Congruence Between Decision and Evaluation Models in Capital Budgeting Situations

Subtitle: Don't Kill the Accountant

By
Dexter E. Gulledge, University of Arkansas - Monticello
Angela Sandberg, Jacksonville State University

Abstract

Although rarely explored, the short story is a unique way of disseminating information to students. This article provides a short story through which the differences between capital budgeting discounted cash flow decision models and performance evaluation measures are explored in a real-life setting. It would be appropriate for use in both undergraduate and graduate Cost/Managerial Accounting courses. In the story, the effect of choice of depreciation method and its effect on performance methods is reviewed. A technique for achieving congruence between decision criteria and performance evaluation techniques is presented and discussed in a historical context. Additional topics such as the accountant-client relationship, benefits of continuing education through professional associations and networking are presented.

Don't Kill the Accountant

Late Tuesday Frank White slumps in a living room chair, waiting impatiently. At about 6:30, his lawyer brother knocks and strolls in the door. "What's up, Frank?" asks Steve. "June said you were upset about something and needed to talk."

Looking up, Frank asks angrily, "Steve, can I get the death penalty for killing an accountant?"

Shocked at the rage coming from his normally calm brother, Steve responds, "Whoa, hold on a second. Calm down before you blow a gasket and tell me what's going on."

"Steve, I'm embarrassed that I could have been so stupid. I don't believe I'll ever be a success in the business world." Reluctantly, Frank tells his story to Steve. "You remember my telling you I need some extra income since I'll be retiring from the mill in six years. Being a maintenance mechanic is a good job with decent benefits, but I wanted a little more. I decided to invest the $50,000 I had in Certificates of Deposit in a small business. The CD's were yielding only 4% at the Savings and Loan, and I believed I should get a minimum before tax return from my new business of 12%. That way I'd be compensated for the use of my time and money as well as for the overall risk. So, I looked at several types of small businesses and visited the local Small Business Development Center at the University. They were very helpful and suggested I see an accountant before making any investment. I narrowed down my choices, decided to open a

Laundromat, and called the accountant who did my taxes last year for an appointment."

"Go on, tell me the rest so I can figure out what's bothering you," encourages Steve.

"Well," Frank responds, pulling a folder out of a briefcase, "my accountant, James Brown, seemed knowledgeable about my taxes, so I figured he would be perfect to help me set up this business. James and I went over my estimates of revenues and expenses. (Listed in Table 1) In fairness to James, he did think of some items which I missed, like the investment I would have to make in an inventory of soap, bleach, etc., and change for the change machines. He called this my working capital investment and explained that the money would return to me at the end of the business' life."

"Frank, I still don't see the problem."

"Hold on, I'm getting there. I clearly told James that I did not want to earn less than a 12 percent return on my investment of $50,000. To my great pleasure, James calculated a projected rate of return of 17.8%. He also projected a net present value of $8,949. When I told him that I had no idea what net present value meant, he told me to think of it as the ***extra*** I would earn over and beyond the 12% desired rate of return. (See Table 1)

Table 1
Calculations of Net Present Value
and Internal Rate of Return

Expected annual cash receipts		
Cash receipts from washers and dryers		$ 50,700
Expected annual cash disbursements		
Utilities	$ 11,700	
Rent, Cleaning, Maintenance, Insurance, etc.	25,500	
Total cash disbursements		37,200
Net annual cash inflows (years 1-5)		$ 13,500
Add: Return of working capital in year 6	$ 2,000	
Disposal value of washers and dryers in year 6	4,800	6,800
Net annual cash inflow (year 6)		$ 20,300

Present Value of Cash Flow (using a 12% discount rate)	Cash Flow	Present Value
Years 1 - 5 (annually)	$ 13,500	$ 48,664.48
Year 6	20,300	10,284.61
Total Present Value		$ 58,949.09
Less: Initial Investment[A]		50,000.00
Net Present Value		$ 8,949.09
Internal Rate of Return		17..8%

[A]Consists of $48,000 of equipment with a $4,800 disposal value and $2,000 of investment in working capital.

"So as you know, I opened my Laundromat and worked some really long hours trying to make it a success. Yesterday I went to my accountant's to review the first year's income statement he prepared. Here's a copy. " Frank continued as he handed Steve the folder. (See Table 2) "As you can see, he said I had made a 12.6% return on my investment. At first this seemed very good to me as it exceeds the minimum I desired. But then I got confused."

