservation effect of the higher water rates,  
15 annual revenues will be somewhat lower. However, no one knows what the elasticity of demand  
16 will be for Paradise Valley’s high-water-use customers. Perhaps this could be a good  
17 econometrics project for a college intern. Nonetheless, Arizona-American accepts the Staff’s  
18 alternative and urges the Commission to approve it so that fire-flow projects can be completed in  
19 Paradise Valley without undue delay.

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<sup>106</sup> Townsley Rejoinder, p. 2.

<sup>107</sup> *Id.*, and Townsley Rejoinder Exhibit PGT-1.

<sup>108</sup> Townsley Rejoinder, p. 2.

<sup>109</sup> 3 Tr. 491.

<sup>110</sup> Exhibit S-9.

1 **IX. ACRM APPROVAL**

2 This rate case was driven largely by Arizona-American's need to timely recover its  
3 massive arsenic investment in its Paradise Valley Water District.<sup>111</sup> The record in the  
4 Company's previous rate case (Decision No. 61831, dated July 20, 1999) was too stale to serve  
5 as the basis for establishing an Arsenic Cost Recovery Mechanism ("ACRM"). An ACRM is the  
6 method established by the Commission to promptly recover, through a series of surcharges, the  
7 majority of a company's capital costs and capitalized O&M costs.<sup>112</sup>

8 Arizona-American's ACRM request is virtually identical to the ACRMs previously  
9 approved for the Company's Havasu Water, Agua Fria Water, Sun City West Water, Sun City  
10 Water districts.<sup>113</sup>

- 11 1. The ACRM is based solely on actual costs and costs eligible for recovery, which  
12 are depreciation, gross return, and recoverable O&M.
- 13 2. Actual rate recovery via the ACRM commences after new arsenic facilities are in  
14 service and are in compliance with the new US EPA standard for arsenic.
- 15 3. Establishment of deadlines for filing our next rate case, without limit on Arizona  
16 American's ability to file earlier as per existing Commission orders.
- 17 4. An ACRM rate design composed of a 50/50 split of the recovery between  
18 monthly minimum charges and volumetric charges. The volumetric charges will  
19 be based on the same inclining block rate design as will be approved in this  
20 decision.
- 21 5. A financial presentation composed of ten standard schedules.

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<sup>111</sup> Stephenson Direct, pp. 3-4.

<sup>112</sup> See generally, Decision No. 68310, dated November 14, 2005.

<sup>113</sup> *Id.*

- 1           6. Recoverable O&M costs include only media replacement or regeneration, media
- 2           replacement or regeneration service, and waste disposal.
- 3           7. A deferral for future recovery of up to 12 months of recoverable O&M, without
- 4           return, commencing with the in-service of facility(s).
- 5           8. Two step-rate increases.
- 6           9. No true-up of the ACRM for over or under collection.
- 7           10. Gross return included in the ACRM based on the return authorized in this
- 8           proceeding.<sup>114</sup>

9           After reviewing the proposal, all parties agree that Arizona-American's ACRM proposal  
10 should be adopted.<sup>115</sup>

11 **X.    SPECIAL CONTRACT – PARADISE VALLEY COUNTRY CLUB**<sup>116</sup>

12           On December 22, 2005, Arizona-American filed a new special contract with the Paradise  
13 Valley Country Club ("PV Country Club").<sup>117</sup> If approved, the contract is effective upon  
14 implementation of new permanent rates for the Paradise Valley Water District. Under the  
15 contract, PV Country Club will pay the rates approved for turf tariff customers, including all  
16 surcharges, reduced by a 15% discount.

17           On January 31, 2006, Staff issued its report and recommended approval of the new  
18 contract without modification. In its report, Staff stated that it would not object if the PV  
19 Country Club application were joined with this rate case. Following the Company's request, the  
20 two dockets were joined by a Procedural Order, issued February 28, 2006. In its rebuttal  
21 testimony, Arizona-American included additional annual revenue of \$8,515 in Company Income  
22 Statement Adjustment AAW-17.

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<sup>114</sup> Stephenson Direct, pp. 15-16.

<sup>115</sup> Chelus Direct; Igwe Direct, pp. 19-24; Moore Direct, pp. 32-34.

<sup>116</sup> See generally, Broderick Rebuttal, pp. 3-4.

<sup>117</sup> Docket No. W-01303A-05-0910.

1           The Company recommended that the turf tariff have a second tier for monthly  
2 consumption in excess of 25,000,000 gallons. However, the base rate charge for this second tier  
3 would be equal to the first tier. Hence, the purpose of creating this second tier is solely to make  
4 it subject to the high block surcharge of \$2.15 per 1000 gallons. This is appropriate for two  
5 reasons. First, Commission Staff recommends that revenues generated by the high block  
6 surcharge be applied as a contribution to fire flow and the Company told PV Country Club that it  
7 should support a share of the cost of this project. Second, the second tier break at 25,000,000  
8 gallons is calculated such that if PV Country Club remains below that amount in the summer  
9 months, it will very likely remain within the limit set by the Arizona Department of Water  
10 Resources for PV Country Club. So, this new rate design achieves funding for fire flow or  
11 conservation or both.

12           The other two existing customers on the turf tariff will not be impacted by this rate design  
13 change insofar as their monthly consumption is far below the 25,000,000 gallon threshold.

14           The parties agree that this contract should be approved.

15 **XI. CONCLUSION**

16           RUCO has taken a number of extreme positions that are contrary to Commission  
17 precedent, sound public policy, or both. The Commission should reject each of RUCO's  
18 proposed adjustments.

19           Staff disagrees with Arizona-American only concerning the appropriate level of rate-case  
20 expense and the return needed to compensate equity investors for their financial risk. The  
21 Company's requested level of rate-case expense is appropriate given recent Commission rate-  
22 expense awards and the significant large-dollar issues in this case.

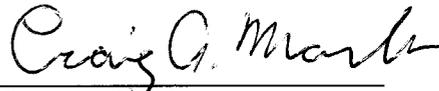
23           The parties' base ROE estimates do not materially differ. However, Staff and RUCO fail  
24 to adequately adjust their base ROE estimates to compensate equity investors for Arizona-  
25 American's greater leverage. This compensation is equitable because leverage means that the  
26 Company carries large amounts of low-cost, tax-shielded debt. As a result, even with the

1 Company's requested ROE, its overall cost of capital will still be among the lowest in Arizona,  
2 and well below the overall returns for Arizona' largest investor-owned electric and gas utilities.

3 Therefore, Arizona-American has demonstrated that it requires a revenue increase of  
4 \$427,939, or an 8.43 percent net increase over test-year adjusted revenues.

5 RESPECTFULLY SUBMITTED on May 5, 2006.

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A

Chaparral City Water Company  
 Test Year Ended December 31, 2003  
 Income Statement

Exhibit  
 Schedule C-1  
 Page 1  
 Witness: Bourassa

Line No.	Test Year Book Results	Label	Adjustment	Test Year Adjusted Results	Proposed Rate Increase	Adjusted with Rate Increase
1	<b>Revenues</b>					
2	\$ 5,914,053	6	\$ 183,371	\$ 6,097,424	\$ 1,797,182	\$ 7,894,606
3	-			-		-
4	307,029	10	(204,760)	102,269		102,269
5	\$ 6,221,082		\$ (21,389)	\$ 6,199,693	\$ 1,797,182	\$ 7,996,875
6	<b>Operating Expenses</b>					
7	\$ 912,723	11a	34,469	\$ 947,192		\$ 947,192
8	726,546	5	106,117	832,663		832,663
9	470,459	8/9	25,997	496,456		496,456
10	61,533			61,533		61,533
11	100,689			100,689		100,689
12	38,836			38,836		38,836
13	324,607			324,607		324,607
14	72,948			72,948		72,948
15	-			-		-
16	59,349			59,349		59,349
17	-			-		-
18	806			806		806
19	-	4	71,250	71,250		71,250
20	803,415			803,415		803,415
21	920,648	1	504,877	1,425,525		1,425,525
22	42,829	11b	500	43,329		43,329
23	277,131	2	32,972	310,103		310,103
24	308,770	12	(244,038)	64,732	701,679	766,411
25	-			-		-
26	\$ 5,121,289		\$ 532,143	\$ 5,653,432	\$ 701,679	\$ 6,355,111
27	\$ 1,099,793		\$ (553,532)	\$ 546,261	\$ 1,095,503	\$ 1,641,764
28	<b>Other Income (Expense)</b>					
29	-			-		-
30	15,291	7a	(15,291)	-		-
31	(475,190)	3	52,593	(422,597)		(422,597)
32	-	7b	(3)	-		-
33	-			-		-
34	\$ (459,896)		\$ 37,299	\$ (422,597)	\$ -	\$ (422,597)
35	\$ 639,897		\$ (516,234)	\$ 123,663	\$ 1,095,503	\$ 1,219,167

36  
 37 SUPPORTING SCHEDULES:  
 38 C-2  
 39 E-2  
 40

RECAP SCHEDULES:  
 A-1

Chaparral City Water Company  
Test Year Ended December 31, 2003  
ADJUSTMENTS TO REVENUES AND/OR EXPENSES  
Adjustment Number 4

Exhibit  
Schedule C-2  
Page 5  
Witness: Bourassa

7

Line			
No.			
1	<u>Rate Case Expense</u>		
2			
3	Estimated Rate Case Expense	\$	285,000
4			
5	Estimated Amortization Period in Years		4
6			
7	Annual Rate Case Expense	\$	<u>71,250</u>
8			
9	Test Year Rate Case Expense	\$	-
10			
11	Increase(decrease) Rate Case Expense	\$	<u>71,250</u>
12			
13	Adjustment to Revenue and/or Expense	\$	<u>71,250</u>
14			
15			
16			
17			
18			
19			
20			

**B**

# **The Effect of Debt On the Cost of Equity**

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In a Regulatory Setting

Prepared by:  
The Brattle Group

Prepared for:  
Edison Electric Institute

January 2005

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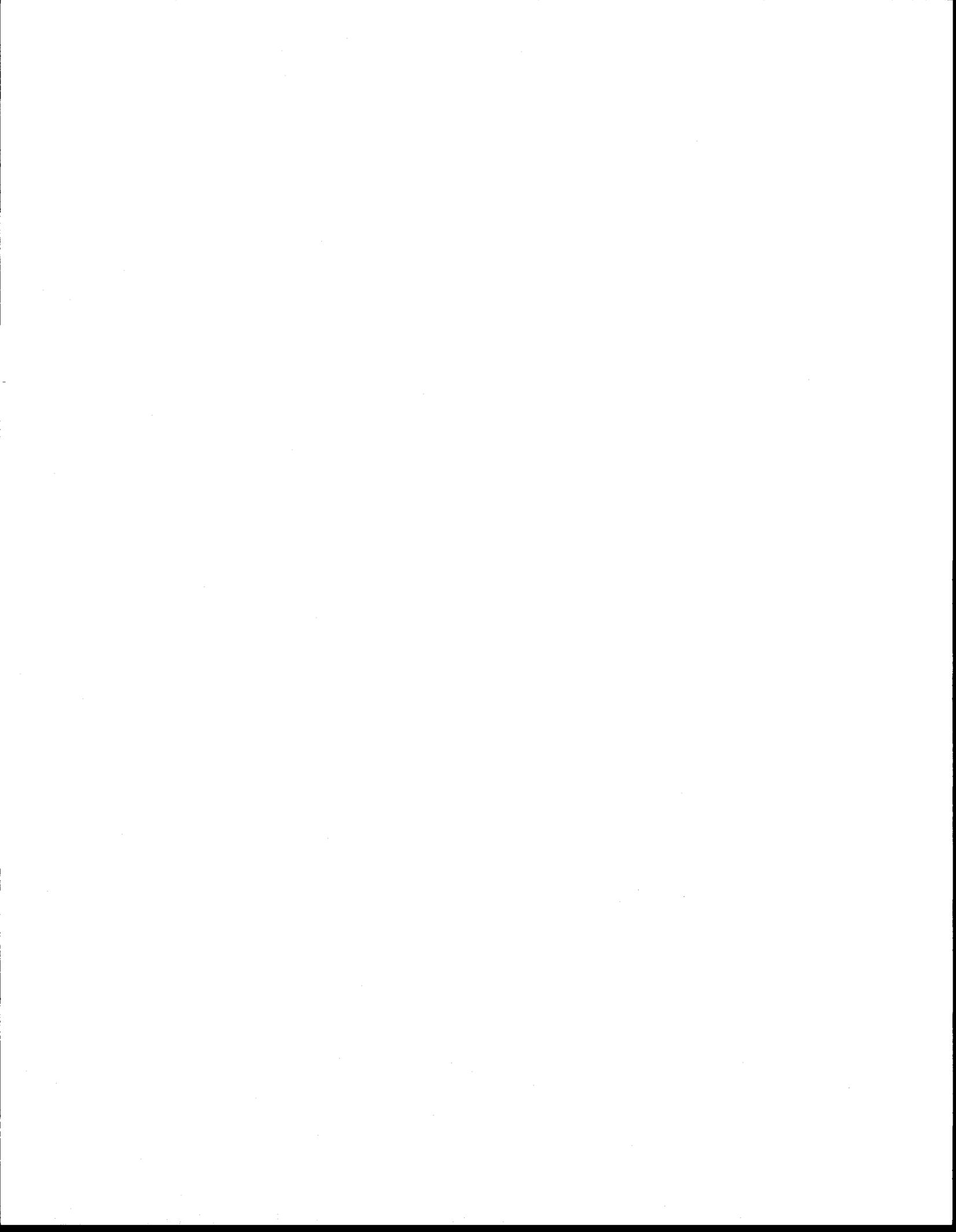
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## I. INTRODUCTION AND SUMMARY

Until recently, the focus of many regulators has been on whether and how to implement restructuring in the electric industry, but regulators are now turning their attention to proceedings in which setting the cost of capital will be an issue. In some jurisdictions, there has not been a fully litigated cost of capital rate case for a number of years. The cost of capital skills of the commission staff as well as those of the commissioners in those jurisdictions may have atrophied from lack of use. Even if the old skills have not decayed, the more recent developments in the art and science of the estimation of the cost of capital are not likely to be well understood if for no other reason than there has simply been no impetus to study them to decide issues in a proceeding.

At the same time, concerns are being raised about whether investment in the infrastructure of the electric industry has kept pace with the growth in demand.<sup>1</sup> One factor affecting the decision to invest in the electric industry is whether the allowed rate of return on investment provides an adequate rate of return compared to alternative investments.<sup>2</sup> As discussed below, failure to provide a return equal to the cost of capital will inevitably lead to under investment in the industry.

Of course, commissions will be faced with conflicting points of view as to exactly how high the cost of capital may be for a regulated company. It is frequently the case that the costs of capital recommendations by intervenor and company expert witnesses diverge widely due to differences in implementation of estimation models, differences in samples, and differences in analysis of the data. One major difference in

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<sup>1</sup> A number of recent articles have addressed the need for investment, particularly in transmission. For example, Eric Hirst and Brendan Kirby, "Transmission Planning for a Restructuring U.S. Electricity Industry," *Edison Electric Institute Paper*, June 2001, estimate that to maintain transmission adequacy an investment of \$56 billion is required during this decade and that twice that is needed for generation. The need for significant transmission investments are confirmed in, for example, Eric Hirst, "Transmission Investment: All Talk and Little Action," *Public Utilities Fortnightly* July 2004 pp. 48-54. The paper notes that the estimates of the required investment range from \$27 billion to \$100 billion just for transmission. However, *Value Line Investment Survey* July 2, 2004 projects the total increase in net plant for electric utilities in the period 2007-09 to amount to only \$57.6 billion. Leonard S. Hyman in "The Next Big Crunch: T&D Capital Expenditure," *Energy Industry Commentary*, January 2004, argues that "The evidence suggests that investor-owned utilities have reduced transmission and distribution spending to bare-bones levels ..."

<sup>2</sup> The average allowed rate of return on equity among electric utilities followed by Regulatory Research Associates was 10.6% in 2003 (Regulatory Research Associates, Major Rate Case Decisions - January 2002 - December 2003 Supplemental Study). The allowed returns vary widely from a low of 9.50 percent (New Jersey) to a high of 12.45 percent (South Carolina). Additionally, other utility industries such as a water utility have been awarded rates of return as low as 7 percent. Numerous parties have expressed concerns regarding very low allowed rates of return. For example, Standard & Poor's on August 7, 2003 in "Why Utilities Lack Spark" lowered its recommended weighting for the sector because, among other factors, "[w]e see normally modest growth for regulated operations restricted by an unfavorable regulatory environment and rising" costs. In May 2002 William R Ferara of Standard & Poor's argued that "insufficient regulated authorized returns" contributed to the "downward pressure" in credit quality ("Regulatory Support for U.S. Electric Utility Credit Continues to Disappoint, Standard & Poor's, May 27, 2002). Standard & Poor's in March 2003 issued a report discussing the rating agency's reassessment of Canadian utility regulation as a ratings factor, and noted that the high leverage of the financial profiles of Canadian utilities were a significant contributing factor in the downward trend of the utilities ratings and "[t]he leverage financial profiles of Canadian utilities generally stem from regulatory directives, which essentially dictate the financial profiles of most utilities." (Standard & Poor's, "Canadian Utility Regulation Reassessed as a Ratings Factor," March 6, 2003).

methodology is whether and how to adjust the allowed cost of equity for differences in financial risk between the sample companies and the regulated utilities.

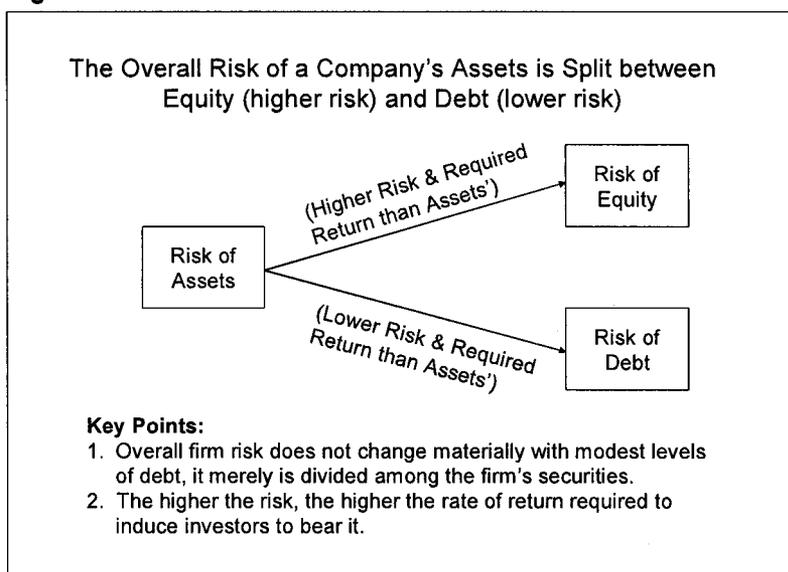
This difference in opinion among cost of capital experts leaves a commission with the difficult problem of determining the cost of capital in a setting with vastly different recommendations; a task made more difficult if the theoretical underpinnings of setting the cost of capital are not well understood.

The main focus of the paper is on the effect of debt on the cost of equity capital, and in particular, the theoretically appropriate way to adjust the cost of equity for differences in capital structure. At the current time, ignoring this issue as some cost of capital experts do, results in a lower estimate of the cost of equity for the regulated company. The remaining portions of the paper discusses the related issues of the deleterious effect on new investment of not providing an adequate rate of return for a regulated company. Finally, the effects of regulatory procedures that result in the inability of the regulated company to earn the allowed rate of return are also discussed.

The following is a summary of the main points:

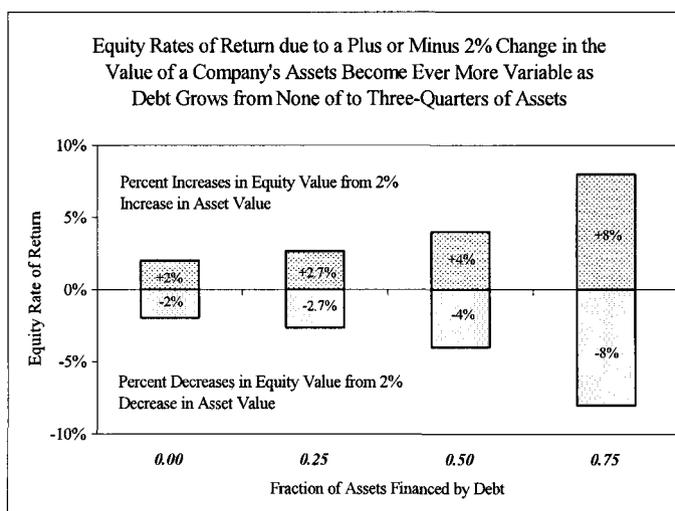
1. As Figure 1 illustrates, companies raise money for investment by issuing securities. Different securities have different claims on the firm's earnings, and if necessary, on its assets. Debt has a senior claim on a specified portion of the earnings. Common equity, the most junior security, gets what's left after everyone else has been paid. Since equity bears more risk, investors require a higher rate of return on equity than on debt. Except at extreme debt levels, the overall level of risk of the firm does not change materially due to the addition of debt. The various securities just divvy that risk up.

Figure 1



2. When a company uses modest amounts of debt, the overall risk of the company's assets falls on a fraction of its capital, the equity. The required return per dollar of equity goes up. Suppose a risk produces earnings fluctuations equal to plus or minus ("±") 2 percent of the company's assets. At 100 percent equity, this risk produces earnings fluctuations of ± 2 percent of the company's equity, too. But at a 50-50 debt-equity ratio, the same risk produces earnings fluctuations of ± 4 percent of the company's equity. At a 75-25 debt-equity ratio, these fluctuations become ± 8 percent of the company's equity. Figure 2 illustrates this point for debt-equity ratios of 0-100, 25-75, 50-50, and 75-25. Higher risk means a higher required rate of return, so the cost of equity goes up at an ever increasing rate as a company adds debt, which offsets the cheaper cost of debt. In short, **there is no magic in financial leverage.**

Figure 2



3. An accurate estimate of the cost of equity for a rate-regulated company needs to consider (1) the levels of financial risk in the sample companies used to estimate the cost of equity and (2) how those levels compare to the level implied by the company's regulatory capital structure. The associated capital structure affects the estimated cost of equity estimate just as a life insurance applicant's age affects the required life insurance premium. An insurance agent wouldn't measure the required insurance premium for one person and charge the same premium to an otherwise identical person who was much older. Neither should a cost of equity analyst measure the cost of equity at one capital structure and apply the same cost of equity to a regulated capital structure with much more (or much less) debt.
4. The sample company's *market-value* capital structure determines the level of risk that a cost of equity analyst measures from market data, because market values determine the level of risk that equity bears due to debt. Example: suppose you buy a home for \$50,000 with a mortgage of \$40,000. Ten years later your home is worth \$100,000 and the mortgage is down to \$35,000. Your equity in the home is now \$65,000. If home prices then drop by 10 percent, or \$10,000, your \$65,000 equity falls by that amount, and the resulting rate of return on your equity is -15 percent ( $= -\$10,000/\$65,000$ ), versus -10 percent if you had no mortgage. The 15 percent loss would affect the measured risk of your home if it were represented by a publicly traded stock (e.g., the "beta" risk measure).<sup>3</sup> The "discounted cash flow" approach starts from the publicly traded price of your home, too, and that price reflects the level of risk borne in the market. The risk that underlies every cost of

<sup>3</sup> If you kept books on the house, the book equity would be \$15,000 (the original \$50,000 less the current \$35,000 mortgage), or less if you were depreciating your investment. But a publicly traded stock for your house would not fall by \$10,000/\$15,000, or 67%, if housing prices fell 10 percent.

equity estimate based on market data *automatically* depends on the market-value capital structure of that company.

5. Failure to recognize and adjust for differences in the financial risk of sample companies and the regulated entity can result in material errors in cost of equity estimation. Ignoring such differences results in a disconnect between the cost of capital information provided by the sample and the allowed return for the regulated entity, because the market value capital structure is as important to estimating the cost of equity as an insured age is for life insurance.
6. Investment is a voluntary activity. Investment will only occur if the expected rate of return justifies the risks involved. The plain language of the U.S. Supreme Court's opinions on return standards for utilities is consistent with this principle. These opinions focus on (1) the returns investors could earn if they put their money elsewhere at a comparable level of risk, and (2) the company's financial integrity. Whatever the legal reasons for these standards (which may arise out of the Constitutional prohibition against the uncompensated taking of property), they recognize basic economic reality: **you can't push on a rope**, and you can't force investors to throw good money after bad.<sup>4</sup>
7. Therefore, policies that systematically deny utility investors a fair opportunity to earn the cost of capital achieve a short-run gain for today's customers, but at a material long-run cost to future customers and possibly to the economy of the jurisdiction involved. Once the long-run costs emerge, they cannot be overcome in a hurry. Investors, once burned, will be loath to trust that the regulatory jurisdiction won't repeat the same pattern should it ask for quick investments to shore up a system that the previous policies let decay. The safest way for once-burned investors to avoid inadequate returns on future major investments is to keep the system capital-starved. Research shows that nations around the world that do not protect investor rights have less investment and more costly conditions imposed on the investment that is made, to the detriment of their economies. States that make investment unattractive or unremunerative risk the same fate.
8. The return investors actually expect to earn is what matters. If a regulatory mechanism claims to allow one rate of return but actually allows a lower one, the lower one is what must pass the comparable return standard. For example, if I promise to pay someone \$10 to wash my car but s/he has learned I always actually pay 10 percent less than I promise, that person will assume the actual payment will only be \$9, and s/he will wash my car only if \$9 is enough. The phantom dollar in my stated payment is irrelevant, because *empty promises buy nothing*. (The same problem arises if I pay the \$10 most of the time but waltz and pay nothing 10 percent of the time. In that case, the expected payment would again be \$9, not \$10.)

The remainder of this paper is organized as follows: *Section II* provides a simple example on how to adjust for differences in financial leverage (capital structures) in a regulatory setting. *Section III* discusses the effect of the use of debt (financial leverage) on the cost of equity, points one to four above. *Section IV* reviews these issues in the context of a regulatory proceeding in which setting the cost of equity is an issue. *Section V* addresses the conditions necessary for voluntary investment, points six and seven above. *Section VI* addresses the distinction between the allowed rate of return and the return investors require, point eight above. *Section VII* concludes.

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<sup>4</sup> Phrases in boldface in this introduction are titles to later sections.

## II. AN EXAMPLE OF ADJUSTING FOR FINANCIAL LEVERAGE

Before discussing the need to adjust for financial leverage in detail, an illustration of the basic principles may be in order. Throughout this paper, financial leverage refers to the use of debt in the capital structure of a company which results in financial risk for the company's equity holders. The cost of equity, or the required rate of return on equity, refers to the market determined cost of equity capital for a company. The cost of debt is the market determined cost of debt, not the embedded cost of debt.

In a regulatory setting, the typical way that differences in financial leverage are ignored occurs when a cost of capital expert applies the standard cost of equity estimation techniques (the risk positioning model or the discounted cash flow model) to a sample of comparable risk companies to estimate the cost of equity. If this cost of equity is applied to the regulated entity without any consideration of differences in capital structure between the sample companies and the regulated entity, the result is a potential mismatch between the financial risk of the sample companies and the regulated company. However, it is frequently the case that when making a recommendation for the return on equity, the expert makes no explicit consideration of the differences between the capital structure of the sample companies and the capital structure of the regulated entity for which the cost of equity is being determined. Note that the cost of equity estimated by the standard techniques is a result of the business *and* financial risk of the sample companies. That is the return on equity estimated by the standard techniques using market data is affected by the market value capital structures of the sample companies.