"What do you mean, confused?" asks Steve.

Table 2
Income Statement and ROI - Year 1

Revenues:		$ 50,700
Expenses:		
Utilities	$ 11,700	
Rent, Cleaning, Maintenance, Insurance, etc.	25,500	
Depreciation[A]	7,200	
Total Expenses		44,400
Net Income		$ 6,300
Divide by Investment		÷ $50,000
Return on Investment		12.6%

[A]($48,000 Cost - $4,800 Disposal Value) ÷ 6 Year Life

"Frank responds, "Well as you can see from the statement, I met the projected estimates of revenues and expenses. I assumed that the bean counter had made a math error somewhere! When I called him on it, he claimed he meant an average return over the life of the investment of 17.8% and that my 'best years were ahead'. Well, for my own peace of mind, that night I went to the local library and checked out a book which explained all this stuff. I sat down and calculated the ROI myself. I came up with.... ,"

"ROI?" asked Steve. "What's that."

"Oh, that's the abbreviation for return on investment."

"Ok, go on. Sorry for the interruption."

"I came up with an average ROI of 23.6%. (See Table 3) Right then I decided my accountant was incompetent. There he sits in a big office, with all his degrees and certificates, and here I am, just a working stiff, yet he can't get something this easy right.

"Today I stormed over to his fancy office and told him he had exactly three days to come up with an explanation of the differences between these ROI figures. I threw my calculation on his desk and said I would be back at 9:00 a.m. Friday and that if he didn't have an explanation I would change CPA firms."

Steve had been listening with some trepidation and worry. As a lawyer, he has had irate clients in his office and can empathize with both Frank and his accountant. Relieved that the problem is not worse, he responds, "Calm down Frank. Look, I know the accounting profession has a strong code of ethics and a sound continuing education program. I'm sure James is a competent professional and this is just a case of miscommunication and misunderstanding. I'll go with you Friday, but I'm sure James will have a sound explanation for you."

Table 3
Projected Return on Investment Calculations

Year	Income	Book Value of Investment at Beginning of Year	Return on Investment
1	$ 6,300	$ 50,000	12.60%
2	6,300	42,800	14.72
3	6,300	35,600	17.70
4	6,300	28,400	22.18
5	6,300	21,200	29.72
6	6,300	14,000	45.00
Average Return on Investment			23.65%

After Frank White stormed out of his office, James Brown immediately started going over his calculations, triple-checking every number and even pulling out his old Cost Accounting textbook to review the techniques of net present value, internal rate of return, and return on investment. He knew the internal rate of return was calculated with cash flows only and that the ROI figure was calculated with accounting net income but couldn't really understand why the figures were different if the estimates of revenues and expenses were met. Just as he was finishing the calculations again, he heard a knock on his door and looked up as Linda Robinson, a senior accountant and his immediate supervisor, stuck her head in.

"Jim, I just wanted to remind you of the CPA society meeting at the Steak Pit at 6:00 p.m. tonight. You are going, aren't you?" asks Linda.

Really, all James wanted was to go home and collapse, but he reluctantly agreed to attend the meeting. There, during the social hour, he saw one of his college professors, Dr. Clayton. During their conversation Dr. Clayton asked, "Jim, how's the new job with Horton and McCracken going?"

"Pretty well until today," responded James, "but today was terrible."

"How so?" asked Dr. Clayton, concern in her voice.

After hearing an outline of the problem, Dr. Clayton immediately commented. "Jim, your problem is that the depreciation method you used in preparing the client's income statement is not consistent with the one you used in your capital budgeting analysis."

Confused, James responded, "Huh, I thought the net present value and IRR calculations used in capital budgeting techniques uses only the cash flows and ignores the depreciation."

"That's not quite correct, an implicit assumption of . . . ," Clayton's explanation is cut short as the chapter president called the meeting to order. As they took their seats, Dr. Clayton offered to meet with James early the next morning to explain and discuss James' problem fully.

After a restless night, James appears at Dr. Clayton's office at 9:00 a.m. and shows Dr. Clayton the figures from Frank White's file. Dr Clayton first explains, "Many people believe that because the net present value and internal rate of return calculations do not explicitly consider depreciation amounts that they are ignored entirely. This is not quite correct. Depreciation, i.e., recovery of investment, is

implicit in the models."