To make matters more confusing, it is also frequently the case that there is no agreement among cost of capital experts on the proper method to adjust for differences in capital structure when an adjustment is made or whether an adjustment is even necessary. As a result, commissions are faced with a bewildering array of conflicting recommendations all seemingly based upon similar data and estimation methods, but with wildly different results.

To illustrate the problem, assume that an electric utility company, Utility A, is filing a rate case. As a first step in determining the cost of equity for Utility A, the cost of capital analyst selects a sample of companies in the electric utility industry whose business risk is considered to be comparable to Utility A. Then the analyst determines the sample companies' cost of equity using capital market information, which depends upon the market value capital structures of the sample companies.<sup>5</sup> Thus, the measured equity risk level depends on the sample companies' market-value capital structures, not their book-value capital structures.

The capital structures of the sample companies will typically differ among themselves so the level of financial risk will also differ among the sample companies. But even if it were the case that the capital structures of the sample companies were identical, their capital structures are likely to differ from that of the regulated company for which cost of capital is being estimated. This means that the cost of equity estimates from the sample companies would not be consistent in terms of financial risk among themselves or with

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<sup>5</sup> Typically, a cost of capital analyst will estimate the sample companies' cost of equity using estimation models such as the Capital Asset Pricing Model ("CAPM") or the Discounted Cash Flow ("DCF") model. Both models rely on market based information.

Utility A. Fortunately, there is a simple way to handle differences in financial risk (capital structure differences) for both the sample companies and Utility A: calculate the overall cost of capital, an approach described next.

#### A. CALCULATING THE AFTER-TAX WEIGHTED-AVERAGE COST OF CAPITAL

The overall cost of capital is known in business textbooks as the "weighted-average cost of capital" or "WACC," but here a different term is used in order to prevent confusion with a measure of the weighted-average cost of capital that is often used in rate regulation to determine the revenue requirement. (Specifically, the regulatory WACC is a book value weighted-average of the after-tax cost of equity and the *pre-tax* average interest rate on the company's outstanding debt).<sup>6</sup> We will use the term after-tax weighted-average cost of capital ("ATWACC") to denote the after-tax value of all of the components of the WACC. To determine the ATWACC, the cost of capital analyst must also use the market cost of debt and market value capital structure for each sample company.<sup>7,8</sup> With these values, the ATWACC for each sample company can be calculated. Table 1 on the next page illustrates the calculation using an average sample company.<sup>9</sup>

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<sup>6</sup> The cost of capital portion of the revenue requirement is determined by multiplying the regulatory WACC times the rate base and then combining it with an estimate of the income taxes owed. In the terminology of this paper, the sum of after-tax equity return, income taxes and interest expense is equal to the before-tax weighted-average cost of capital or the "BTWACC". Note that regulatory interest expense is an estimate of embedded cost as opposed to the market cost of debt.

<sup>7</sup> While the cost of equity must be estimated using one or more estimation techniques, estimates of the market cost of debt is widely available from indices of utility bond yields for different debt ratings, e.g., the Mergent Bond Record. Book value capital structure information is available from sources such as *Value Line* or Compustat. The market capital value structure can be calculated by substituting the market value of debt and equity for their book values.

<sup>8</sup> For simplicity, the example ignores the presence of preferred stock.

<sup>9</sup> Currently, the yield on long-term government bonds is unusually low as are the beta-estimates (e.g., risk estimates) of utilities using standard methods. Because the examples in this paper relies on standard estimation methods and makes no attempt to adjust for low interest rates or risk-estimates, the reported cost of equity estimates are also low.

<b>Table 1: Computing After-Tax Weighted-Average Cost of Capital for a Sample Company</b>		
	<u>Abbreviation</u>	<u>Numerical Value in Example</u>
Cost of Equity	$r_E$	9.10%
Market Value Equity (%)	E	53%
<b>Weighted Cost of Equity</b>	$r_E \cdot E$	<b>4.82%</b>
Cost of Debt	$r_D$	6.75%
Market Value Debt (%)	D	47%
Weighted Cost of Debt	$r_D \cdot D$	3.17%
Marginal Tax Rate	T	35%
<b>After-Tax Weighted Cost of Debt</b>	$r_D \cdot D \cdot (1-T)$	<b>2.06%</b>
<b>ATWACC</b>	$r_E \cdot E + r_D \cdot D \cdot (1-T)$	<b>6.88%</b>

Notes: The cost of equity was assumed for illustration purpose. For the example, we assume that Utility A has a marginal tax rate of 35 percent.<sup>10</sup> The capital structure corresponds to a five-year average for a selected sample of electric utilities, and the market cost of debt corresponds to the June 2004 weighted yield on A and Baa-rated utility bonds as reported by the Mergent Bond Record.<sup>11</sup>

## B. ADJUSTING FOR DIFFERENCES IN FINANCIAL RISK

Having determined the cost of capital (the ATWACC) for a sample of comparable companies, the next step is to determine the cost of equity for Utility A that is consistent with the both the sample information and the financial risk (capital structure) in its regulatory filing. To recap the steps up to this point. The cost of capital analyst has selected a sample of regulated electric utilities considered to be comparable in terms of business risk. To insure that any differences in financial risk that results from differences in capital structure are properly recognized, the average ATWACC for the sample companies was calculated. The remaining question is how to calculate the return on equity for Utility A that takes into consideration both the business risk evidence of the sample companies and the financial risk of Utility A. As discussed below, the adjustment for financial risk is based upon the observation that the ATWACC is constant over a broad middle range of capital structures.

<sup>10</sup> The assumption of a 35 percent tax rate corresponds to the statutory Federal tax rate of 35 percent. In reality, the tax rate for a company's rate filing would include a provision for state income taxes and would have to be determined on a case by case basis.

<sup>11</sup> The yield on A-rated utility bonds is weighted by 3/11, and the yield on a Baa-rated utility bonds is weighted by 8/11. These weights correspond to a sample of 11 electric utilities relied upon for illustration purposes.

Continuing with the example, based upon the sample's ATWACC information, Utility A's expected after-tax weighted-average cost of capital is 6.88 percent.<sup>12</sup> In other words, the sample's market value information says that the regulated entity should earn a 6.88 percent ATWACC on its invested capital, i.e., its rate base. Knowing the percentage of debt and equity in the rate base, the cost of equity consistent with both the business risk of the sample and the capital structure of Utility A can be determined as the cost of equity ( $r_E$ ) that would give rise to an ATWACC of 6.88 percent given Utility A's capital structure, market cost of cost of debt, and marginal tax rate.<sup>13</sup>

For simplicity, assume that Utility A is filing its rate case with a capital structure consisting of 40 percent equity and 60 percent long-term debt. Further, assume Utility A has a Baa-rating from Moody's which has a market yield of 6.84 and an income tax rate of 35 percent. Table 2 below computes the cost of equity for Utility A given its regulatory capital structure, cost of debt, and tax rate.

<b>Table 2: Utility A's Cost of Equity at 40 Percent Equity</b>		
	<u>Abbreviation</u>	<u>Numerical Value in Example</u>
After-Tax Weighted-Average Cost of Capital	Sample Average ATWACC	6.88%
Utility A's Equity (%)	E	40%
Utility A's Cost of Debt	$r_D$	6.84%
Utility A's Debt (%)	D	60%
Marginal Tax Rate (%)	T	35%
<b>Utility A's Cost of Equity</b>	$\frac{\text{ATWACC} - r_D \cdot D \cdot (1-T)}{E}$	<b>10.5%</b>

Notes: the estimated cost of equity corresponds to that of a utility with a rate base with 40 percent equity, a Baa bond rating, a marginal tax rate of 35 percent and business risk comparable to that of the sample companies.

Note the effect of differences in financial risk between the sample's average market value capital structure and the capital structure for Utility A. In the example, the cost of equity for the sample was 9.10 percent for a sample of electric utilities with an average market value capital structure with 53 percent equity. Utility A is filing a rate case in which it has only 40 percent equity, so it has more financial leverage (more financial risk) resulting in a cost of equity of 10.5 percent. Applying the sample's 9.10 percent estimated cost of equity to the regulated entity would ignore the differences in financial risk between the sample companies and the regulated company. Investors require a greater expected return for bearing additional risk, so Utility A requires a higher expected cost of equity than measured in the sample companies. The calculated cost of equity of 10.5 percent for Utility is exactly enough to offset the additional financial risk of Utility A. Note that after the adjustment for financial leverage, the ATWACC for Utility A is remains the same as the

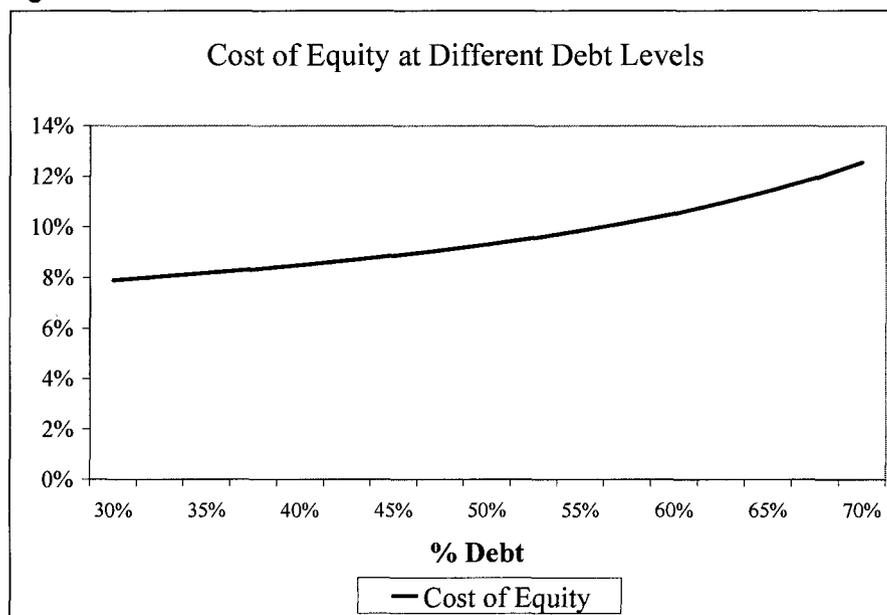
<sup>12</sup> This assumes that the regulatory capital structure is within the broad middle range over which the ATWACC is constant.

<sup>13</sup> Again, financing means other than equity and long-term debt are ignored for simplicity.

ATWACC for the sample. In other words, Utility A would earn the same ATWACC on its rate base as the ATWACC estimated for the sample companies.

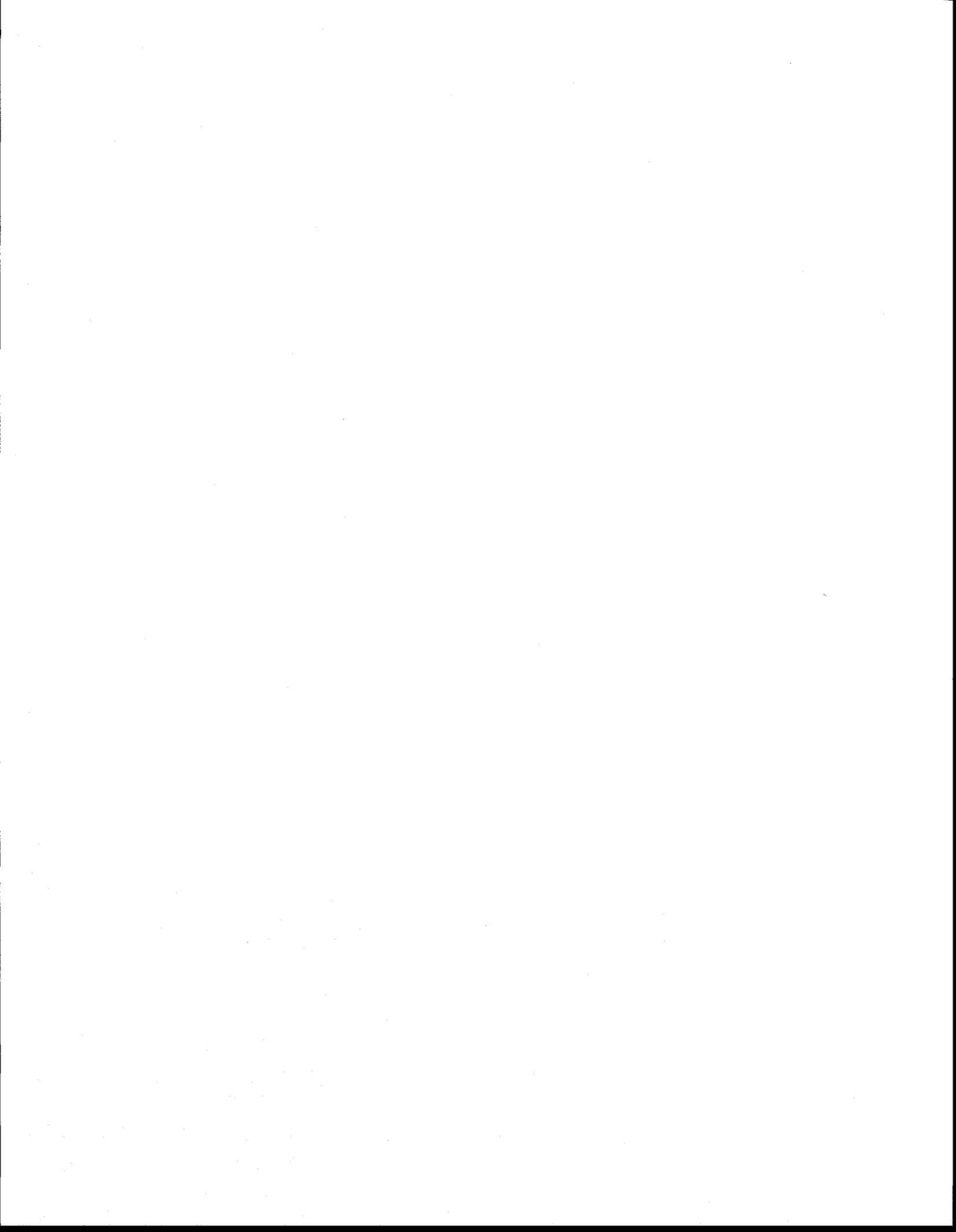
The relationship between the cost of equity and the percentage of debt in the capital structure is illustrated in Figure 3 below which displays the cost of equity for debt levels ranging from 30 to 70 percent using the sample ATWACC from Table 1 on page 7.

**Figure 3**



As can be seen from Figure 3, the cost of equity increases at an increasing rate as more debt is used in the company's capital structure. Figure 3 also shows that for companies with identical business risk, the cost of equity for a company with 40 percent equity is not the same as the cost of equity for a company with 60 percent equity. The slope of the curve in Figure 3 indicates the increase in cost of equity that is required to compensate investors for the additional risk they carry when debt is added to the capital structure.

Having provided a simplified example of how to take differences in financial leverage into account when estimating a utility's cost of equity, the remainder of the paper focuses on the specifics of the adjustment, the financial theory underlying the reason that an adjustment for differences in financial risk is required, and other issues related to the adjustment. The paper concludes with a discussion of the likely effect on new investment of failing to provide an allowed rate of return equal to the cost of capital, and a discussion of the importance of regulatory procedures that provide the regulated company with an opportunity to expect to earn the allowed rate of return.



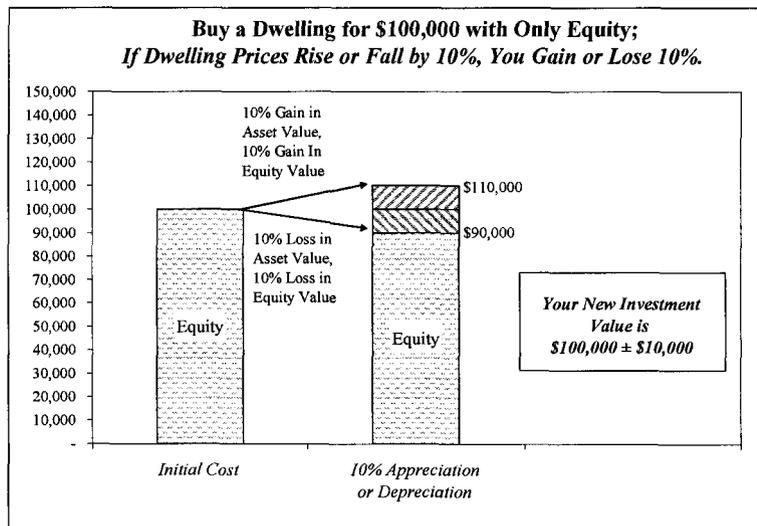
### III. "THERE IS NO MAGIC IN FINANCIAL LEVERAGE"

As noted at the outset (Figure 1), when companies use debt the risk of the assets is divided up among the various types of securities in the capital structure. Equity bears the bulk of the risk, so the cost of equity goes up as debt is added to the capital structure.<sup>14</sup> Therefore, to compare validly the costs of equity from a sample of companies and the cost of equity of a regulated company, analysts must consider any differences among the equity risks generated by differences in capital structures. This section explains this issue in more detail, using various examples.

#### A. EXAMPLE OF WHY DEBT ADDS RISK TO EQUITY

The reason that the risk of equity increases as debt is added to the capital structure is because debt magnifies the variability of the equity return. Consider a simple example.<sup>15</sup> Most people who participate in regulatory hearings do own or will own a home at some point in their lives. Suppose someday you decide to take money out of your savings and buy a dwelling for \$100,000. The home's future value is uncertain. If housing prices go up, you win. If housing prices go down, you lose. Figure 4 depicts the outcome of a 10 percent fluctuation in the residence's price.

Figure 4



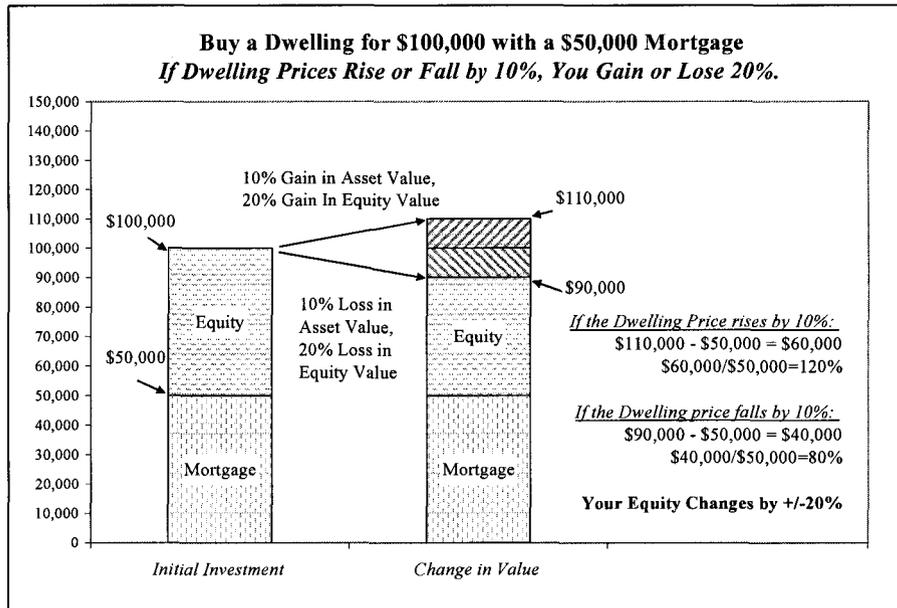
Now suppose you don't want to take the full \$100,000 out of your savings, or you don't have that much saved, so you take out a mortgage for half the money you need to buy the dwelling. Your mortgage lender does not expect to share in the benefits of rising housing prices, nor to bear the pain of falling ones. You owe your lender the \$50,000 you borrow either way. That means your equity investment bears the entire risk of changing housing prices. Figure 5 illustrates this effect (see page 12).

Now the variability of your equity return due to the dwelling's price fluctuations doubles. The entire variability of a 10 percent increase in housing prices now falls on the \$50,000 in original equity.

<sup>14</sup> Preferred equity acts much like debt in magnifying common equity's risk. However, it simplifies the discussion to focus on debt and common equity alone.

<sup>15</sup> The example ignores the effect of taxes, interest payments and depreciation to keep things simple, but only the details would be affected by including them not the main message.

**Figure 5**



The rate of return calculations when the entire purchase price is paid using savings are as follows: If the price falls to \$90,000, the rate of return on your equity due to the decrease was:

**Figure 4:**

$$\begin{aligned} \text{Rate of return on equity} &= \frac{(\text{New Market Value} - \text{Old Market Value})}{\text{Old Market Value}} \\ &= \frac{(\$90,000 - \$100,000)}{\$100,000} \\ &= \frac{-\$10,000}{\$100,000} = -10\% \end{aligned}$$

But in the Figure 5 case, where you've financed half of the purchase price with a mortgage that you have to pay back regardless of the housing price change, the rate of return on the equity part of the investment is

**Figure 5:**

$$\begin{aligned} \text{Rate of return on equity} &= \frac{(\text{New Dwelling Value} - \text{Old Dwelling Value})}{\text{Old Equity Value}} \\ &= \frac{(\$90,000 - \$100,000)}{\$50,000} \\ &= \frac{-\$10,000}{\$50,000} = -20\% \end{aligned}$$

Halving the amount of equity doubles its variability.

The equity return gets ever more variable as the mortgage proportion grows. Figure 6 shows the outcome for mortgages that are 0 percent, 20 percent, 50 percent and 80 percent of the dwelling purchase price.

Figure 6

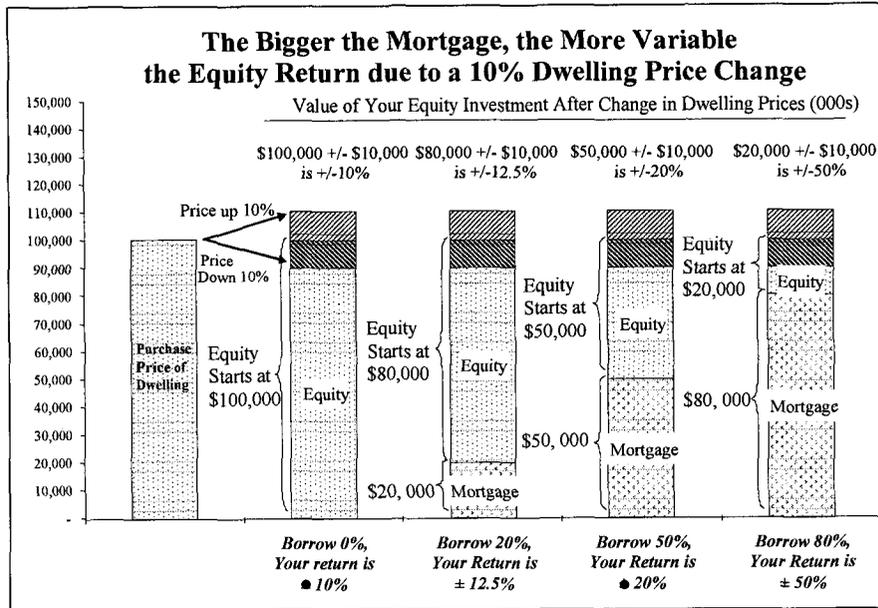
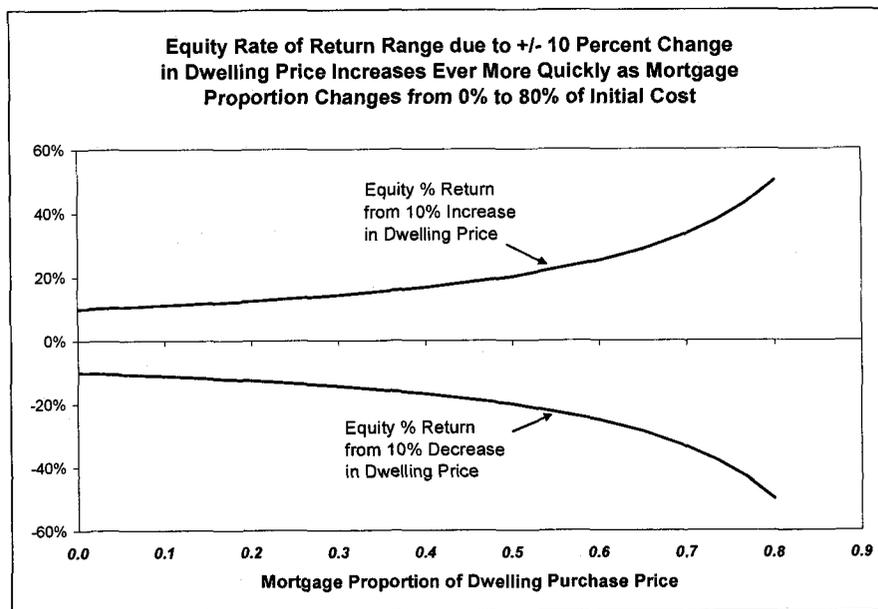


Figure 7 depicts the same point in a different way. It shows the growing variability of the equity return as the mortgage proportion increases for a more nearly continuous set of cases. The basic message is the same either way: a higher mortgage (more debt) means ever more risk for equity. This same effect is present in the equity returns of a company that finances a portion of its assets with debt. The equity returns are more variable as the percentage of debt in a company's capital structure increases.

Figure 7



As illustrated in Section II, the same principle applies to the equity of a regulated utility in general. The equity rate of return on a capital structure with a 60 percent equity component is not the correct rate of return for the identical company with a 40 percent equity component because the financial risk is different. (see *Tables 1 and 2 on pages 7 and 8*). As obvious as this seems, it is frequently the case that commissions as well as some cost of capital experts make recommendations that ignore this fact.

The next section discusses the theory underlying the effect of debt on the required rate of return for equity. Section IV discusses the theoretically correct method to adjust for differences in financial leverage applicable in a regulatory setting.

## **B. IMPACT OF DEBT ON THE COST OF EQUITY**

Investors do not like risk. For the same expected rate of return on equity, rational investors would choose to be on the left edge of Figure 7 (or Figure 3), not somewhere to the right. No risk-averse investor would choose an investment with an expected return of, say, 10 percent plus or minus 50 percent over one with an expected return of 10 percent plus or minus 5 percent. Investors demand a higher rate of return to bear more risk.

The messages of this example are simple:

1. *Debt magnifies equity's risk.*
2. Debt magnifies equity's risk *at an ever increasing rate*. Therefore,
3. *The required rate of return on equity goes up at an ever increasing rate as you add more and more debt.*

This is not only basic finance theory, it is the everyday experience of anyone who buys a home. The bigger your mortgage, the more percentage risk your equity faces from changes in housing prices. The same principle is applicable to the equity of a regulated electric utility.

Note that although up to now nothing has been said in the mortgage example about the effect of rent, mortgage interest and taxes on the three "messages," *not one word* of these three messages needs be changed to accommodate such factors. Such factors do affect the precise magnitude of the cost of equity and the precise way in which it changes as additional debt is added, but all three messages remain completely correct as stated regardless of these details. This is true not only for the mortgage example but also for the equity of corporations.

There is sometimes confusion, particularly in a regulated setting, on whether it is appropriate to use market-value or book-value capital structures to assess the degree to which financial risk affects the cost of equity. The answer is that it is the market-value capital structure that is the relevant quantity for analyzing the cost of equity evidence, not the book-value capital structure.<sup>16</sup>

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<sup>16</sup> See, for example, Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance*, New York: McGraw-Hill/Irwin, 7th ed. (2003), at 525-26. Book values may be relevant for some issues, e.g., for covenants on individual bond issues, but as explained in the text, market values are the determinant of the impact of debt on the cost of equity.