"What do you mean?" asks a frustrated James.

Dr. Clayton continued, "Look at your original calculation of an internal rate of return of 17.8%. (see Table 1) In making that calculation, you ignored depreciation expense because the methodology did it for you."

"Here," she says, flipping on her computer. "Let me show you with a spreadsheet example with a more accurate IRR of 17.804%" (See Table 4)

Table 4
Pattern of Return of Investment Under Discounted Cash Flow Capital Budgeting Techniques

Year	Investment at Beginning of Year	Annual Cash Inflows	Return on Investment[A]	Return of Investment	Investment at End of Year
1	$ 50,000.00	$ 13,500	$ 8902.02	$ 4,597.98	$ 45,402.02
2	45,402.02	13,500	8,083.40	5,416.60	39,985.42
3	39,985.42	13,500	7,119.02	6,380.98	33,604.44
4	33,604.44	13,500	5,982.95	7,517.05	26,087.39
5	26,087.39	13,500	4,644.61	8,855.39	17,232.00
6	17,232.00	20,300	3,068.00	17,232.00	0.00

[A](17.804046404322%)x (Investment at Beginning of Year)

After reviewing the spreadsheet with Dr. Clayton, James comments, "I think I see what you mean. If the Return of Investment is thought of as 'depreciation', and I used the straight-line method of depreciation in Frank White's Income Statement, it would be improper to use it to evaluate the validity of the capital budgeting decision."

"That's right," responds Dr. Clayton, at she reaches to get a book from the shelf behind her. Quickly flipping to a page, she continues, "Look here, in Kaplan and Atkinson's Managerial Accounting (1989) text, they note that the accounting rate of return obtained from an ROI calculation is frequently assumed to be an estimate of the division's economic rate of return on invested capital. The division's economic rate of return will be the same as the accounting rate of return if revenues and expenses are equal to cash inflows and outflows and if a depreciation method is used which is consistent with the implicit assumptions of the discounted cash flow capital budgeting techniques. In addition, if these revenues and expenses are equal to the originally estimated amounts, the accounting rate of return will be consistent with the Internal Rate of Return (IRR) that you projected for Mr. White."

"Wait a minute, Dr. Clayton. The example you just showed me had a return of investment totaling $50,000, but the depreciable cost of White's investment is only $43,200, a $48,000 investment in machines less the estimated residual value of $4,800."

"True. But remember, return of investment includes return of his investment in working capital and the residual value of the equipment. In 1990, the FASB put out a discussion

memorandum on the use of present value measurements in accounting and included a section on the use of the interest method, also called the annuity method, of depreciation. Unfortunately, the FASB did not include a formula for calculation of the method. However, there is a formula which can be used in the case of even cash flows. Here it is," She remarks as she opens up another text from the collection on her bookshelves.(Welch, Zlatkovich and Harrison, 1979)

"If you apply this formula with the more accurate IRR figure of 17.804%, the annuity amount is $13,500 and the example we just reviewed can become a depreciation schedule." (See Table 5)

$$ANNUITY = \frac{COST - \frac{SALVAGE\ VALUE}{(1+i)^N}}{\frac{1 - \frac{1}{(1+i)^N}}{i}}$$

Where: SALVAGE VALUE includes the return of working capital
COST includes the investment in working capital
i = internal rate of return
N = years of life of the project

Note: The depreciation expense is the annuity amount less interest at the internal rate of return on the beginning of year book value of the total investment.

Table 5

Calculation of Depreciation Expense Under the
Annuity Method, Applied Using the Internal Rate of Return (IRR)
from the Capital Budgeting Analysis

Year	Investment at Beginning of Year	Annual Cash Inflows	Interest on Investment[A]	Depreciation Expense	Investment at End of Year
1	$ 50,000.00	$ 13,500	$ 8,902.02	$ 4,597.98	$ 45,402.02
2	45,402.02	13,500	8,083.40	5,416.60	39,985.42
3	39,985.42	13,500	7,119.02	6,380.98	33,604.44
4	33,604.44	13,500	5,982.95	7,517.05	26,087.39
5	26,087.39	13,500	4,644.61	8,855.39	17,232.00
6	17,232.00	20,300	3,068.00[B]	10,432.00	6,800.00

[A](17.804046404322%) x (Investment at Beginning of Year).
[B]Rounded to reduce investment to residual value plus working capital.