The variability of the equity in the housing example depends on the market-value shares of the mortgage and the equity, not the book-value shares. Suppose you bought your home 10 years ago, and you've been renting it out. Suppose depreciation has reduced the original book value from \$100,000 to \$75,000. Suppose also that you've paid off about 20 percent of the original mortgage, leaving 80 percent still owed. Suppose as well that your original mortgage was for 80 percent of the purchase price, or \$80,000. That means your mortgage balance is now  $(\$80,000 \times 0.80) = \$64,000$ . On a book value basis, you have  $\$75,000 - \$64,000 = \$11,000$  in equity.

What happens now if housing prices increase or decrease 10 percent? You cannot even start to answer this question unless you also know how housing prices have changed over the last ten years. If the market value of the home is now \$200,000, you can calculate a 10 percent change as \$20,000. A 10 percent decrease in housing prices is therefore almost twice your book equity of \$11,000. Does that mean a 10 percent decrease will wipe you out?

Of course not. Your real equity is the market value equity in your home. Suppose interest rates are unchanged, so the market value of the mortgage equals its remaining unpaid balance. The relevant measure of equity for risk-reward calculations is

$$\begin{aligned} \text{True Equity in Dwelling} &= \text{Market Value of Dwelling} - \text{Market Value of Mortgage} \\ &= \$200,000 - \$64,000 = \$136,000 \end{aligned}$$

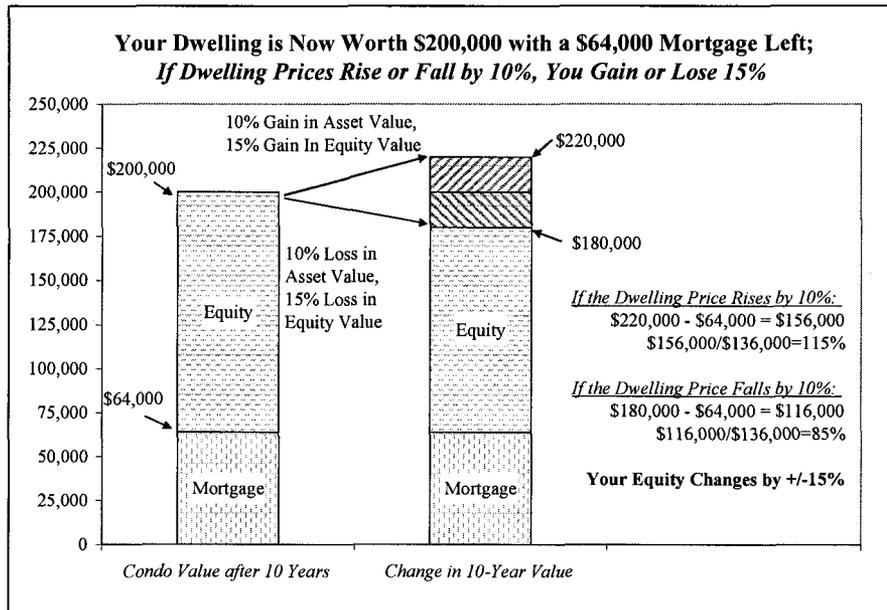
Therefore, the percentage rate of return on equity due to a 10 percent change in housing values is

$$\begin{aligned} \text{Rate of return on equity} &= \frac{\text{Change in Dwelling Value}}{\text{Starting Equity Value}} \\ &= \frac{\pm \$20,000}{\$136,000} \\ &= \pm 15\% \end{aligned}$$

Figure 8 (see page 16) depicts the actual risk-return tradeoff after 10 years. A 10 percent decline in home prices would be painful, but it wouldn't come close to wiping you out, no matter what the books say. Nor would the 10 percent price decline even show up on the books, despite its still material impact on your actual investment.

No landlord would assess his or her risk due to a mortgage by comparing fluctuating property values to the remaining book value of the property. The risk that debt imposes on the cost of equity is a function of relative market values, not relative book values. This is equally true for the sample companies when estimating the cost of equity using cost of equity estimation models based on market information.

**Figure 8:**



Suppose that you have refinanced your dwelling. While it still is worth \$200,000 ten years after you bought it, your new market-value debt-equity proportions are consistent with the above example's book capital structure. That is, given an undepreciated book value of \$75,000 consisting of \$11,000 of equity and \$64,000 of debt, your post-refinancing capital structure gives you a mortgage of  $[\$200,000 \times (64/75)] = \$171,667$  and equity of  $[\$200,000 \times (11/75)] = \$29,333$ . Now a plus or minus 10% swing in housing prices gives you an equity rate of return of:

$$\begin{aligned}
 \text{Rate of Return on Equity} &= \frac{\text{Change in Dwelling Value}}{\text{Refinanced Starting Equity Value}} \\
 &= \frac{\pm \$20,000}{\$29,333} \\
 &= \pm 68\%
 \end{aligned}$$

Contrast this value with the +/- 15 percent in Figure 7, in the case where the home's market value had gone up the same amount but there was no refinancing. A cost of equity analyst who estimated the "beta" risk measure on a stock like this would get a much higher value than in the earlier example, because the stock would be much more volatile.<sup>17</sup> In short,

**Market values, not book values, determine the risk impacts of capital structure on the market cost of equity for all companies, even those regulated on a book-value rate base.**

<sup>17</sup> Technical note: debt magnifies the stock's entire variability, diversifiable and non-diversifiable alike. Therefore, the stock's beta (or "betas," if more than one risk factor matters to investors) will in fact be affected by the company's market-value capital structure.

The conclusion of this section is that the risk of equity depends directly on the market-value capital structure of the company or asset in question. It is therefore impossible to compare validly the costs of equity of different companies without taking capital structure into account. Capital structure and the cost of equity are unbreakably linked, and any effort to treat the two as separate and distinct questions violates both everyday experience and basic financial principles. In particular, capital structure differences between sample companies and the regulated company must be properly considered in establishing the cost of capital.



## IV. CAPITAL STRUCTURE ISSUES IN A REGULATORY SETTING

This section discusses how the ideas on the effect of capital structure on the cost of equity should be addressed in a regulatory setting. There are two aspects of this problem. First, the standard cost of equity estimation techniques rely upon sample companies which have capital structures that generally differ among themselves. Proper interpretation of the market information provided by the sample companies requires considering the differences in their market value capital structures, because of the effect of financial leverage on the cost of equity. But note, as the discussion above demonstrates, the equity risk level depends on the sample company's market-value capital structure, not its book-value capital structure. Second, even if it were the case that the capital structures of the sample companies were identical, it still remains to consider the capital structure of the regulated entity in comparison to the sample companies. As discussed above, there is a simple way to handle both of these issues: calculate the overall cost of capital or ATWACC. The next section elaborates on this approach.

### A. THE AFTER-TAX WEIGHTED AVERAGE COST OF CAPITAL

As discussed above, business textbooks uses the "weighted-average cost of capital" or "WACC," but here a different term is used in order to prevent confusion with a measure of the weighted-average cost of capital that is often used in rate regulation (specifically, the regulatory WACC is a book-value-weighted average of the after-tax cost of equity and the pre-tax average interest rate on the company's outstanding debt).<sup>18</sup> We will call the above textbook formula for the overall cost of capital the "after-tax weighted-average cost of capital," or "ATWACC". The formula for the ATWACC was given in Table 1.

The ATWACC is not a new concept and is routinely used in the business world. The value of a proposed investment project is normally calculated as the Net Present Value ("NPV") of its expected after-tax cash flows discounted at the ATWACC.<sup>19</sup>

The overall costs of capital (the ATWACCs) of different companies or industries depends primarily on the business risk, or the risk the business would have with no debt. Biotech firms have more business risk than automobile manufacturers, which in turn have more risk than gas distribution companies or electric utilities. Business risk depends on the nature of the variability of the company's operating cash flows, which are the cash flows to all investors including bondholders. Operating cash flows are the net result of uncertain revenues minus uncertain operating costs. All else equal, business risk grows as revenues become more

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<sup>18</sup> The regulatory WACC is combined with an estimate of the income taxes owed to determine the return on invested capital for the revenue requirement. In the terminology of this paper, the sum of after-tax equity return, income taxes and interest expense is equal to the before-tax weighted-average cost of capital or the "BTWACC".

<sup>19</sup> "Cash flow" means the change due to the project in the actual amount of money the company has that year • dollars you can buy books with. The usual calculation of a project's NPV is the sum of the project's expected after-tax all-equity cash flows (i.e., the expected cash flow if the investment were financed entirely with common equity), discounted at the ATWACC: where the first cash flow occurs right away, at time 0, and need not be discounted. The initial cash flow is usually an investment outlay, i.e., a negative cash flow.

uncertain and more highly correlated with the forces that drive the economy. Business risk also grows, all else equal, and as costs become less uncertain and less correlated with the general economy.

Calculation of the ATWACC captures both the business and financial risk of the company. This makes it easy to compare the cost of capital evidence from sample companies with different capital structures. As discussed below, deriving the cost of equity consistent with different capital structures is also easy with this approach. Table 1 provides an illustration of the calculation.

Before proceeding further, it is worth addressing three objections that are frequently voiced in regulatory proceedings when a cost of capital expert recommends a cost of equity adjusted for differences in financial risk. The three objections are addressed next.

It is sometimes argued that the use of market values to calculate the impact of capital structure on the risk of equity is incompatible with use of a book-value rate base for a regulated company. This is not the case any more than it would be inappropriate to use market-based cost of equity estimation methods (such as the Discounted Cash Flow method or the Capital Asset Pricing Model) with a book value rate base. That is, the cost of capital is the fair rate of return on regulatory assets for investors and customers alike. Most regulatory jurisdictions in North America measure the rate base using the net book value of assets, not current replacement value or historical cost trended for inflation, but the jurisdictions still apply market-derived measures of the cost of equity to that net book value rate base. In essence, the cost of capital expert should strive to determine the market cost of capital for companies of comparable risk to the regulated entity. In this way, the regulated entity will be allowed a market determined cost of capital on its *book value* rate base which is a measure of the amount of unrecovered investment in the company's assets.

The second objection is that any adjustment for differences in financial leverage should be based upon differences in the book value not the market value capital structures of the sample firms. This objection was addressed in Section III above. The market value capital structure is the correct measure of financial risk.

The third objection is based on the assertion that adjusting the cost of capital estimate for differences in financial leverage will result in an ever increasing market value to book value of equity ratio, because the need for an adjustment for differences in financial leverage is the result of the fact that the market to book value ratio for the sample companies is generally greater than one. Adjusting the allowed rate of return on equity for differences in financial risk will not result in an ever increasing market to book ratio, because the adjusted return simply awards the market-determined overall cost of capital to the regulated entity. However, responding to this objection is complicated by the fact that financial theory does not have a complete explanation of market prices even for regulated companies. In the past, a market to book ratio near one was regarded as evidence that the regulated rate of return was being set at appropriate levels, but this measure is no longer considered reliable by most cost of capital experts.<sup>20</sup>

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<sup>20</sup> For a further explanation of this issue, see, for example, Stewart C. Myers, "Fuzzy Efficiency," *Institutional Investor*, December 1988.

## B. THE EFFECT OF DEBT ON THE OVERALL COST OF CAPITAL

As discussed above, increased use of debt in a company's capital structure increases the cost of equity because equity is bearing an increasing portion of the variability of returns. The question addressed in this section is the effect of debt and the corresponding tax deduction for interest expense on the overall cost of capital. In other words, does the use of debt decrease the overall cost of capital for the firm?

### 1. THE EFFECT OF TAXES ON THE OVERALL AFTER-TAX COST OF CAPITAL CURVE

This section discusses the effect of taxes on the after-tax weighted-average cost of capital. For most companies, the ATWACC decreases initially as a company financed entirely with equity substitutes debt for equity because of the corporate income tax shield provided by interest payments. At some point, the disadvantages of debt begin to outweigh the benefits so that using more debt actually increases the overall cost of capital. A firm with too much debt begins to suffer from the effects of financial distress so there is generally considered to be a tradeoff between the costs and benefits of debt in the overall cost of capital. There is debate about the precise effects of taxes and the costs of financial distress, but the effect on the cost of equity is basically unchanged. This is *why* the three messages listed above remain true despite such details as the precise impact of taxes or of the possible use of excessive debt.

Repeating the three messages:

*The cost of equity of any company or investment increases at an ever increasing rate as you add more and more debt, regardless of the "true" effect of taxes or the "true" shape of the overall after-tax weighted-average cost of capital curve.*

Indeed, debt is known as "leverage" • or "gearing" • precisely because it amplifies the risk and expected return of equity. The examples above demonstrate the reason, which every property owner who has used a mortgage should be able to confirm by reflecting on his or her own experience. If it were otherwise, the average level of, and the variability of, the rate of return on the equity in your home would be much different. The effect of taxes and other effects on the shape of the ATWACC curve are details that do not affect the message of this paper: the cost of equity is a function of both business and financial risk.

There is no theory to explain definitively how to pick the "best" capital structure for a firm. In fact, the evidence is consistent with the view that the ATWACC is constant over a broad middle range of capital structures for companies in an industry. If it were otherwise, we would see firms in an industry converging on one optimal structure, because of the competitive advantage accruing to a firm with a lower cost of capital. We do not observe such clustering of capital structures around some optimum value and conclude that the ATWACC must be constant within this range. While there are several theories of capital structure, none has emerged as the definitive explanation of capital structure choice. Nonetheless, one very important conclusion is supported by the research:

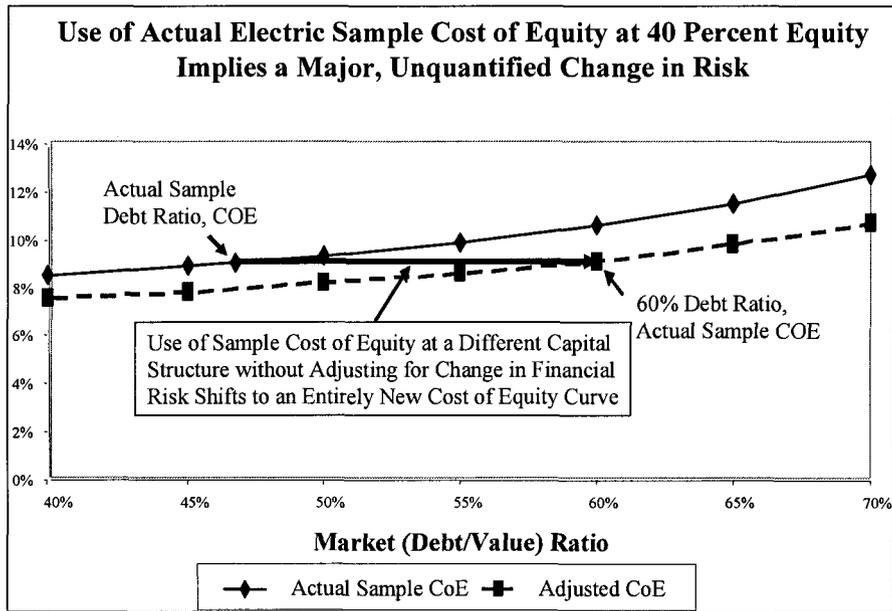
*The effect of debt on the cost of equity is material regardless of the "true" shape of the ATWACC curve, i.e., regardless of the true impact of a particular amount of debt on the overall value of the firm.*

## 2. AN EXAMPLE OF THE EFFECT OF THE FAILURE TO CONSIDER DIFFERENCES IN CAPITAL STRUCTURE

This section discusses the potential magnitude of the misestimation of the cost of equity if capital structure differences between sample companies and the regulated entity are not explicitly considered.

Suppose a commission accepted the implied cost of equity of 9.1 percent at a 53 percent equity, 47 percent debt market-value capital structure for the sample companies, but applied it directly to a regulated entity with a 40 percent equity ratio.<sup>21</sup> The result is depicted in Figure 9.

Figure 9



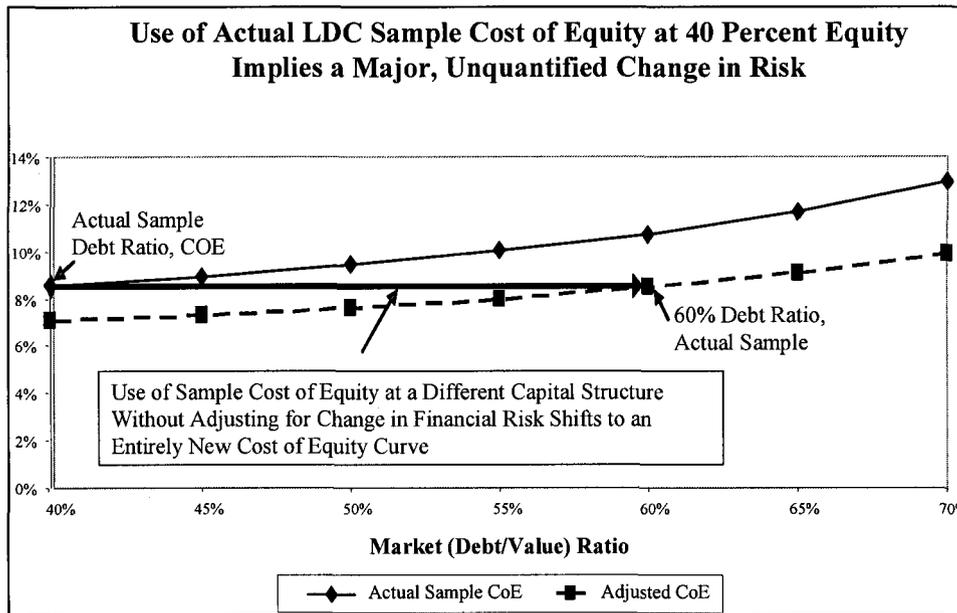
If the cost of capital expert's sample had actually had a market-value debt-equity ratio of 60-40, its true cost of equity would have been higher. Estimation problems aside, it would have been on the order of 10.5 percent, not 9.1 percent, an error of approximately 140 basis points! Alternatively, a company with the risk this procedure attributes to the regulated entity would have a true cost of equity on the order of 8.0 percent at the sample's market value capital structure, not 9.1 percent.

Moving the 9.1 percent sample cost of equity from the actual capital structure to a 60-40 debt-equity ratio shifts to an entirely different cost of equity curve. It effectively throws away all of the information in the sample cost of equity estimation process and uses a number that might as well be picked at random. *The sample cost of equity has no validity at a radically different capital structure from the one at which it was estimated.*

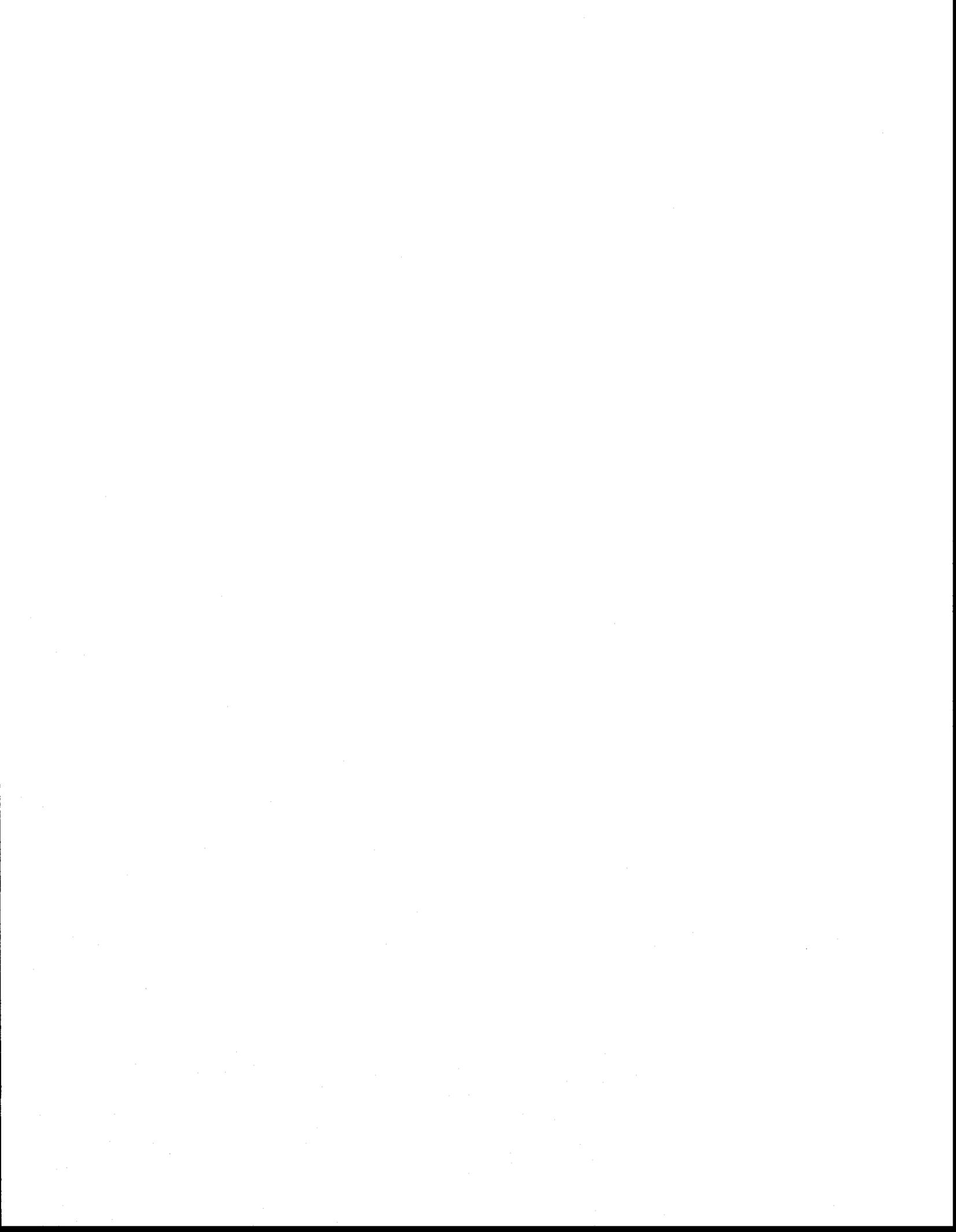
<sup>21</sup> As discussed above, the 9.1 percent at 53 percent equity was obtained using a standard CAPM estimation method. Which estimation method to rely on for cost of capital estimation in the current economic environment is subject to significant debate, but however the sample estimate is obtained, adjustment for differences in financial leverage is still appropriate.

The equivalent graph for a second sample of gas local distribution companies ("gas LDCs) is shown in Figure 10. Here the change is even more extreme. Since the initial sample cost of equity is lower, at 8.5 percent at 43 percent debt, the new cost of equity curve implied by the use of this value at the 60-40 debt-equity ratio is even lower than in Figure 9. The true sample cost of equity at the regulatory capital structure of 40 percent equity would be on the order of 10.7 percent. Alternatively, the true cost of equity of the new curve at a capital structure that matches the second sample's would have been on the order of 7.4 percent, not 8.5 percent. Again, the leap from the actual capital structure to a radically different one simply robs the sample cost of equity of any meaning. The use of that particular cost of equity value for the regulated entity is completely independent of, and is in no way supported by, the current risk and cost of capital evidence for the sample of rate-regulated companies.

Figure 10



These two figures illustrate the magnitude of the potential mismatch between the market value information used to estimate the cost of capital and the cost of equity for the regulated company when differences in capital structure (financial leverage) between the sample companies and the regulated entity are not considered.



## V. "YOU CAN'T PUSH ON A ROPE"

This section discusses what is needed to induce investment by corporations in a market economy. Investment by ordinary (i.e., non-financial) corporations is the process of turning a fungible and very liquid asset • money • into other assets that have at least as much value, but which are much less fungible and liquid. Examples of such other assets include electric generation and transmission facilities, water treatment plants, automobile factories, and research and development programs that companies hope will produce valuable patents.

Corporations get money to invest by inducing investors to provide it. The inducement comes in the form of an expected return on the investors' money. The level of return investors require depends on the risk involved, which varies from industry to industry *because* some of the assets in which corporations invest are riskier than others.

That is, the expected rate of return investors can get if they keep their money in the bank or money-market funds is predictable and carries little or no risk, but the return is also low. The expected rate of return on the assets corporations build or buy with investors' money is less predictable and carries more risk, and sometimes much more. The expected return is also higher, because investors require a higher expected rate of return to bear more risk. To attract capital, corporations must identify investments with an expected rate of return at least equal to that available to investors on alternative investments of equivalent risk.

In several opinions, the U.S. Supreme Court has established the legal standards for allowed rates of return for rate-regulated companies which appear to be in line with these economic principles. For example,

A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public . . . equal to that generally being made...on investments in other business undertakings which are attended by corresponding risks and uncertainties. • The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties.<sup>22</sup>

and

From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock. [Citation omitted.] By that standard, the return to the equity owner should be commensurate with return on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure

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<sup>22</sup> *Bluefield Waterworks & Improvement Co. v. Public Service Commission*, 262 U.S. 668 (1923) at 692-693.

confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.<sup>23</sup>

These passages suggest a two-part standard. First, the expected rate of return for investors in a rate-regulated company should equal that available in other investments of equivalent risk. Second, the return should be adequate to maintain the financial integrity of the company. Both parts of this standard make good economic sense, since you can't force investors to put their money into a venture. The very fact that such legal standards exist makes good economic sense, too.

The latter is true because there is presently an active corporate finance literature that documents the impact of international differences in enforceable legal rights on the health of a nation's financial markets and the level of investment. Two quotations from that literature summarize some of the relevant findings:

Recent research reveals that a number of important differences in financial systems among countries are shaped by the extent of legal protection afforded outside investors from expropriation by the controlling shareholders or managers. The findings show that better legal protection of outside shareholders is associated with: (1) more valuable stock markets... ; (2) a higher number of listed firms... ; (3) larger listed firms in terms of their sales or assets... ; (4) higher valuation of listed firms relative to their assets ... ; (5) greater dividend payouts... ; (6) lower concentration of ownership and control... ; (7) lower private benefits of control... ; and (8) higher correlation between investment opportunities and actual investments... . [Omitted citations indicated by ellipses.]<sup>24</sup>

Also,

Recent research suggests that the extent of legal protection of investors in a country is an important determinant of the development of its financial markets. Where laws are protective of outside investors and well enforced, investors are willing to finance firms, and financial markets are both broader and more valuable. In contrast, where laws are unprotective of investors, the development of financial markets is stunted. Moreover, systematic differences among countries in the structure of laws and their enforcement, such as the historical origin of their laws, account for the differences in financial development... . [Omitted citations indicated by ellipses.]<sup>25</sup>

This literature focuses on the possibility of expropriation by a country's citizens of minority investments made by outsiders, typically foreigners. The issue the Supreme Court addresses is the possibility of uncompensated takings by acts of government. But the key question is whether the investment is or is not at risk of being taken, not who the taker is. Investors are understandably reluctant to commit funds when such takings are possible, leading to less investment and to more costly terms for the investments that are made.

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<sup>23</sup> *Federal Power Commission v. Hope Natural Gas*, 320 U.S. 591 ("Hope") at 603.

<sup>24</sup> Andrei Shleifer and Daniel Wolfenzon, "Investor Protection and Equity Markets," *Journal of Financial Economics* 66: 3-27 (October 2002), pp. 3-4.

<sup>25</sup> Rafael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, "Investor Protection and Corporate Valuation", *The Journal of Finance* 56: 1147:1170 (June 2002), p. 1147.

To understand what is meant by "takings" in the context of a regulatory proceeding, it is useful to consider a bit of background on how an asset's risk may be allocated among different groups of customers. Investments in industry-specific corporate assets can be hostages to fortune. To sink fungible money into a non-fungible asset with few or no alternative uses, particularly one with a long life, is to accept a great deal of intrinsic risk. Companies sometimes choose to bear all of this risk and sometimes try to lay some or all of it off on other parties.

An example is a commercial building that might be used for office space or as a hotel. (Some buildings have both uses at the same time.) Commercial office space normally is rented out under long-term leases. The owner of the building gets a secure payment from the office space lessee, who thereby removes the owner's risk that the office space might lease at a much different rate in a few years. Hotel space, in contrast, rents night to night. The owner bears the risk of bad times, when more rooms will be empty and those rooms that are rented command lower rates or deeper discounts. The owner hopes to more than make up for such losses in good times, when more rooms are occupied and daily rates are higher.

The owner of a building with both office space and hotel space thus lays off some of his or her risk on office space lessees, but keeps the risk for the hotel space. The rents charged to office space lessees are lower than they would otherwise be precisely because the lessees are bearing this risk. Put differently, the cost of capital for office space is lower than the cost of capital for hotel space, and in a competitive market, the average rates for office and hotel space would reflect this difference.

This is an issue for rate-regulated firms because rate regulation often involves companies with long-lived assets with little or no alternative uses, and it therefore involves a great deal of intrinsic risk. The institutions of rate regulation pass much of this risk through to customers, in exchange for lower prices than they would otherwise have to pay. Investors' risk-bearing under rate regulation normally lies somewhere between the office-space and hotel-space extremes. Regulation denies regulated companies the right make extra-high profits by charging premium prices in good times, and in exchange is supposed to protect the company from having to suffer from extra-low prices in bad times. It also is supposed to assure the investor a fair opportunity to recover all of the money sunk into the company's assets, through depreciation or amortization charges. Yet the company normally retains some risks, too. An example is gains or losses due to variations of sales from forecasted levels, which typically fall on the company between rate hearings, at which time new forecasts can be made.

Rate-regulated companies invest under the expectation that they will earn a return equal to the cost of their capital on average, i.e., that investors will have a fair opportunity to earn exactly the rate of return they could get on alternative investments of equivalent risk. The cost of capital for electric utilities is lower than in most industries precisely because of the constraints imposed by rate regulation. Nonetheless, it is higher than office space lessees command, because rate-regulated companies bear more risk than a building owner does from an office lease.

With that background, the economic (not legal) interpretation of what is meant by "takings" follows. Economically a "taking" of regulatory property, in the sense used above, would occur when the terms of regulation were changed so as systematically to deny to investors a fair opportunity to earn the cost of capital *after* the investors have sunk their money in non-fungible rate-regulated assets.

If it were known in advance that regulators would mark regulated rates down to unremunerative levels right after major investments had been made, for example, investors would invest less than if they believed the returns would be adequate; possibly they would not invest at all. If the policy of unremunerative returns were known in advance, the company's service quality would be lower, and service would be less available and/or more expensive than it would otherwise have to be. Therefore, a change to the terms of regulation to deny a fair opportunity to earn the cost of capital after the fact would get higher service levels without paying for them, and that would constitute a taking from an economic perspective.<sup>26</sup> Whether legal or not, such an act would achieve a short-run benefit for today's customers at a material long-run cost to future customers. The research cited above suggests the long-run cost could be material for the economy of the jurisdiction committing the act, too. Uncertainty of this type may lead to under investment in the electric utility infrastructure of the country.

It is sometimes argued that a commission's need to balance customer and investor interests means that the rate of return on equity should be lowered, especially if overall rates are high due to new investments, but this would violate the standards discussed above if the result is an expected rate of return on equity that is below the cost of capital. The cost of capital is as much a real cost as workers' wages. From an economic perspective, cutting the return on equity because new investment makes costs high is no different from cutting the wages of a utility's workers because costs are high. Workers who were satisfied with the wage before the cut would look for better opportunities after the cut, and some would find such opportunities and quit. The deeper the cut, the larger the proportion of workers who would quit. Investors would have an even easier time finding better opportunities, because the stock market is full of investments that offer an expected rate of return equal to the cost of capital (which varies with the risks of the particular stock). With an allowed rate of return below the cost of capital, managers who act in their shareholders' interests would try to avoid putting any more capital into the now unremunerative line of business, with material long-run consequences. That would not be in the best interest of customers, any more than would a utility's being unable to operate or to maintain its service quality because it could not attract workers at the wages it was allowed to offer.

Another argument sometimes offered is that if the gain is now and the cost is in the long-run, why worry about it? Is not that a problem for the future? The answer is that it is always possible for one generation to live well and leave future generations to pick up the tab, and economists have no particular claim to expertise with the ethical questions generated by such decisions. However, we can try to help make sure the questions are resolved with a complete understanding of the tradeoffs involved.

Rate-regulated companies, like the institutions of regulation themselves, generally have a great deal of inertia. They are like oil supertankers, which take a great deal of time to turn if trouble looms, but which then take at least as much time to get back on the original course.

Regulated companies' managers tend to want to provide service when it's requested, trusting to the regulatory process to perform acceptably for their investors on average. Therefore, they may not react immediately to the full extent possible if the regulatory process stops doing so. They certainly react less quickly than competitive firms to signals that a previously remunerative market no longer is generating an adequate

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<sup>26</sup> From an economic perspective, there is little to distinguish between changing the terms on which capital was invested after the fact and notifying the laborers finishing up on a construction project that they weren't going to receive their final paycheck, or that they would get it but at a much lower wage. The cost of capital is as much a real cost as wages.

return.<sup>27</sup> And even after managers do react and slow or stop new investment, the long-lived nature of regulatory assets can mean existing services take a long time to decay. Therefore, the adverse impacts of a regulatory policy that systematically denies investors a fair opportunity to earn the cost of capital are likely to take awhile to become material, which can lead to the mistaken impression that they will not do so.

Once the adverse impacts are manifest, however, they cannot be overcome in a hurry, any more than a supertanker can immediately resume its previous course. Not only would remedial investment take time, but also it would take longer to get started and/or be more expensive. Moreover, investors, once burned, will be loath to trust that the regulatory jurisdiction in question won't repeat the same pattern if regulators subsequently ask for quick investments to shore up a system that the previous policy let decay, or to extend service to new customers. The safest way for investors to avoid inadequate returns on future major investments in such a jurisdiction is to keep the system capital-starved. For example, the company might not invest unless regulators were willing to negotiate *ex ante* terms that assured a fair return on incremental investment, at least. Such negotiations at least take time and cost extra money. They also lead to a higher rate of return and/or to a shift of more risk to customers than could have been achieved by a policy of allowing the company a fair opportunity to earn its cost of capital all along.

Even though rate-regulated companies an obligation to invest to maintain service, there will be incentives for investors to slow the rate of investment if they become convinced that the return will not be remunerative. It is certain that if a rate-regulated company becomes convinced that its returns in a particular jurisdiction will systematically be inadequate in the future, the best thing it can do for its shareholders is to devise an optimal exit strategy from that jurisdiction. Moreover, whatever the legal form of that strategy, and whatever the direct costs to both investors and customers of its execution, it will also constitute a very negative signal to all companies considering investing in that jurisdiction in the future.

Additionally, even if the company in question stops short of an exit strategy, those most likely to pay attention to inadequate returns for one rate-regulated company are investors in and managers of other rate-regulated industries in the jurisdiction. They may grow cautious about new investment, also, even if they have not yet been affected directly. Rate-regulated industries tend to provide basic services, so a reluctance to invest in these industries, whether solely in the one directly affected or in all of them, is very likely to spill over to the rest of the jurisdiction's economy.

Therefore, a decision to take systematically from today's investors to give service below cost to today's customers will create material problems for tomorrow's customers and very probably for the state's or the country's economy. The optimal strategy for investors in such a company is to keep it capital-starved, and possibly even to exit the jurisdiction. You can't force investors to throw good money after bad, any more than you can push on a rope. As time passes, that will lead to less reliable (and less extensive) service. Unfortunately, while systems consisting of long-lived assets take a long time to "break," once "broken" they also take a long time to fix. Moreover, tomorrow's investors will not put up new money to fix such systems

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<sup>27</sup> This is one reason that regulated firms can have so much trouble adapting to competition if it appears. See A. Lawrence Kolbe and Richard W. Hodges, "EPRI PRISM Interim Report: Parcel/Message Delivery Services," report prepared for the Electric Power Research Institute, RP-2801-2 (June 1989), reprinted in S. Oren and S. Smith, eds., *Service Opportunities for Electric Utilities: Creating Differentiated Products*. Boston: Kluwer Academic Publishers (1993).

on the old terms. Even after such a system is restored, it will cost tomorrow's customers more than it would have without the initial decision to take from today's investors.

## VI. "EMPTY PROMISES BUY NOTHING"

This section addresses the difference between the cost of capital and the allowed rate of return, and in particular, shows why setting the allowed return equal to the cost of capital provides inadequate compensation if the regulated entity can not expect to earn the allowed return on average.

The "opportunity cost of capital," or "cost of capital" for short, is defined as the expected rate of return in capital markets on alternative investments of equivalent risk. The cost of capital is the bare minimum rate of return necessary to attract capital and to compensate investors for a given level of risk, since that is what they could earn elsewhere without bearing any more risk. That is, it is the competitive market price for capital exposed to a given level of risk. To treat both investors and customers fairly, regulatory procedures should operate so the company expects to earn the cost of capital on the assets its investors' money has bought.<sup>28</sup>

The "allowed rate of return" is a regulatory parameter used to determine the revenue requirement. Typically, the allowed rate of return is set equal to regulators' estimate of the cost of capital. The issue for this section is whether the mere setting of the allowed rate of return equal to the cost of capital actually permits investors to expect to earn the cost of capital, even if all parties were to agree that regulators had estimated the cost of capital perfectly.

An allowed rate of return equal to the cost of capital lets the company expect to earn the cost of capital if and only if the company expects to earn the allowed rate of return. If the jurisdiction's regulatory procedures are designed so the company actually expects to earn less than the allowed rate of return, then it expects to earn less than the cost of capital, too.

In this context, the "expected" rate of return or the return the company "expects" to earn refers to the average value. The term "expected" is from statistics, and denotes the mean of the distribution of possible returns or rates of return.<sup>29</sup>

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<sup>28</sup> A potential exception to this rule is "incentive regulation." Under incentive regulation, the company may be able to expect to earn more than the cost of capital for a period of time *if* its managers are able to find innovative ways to cut costs. Customers benefit after this period ends (or sometimes right away, according to a predetermined sharing formula) when costs are lower than they would otherwise have been.

<sup>29</sup> This paper uses "expect" and "expected" only in the statistical sense:  
... the idea of expectation of a random variable is closely connected with the origin of statistics in games of chance. Gamblers were interested in how much they could "expect" to win in the long run in a game, and in how much they should wager in certain games if the game was to be "fair." Thus, expected value originally meant the expected long-run winnings (or losings) over repeated play; this term has been retained in mathematical statistics to mean the long-run average value for any random variable over an indefinite number of samples. This holds whether a large number of samples will actually be conducted or whether the situation is a one-trial affair and we consider hypothetical repetitions of the situation. Over a long series of trials, we can "expect" to observe the expected value. At any *single* trial, we in general cannot "expect" the expected value; usually the expected value is not even a possible value of the random variable for any single trial. . . .

W. L. Hayes, and R. L. Winkler, *Statistics*, Vol. I, New York: Holt Rinehart & Winston (1970) at 136-137.

In some regulatory jurisdictions, some regulated companies do not earned their allowed rate of return over several years. The specific reasons for these shortfalls would need to be investigated on a case by case basis, but the fact of such shortfalls raises the possibility that investors will not expect to earn the allowed rate of return under some regulatory arrangements. Fair treatment of both investors and customers means that rate-regulated companies should expect to earn the cost of capital on average. If a company does not expect to earn its allowed rate of return, then setting the allowed rate of return equal merely to the cost of capital shortchanges its investors, because the supposed opportunity to earn the allowed rate of return on average is actually an empty promise. Fair treatment of investors in such a case requires either changes to the regulatory mechanism so the company does expect to earn its allowed rate of return on average, or an allowed rate of return set enough above the cost of capital to make up for the expected shortfall between the cost of capital and the rate of return the company actually expects to earn.

## VII. CONCLUSIONS

Setting the cost of capital correctly for regulated entities is critical to insuring the adequacy and reliability of service for ratepayers. If the allowed return is set too low, there is likely to be an adverse affect on investment. In addition, merely setting the allowed return equal to the cost of capital does not provide an adequate return if the regulated entity can not expect to earn the allowed rate of return on average. At the same time, setting the allowed return too high means that the rate payers are charged too much for service. Neither outcome is in the best interests of ratepayers or the industry.

Now that the focus of regulation is returning to setting the allowed rate of return, it is important that the latest developments in financial theory be incorporated into the rate setting process so that the cost of capital can be estimated and set as accurately as possible. One area of development in financial theory is the effect of financial leverage (financial risk) on the cost of equity. Just as increased business risk means an increase in the required rate of return on equity, increased financial risk also means an increase in the required rate of return. An allowed return that does not consider both the level of business risk and the level of financial risk is not likely to be an accurate estimate of the cost of capital for the regulated entity.

Unfortunately, the methods used in a regulatory setting frequently ignore differences in financial risk. This paper has described a method that fortunately is very simple that considers both business and financial risk simultaneously so that the allowed return on equity can be set that is consistent with the regulatory capital structure to which the return is applied. This method is to calculate the overall cost of capital (the ATWACC) for all sources of financing in the firm. Using the assumption of a constant overall cost of capital, the analyst can adjust the return on equity to be consistent with both the information provided by the sample companies and with the regulatory capital structure allowed. As demonstrated in the examples in Section V, failure to consider differences in capital structure between the sample and the regulated entity can lead to errors in the estimated cost of equity of 200 basis points or more. Errors of this magnitude make it critical that financial risk be treated appropriately.

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## Business & Money

# Measuring Return on Equity Correctly

Why current estimation models set allowed ROE too low.

August 2005

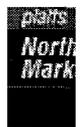
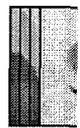
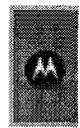
By A. Lawrence Kolbe, Michael J. Vilbert and Bente Villadsen

**E**stimated costs of equity for utilities are, like interest rates, very low by historical standards. A standard capital asset pricing model (CAPM) value might be 9 percent,<sup>1</sup> although some analysts might argue for much lower values.<sup>2</sup> Discounted cash flow (DCF) methods may produce a wider range of answers, due to variations in the growth rates selected, but many of those answers will be low by historical standards, too.<sup>3</sup>

These low findings are based in part on problems with the underlying models. For example, the CAPM long has been known to underestimate the cost of equity of low-beta stocks and to overestimate the cost of equity of high-beta stocks.<sup>4</sup> However, often there is a more fundamental problem that rate regulation in North America usually overlooks: a material mismatch between the capital structure at which the cost of equity is estimated and the ratemaking capital structure to which it is applied.<sup>5</sup> A material capital structure mismatch, which occurs frequently, can lead to material misestimates of the appropriate allowed return on equity, perhaps on the order of 2 percentage points. That is, a 9 percent estimate of the cost of equity can imply an allowed rate of return on equity of 11 percent.

### Effect of Debt On Equity Risk

Let's start with the basics. Companies raise money for investment by issuing securities. Different securities have different claims on the firm's earnings, and if necessary, on its assets. Debt has a senior claim on a specified portion of the earnings. Common equity, the most junior security, gets what's left after everyone else has been paid.



The company's overall risk depends on the business it's in. When a company uses (reasonable amounts of) debt, the company's overall risk falls on a fraction of its capital, the common equity.<sup>6</sup> Since equity bears more risk, investors require a higher rate of return on equity than on debt. Except at extreme debt levels, the overall risk of the firm does not change materially due to the addition of debt. The various securities just divvy that risk up.

Modern models of the cost of equity assume risk consists of a stock's sensitivity to one or more economic factors that affect asset values generally. Suppose changes in some market-wide economic factor normally produce fluctuations in the market value of a company's assets of plus or minus (+/-) 2 percent. At 100 percent equity, these changes produce fluctuations of +/- 2 percent of the market value of the company's equity, too. But at a 50-50 market-value, debt-equity ratio, the same asset-value fluctuations produce equity-value fluctuations of +/- 4 percent. At a 75-25 market-value debt-equity ratio, these fluctuations become +/- 8 percent of the market value of the company's equity. Figure 1 illustrates this point for debt-equity ratios of 0-100, 25-75, 50-50, and 75-25. Higher risk means a higher required rate of return, so the cost of equity goes up at an ever increasing rate as a company adds debt, which offsets the lower cost of debt. In short, there is no magic in financial leverage.

This result should be familiar to anyone who owns a home. When housing prices go up or down, the effect on the owner depends in part on how big the mortgage is. Figure 2 shows this effect for mortgages that are 0 percent, 20 percent, 50 percent, and 80 percent of the dwelling's initial purchase price. The figure assumes the purchase price of a home is \$100,000, and that a year later housing prices in the area are expected to vary within a range of plus or minus 10 percent of today's price. The impact on the homeowner's net worth depends on the size of the mortgage. With no mortgage, a +/-10 percent change in the dwelling's price translates into a +/-10 percent change in the owner's equity. With a mortgage of 50 percent of purchase price, this range doubles to +/-20 percent. With a mortgage of 80 percent of purchase price, the +/- \$10,000 in the home's value becomes +/-50 percent of the owner's initial \$20,000 in equity.

#### Implications for Rate Regulation

Nearly half a century of financial research on the effects of capital structure on the value of the firm<sup>7</sup> and the resulting literature have explored the effects of risk, corporate taxes, personal taxes, financial distress, the signals companies send investors through the ways they raise capital, and possible divergences of interests between managers and shareholders. We believe it is fair to say that no single theory has emerged as "the answer" to how capital structure affects the value of a firm.

Empirical as well as theoretical research has been done. For most industries, modest amounts of debt appear to add some value to the firm. However, companies display a wide range of intra-industry capital structures, and the most profitable firms in an industry tend to use the least debt, a finding that holds internationally as well as in the United States. The most profitable firms are the ones that could make best use of the corporate tax shields that interest expense provides,<sup>8</sup> and presumably these firms tend to be the best managed (why else are they the most profitable?). The fact that these firms do not use more debt implies that the corporate tax advantage of debt must be offset by other costs. The upshot of such research is that the value of a firm is not very sensitive to the debt ratio over a broad middle range of capital structures.

What does this mean for the cost of capital? Standard practice uses the after-tax weighted-average cost of capital as the discount rate in determination of the value of a project or a firm.<sup>9</sup> If the value of the project or the firm is independent of capital structure over a broad middle range, as the research demonstrates, so too must be its after-tax weighted-average cost of capital.<sup>10</sup>

The result is illustrated in Figure 3. Here the after-tax weighted-average cost of capital is shown essentially as flat between market-value capital structures of about 30 and 55 percent debt. If the overall cost of capital is essentially constant as the proportion of risk-bearing equity shrinks, the risk and cost of equity must rise at an ever-increasing rate—just what the risk discussion in the previous section predicted. But the finding that the after-tax weighted-average cost of capital essentially is flat tells us just how fast the cost of equity increases with debt. The figure shows this effect in the cost-of-equity curve.<sup>11</sup>

Market-value equity ratios typically are higher than book-value debt ratios for utilities today. Suppose an analyst examines a sample of firms in this industry and estimates a 9 percent cost of equity at the sample's 34 percent market-value debt ratio. Then (estimation errors aside) she would have found an 11 percent cost of equity had the sample had a 53 percent debt ratio, because the sample's equity holders would have been bearing much more financial risk at the higher debt ratio.<sup>12</sup> That, in turn, means that if the capital structure used to set rates were 53 percent debt, the allowed rate of return on equity should be 11 percent, not 9 percent.

The finding that the after-tax weighted-average cost of capital is essentially flat for companies in the industry's middle range of capital structures provides a ready three-step procedure to use in rate hearings:

1. Calculate the after-tax weighted-average cost of capital of a sample of companies not in financial difficulty,<sup>13</sup> using each company's market-value capital structure and its current after-tax market cost of debt;<sup>14</sup>
2. Take the average of these values as the industry's after-tax weighted-average cost of capital; and
3. Calculate the regulated company's allowed rate of return on equity as the cost of equity that produces the same after-tax weighted-average cost of capital at the ratemaking capital structure, again using the company's current after-tax market cost of debt.

The result will be the cost of equity found by the analyst, estimation problems aside, if the sample's market-value capital structure had been equal to the ratemaking capital structure. That value is the appropriate allowed rate of return on equity at the ratemaking capital structure.

Differences between the market-value capital structures of the sample companies and the capital structure used to set rates can be large. If so, there will be equally large differences in the amount of financial risk—hence, the costs of equity at the different capital structures. Failure to take these differences into account is likely to lead to allowed rates of return on equity that are materially below the costs of equity that utility shareholders actually require.

*Drs. Lawrence Kolbe and Michael J. Vilbert are principals, and Dr. Bente Villadsen is a senior associate at The Brattle Group. The authors would like to thank Stewart C. Myers and James A Read Jr. for helpful discussions on this topic over a period of years, and Dan Harris, Matthew P. O'Loughlin, and Richard A. Patterson for helpful comments on earlier drafts of this paper. Opinions expressed in this article, as well as any errors or omissions, are the authors' alone. Contact the authors at [www.brattle.com](http://www.brattle.com). A more detailed discussion of the principles covered in this paper is available in *The Brattle Group, The Effect of Debt on the Cost of Equity in a Regulatory Setting*, Washington: Edison Electric Institute (2005).*

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Endnotes:

1. Recall that the CAPM estimates the cost of capital as the sum of (1) the risk-free interest rate plus (2) the product of the stock's beta and the market risk premium. If the long-term risk-free rate is set at 5 percent, the market risk premium at 6.5 percent, and the beta at 0.6, the result is 8.9 percent. (Recall also that beta measures the sensitivity of the stock's returns to the market's returns, and that the average beta is 1.0, indicating an average-risk stock.)
2. For example, a 5 percent value for the long-term risk-free rate, a market risk premium of 5.5 percent, and a beta of 0.5 produce a CAPM cost-of-equity estimate of 7.8 percent. Use of a short-term interest rate, although uncommon in rate regulation, currently would produce even lower estimates for the cost of equity.
3. Recall that the basic DCF method estimates the cost of equity as the sum of (1) the forecasted dividend yield plus (2) the growth rate.
4. See, for example, Fischer Black, Michael C. Jensen and Myron Scholes, "The Capital Asset Pricing Model: Some Empirical Tests," in M. Jensen (ed.) *Studies in the Theory of Capital Markets*, New York: Praeger (1972) 79-121; Eugene F. Fama and James D. MacBeth, "Risk, Returns and Equilibrium: Empirical Tests," *Journal of Political Economy* 81 (1973), 607-636; and Robert H. Litzenberger, Krishna Ramaswamy and Howard Sosin, "On the CAPM Approach to Estimation of a Public Utility's Cost of Equity Capital," *The Journal of Finance* 35 (1980) 369-387.
5. Countries such as Australia, the United Kingdom, and New Zealand have implemented rate regulation much more recently than Canada or the United States. Their procedures, developed with the advantage of access to modern financial research, focus primarily on the overall market cost of capital rather than the separate costs of debt and equity. This approach avoids the problems raised in this article.
6. At excessive debt levels, debt starts to bear risks ordinarily borne by equity. We ignore this possibility for now, but recognize it in the next section.
7. The modern literature begins with Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review*, 48: 261-297 June 1958). Hundreds of papers have explored the theoretical and empirical aspects of the issue since that time.
8. One advantage of debt is that it reduces corporate taxes on operating income, an advantage offset to a degree by the higher personal taxes on interest versus capital gains (and currently, dividends).
9. See, for example, Brealey and Myers, *Principles of Corporate Finance*, New York: McGraw-Hill/Irwin, 7th ed. (2003), Chapter 19. The after-tax weighted-average cost of capital is applied to the all-equity cash flows generated by the firm or project.
10. The decline in firm or project value at high debt ratios is due to a combination of increases in the weighted-average cost of capital and other costs. In principle, both capital budgeting and rate regulation could model the pure cost-based part separately. But this is not done in ordinary practice. Treating the weighted-average cost of capital estimated at normal capital structures as flat when debt becomes excessive is an easy, practical approach to recognizing both effects. (We understand that the next edition of Brealey and Myers, *op. cit.*, may recommend this practice, too.)

11. The rate at which the cost of equity increases is mitigated by increases in the after-tax cost of debt as higher debt ratios force debt to bear an increasing proportion of the firm's risk.
  12. These precise values depend on the precise cost of capital curves assumed in Figure 3, but the basic conclusion holds for any set of cost of capital curves consistent with the research on the effects of capital structure on the value of the firm.
  13. Companies in financial distress will be beyond the middle range of capital structures. A ready practical procedure to avoid such companies is to exclude from the sample any companies without investment-grade debt.
  14. The after-tax cost of debt is the current yield to maturity times the quantity, one minus the corporate tax rate. The market value of equity is price per common share times the number of outstanding common shares. Unless the company's embedded interest rates are far from current market values, analysts typically use the book value of debt in such calculations. Preferred stock should be treated like debt, except that its current yield is already after-corporate-tax.
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February 15, 2006

Hon. Jeff Hatch-Miller, Chairman  
Arizona Corporation Commission  
1200 West Washington  
Phoenix, AZ 85007

Re: Arizona-American Water Company Rate Case #W-01303A-050405

Dear Commissioner Hatch-Miller:

The Town of Paradise Valley has reviewed the January 16, 2006 filings by staff of the Arizona Corporation Commission and by the Residential Utility Consumer Office (RUCO) with respect to Arizona-American Water Company's ongoing rate case for water system fire flow improvements. Since the Town's perspective on the fire flow improvements apparently differs from comments submitted by RUCO, the following information is provided for your consideration in connection with the rate case.

Apparently, RUCO purports to represent consumers within the Town regarding the rate impact of the proposed water system fire flow improvements. Actually, the water system improvement plan designed to provide adequate fire flows began at the grass roots level by Town residents who were aware throughout the process that the cost of the improvements would need to be supported by the rates.

The support of the Commission staff for the fire flow improvements in the Town is very much appreciated. Although Arizona-American has already committed significant resources and made major improvements to the water system, there is a long way to go to assure a satisfactory level of fire protection throughout the water system. The Town urges Arizona-American to continue the water system improvement program as planned in order that it may be completed within the five-year time frame which was planned.

The Town government cannot, for both statutory and public policy reasons, fund water system improvements for a private utility. The Town is not a water utility. Town residents are served by three water utilities, Arizona-American, Berneil Water Company and the City of Phoenix. Each of these utilities is responsible to make the necessary improvements within their respective service area, and to not only meet public health standards, but to meet fire safety standards prescribed by the Uniform Fire Code as well.

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Fortunately, all three water utilities are moving forward with necessary improvements. Legally, the Town is not a water utility and could not spend public money on water system improvements without a vote of the people. From a public policy perspective the Town could not subsidize a private business with public money. Both A.R.S. §9-5 14 and the Gift Clause in the Arizona Constitution prohibit the Town from spending general fund money to build or contribute to the construction of the water system infrastructure that would be owned by Arizona-American.

From the Town's perspective each of the three water utilities serving our residents must utilize whatever mechanisms they have to fund improvements which are necessary for public safety. The Town, like other Arizona municipalities, has adopted the Uniform Fire Code which specifies minimum flow rates necessary for different types of development. A minimum fire flow of 1500 gallons per minute is the standard which all three water utilities must meet within the Town.

If representatives of the Corporation Commission wish any further information from the Town of Paradise Valley, please feel free to contact me.

Sincerely,



Thomas M. Martinsen  
Town Manager

TMM/nm