"For example, the first year depreciation expense is $4,597.98. This expense is calculated by subtracting interest on the beginning balance of the book value of the investment from the net annual cash receipts of $13,500. The interest is figured by taking the interest rate of return multiplied by the book value of the investment of $50,000. The interest is equal to $8,902.02. This amount is subtracted from the $13,500 to give you the depreciation expense of $4,597.98. Each year, the book value of the investment will decrease by the amount of the depreciation expense."

"Ok," mutters James, "I think I understand this, but how does that help me handle Mr. White?"

"Well Jim, how about we set up a set of revised income statements for your Mr. White and see what happens to his return on investment?" (See Table 6)

Looking at her example, Jim comments to Dr. Clayton, "You know, I can see a couple of real advantages to using the annuity method. First of all, if the actual results are better than estimated, the ROI will be above the IRR indicated in the capital budgeting analysis, and if we find actual results are less than projected, then ROI will be less. This technique will give both us and our clients a quick indicator of the validity of our capital budgeting decisions without conducting a complete audit. That way we can focus only on those situations with large variances from expectations, conserving both time and money."

Table 6

Return on Investment Calculations
Using the Annuity Method

	Year					
	1	2	3	4	5	6
Revenues:	$50,700.00	$50,700.00	$50,700.00	$50,700.00	$50,700.00	$50,700.00
Expenses:						
Utilities	$11,700.00	$11,700.00	$11,700.00	$11,700.00	$11,700.00	$11.700.00
Rent, etc.	25,500.00	25,500.00	25,500.00	25,500.00	25,500.00	25,500.00
Depreciation	4,597.98	5,416.60	6,380.98	7,517.05	8,855.39	10,432.00
Total	41,797.98	42,616.60	43,589.98	44,717.05	46,055.39	47,632.00
Net Income	$ 8,902.02	$ 8,084.40	$ 7,119.02	$5,982.95	$ 4,644.61	$3,068.00
Investment Balance						
Beginning	$50,000.00	$45,402.02	$39,995.42	$33,604.44	$26,087.39	$17,232.00
Ending	45,402.02	39,995.42	33,604.44	26,087.39	17,232.00	6,800.00
ROI[A]	17.8%	17.8%	17.8%	17.8%	17.8%	17.8%

[A]Net Income ÷ Beginning Inventory Balance

"That's true," says Dr. Clayton, "and a second major advantage for larger firms using ROI for performance evaluation is that you are also able to avoid some of the dysfunctional behavior of managers who turn down acceptable projects because the Accounting Rate of Return computed with the straight-line or one of the accelerated methods severely understates the economic rate of return in the early years of a project's or investment's life."

"I must, however, caution you about a couple of items. First, as you know, the capital budgeting analysis should be done on an after-tax basis, not before as you have done. Second, because the tax law mandates the use of an Accelerated Cost Recovery System (ACRS), ROI figures on an after-tax basis are not consistent with an after tax ACRS IRR figure. However, this does not invalidate the use of the annuity method and before tax comparisons of IRR and ROI as tools for monitoring and evaluating the validity of prior capital budgeting decisions."

"Well, Dr. Clayton, I'm sure glad I ran into you at the CPA meeting. Without your help I would have been in real trouble. I am wondering though why Dr. Carpenter didn't mention this annuity method in our intermediate accounting course and I don't remember it being in the textbook either."

"Jim, in the 70's, before you were born," chuckles Dr. Clayton, "The AICPA had issued around 23 to 25 APB opinions and there was time available to discuss items such as this. However, the explosion of FASB statements has crammed the textbooks full of very technical details and makes it very difficult for Dr. Carpenter and the students to complete the material in just two semesters. That's one of the reasons why we here at City College and many other schools are now covering the material in a three course sequence. Even with the extra time, many topics have almost disappeared from the Intermediate books as authors and teachers are forced pick and choose which topics are most important."

"I guess this is one of the reasons you, Dr. Carpenter and the rest of the faculty wanted all of us to get involved in professional organizations."

"That's right, James. Professional contacts, exchange of knowledge and continuing education are a big part of what the local and state societies of the AICPA as well as other organizations such as the Institute of Internal Auditors and Institute of Management Accountants are all about," responds Dr. Clayton as she walks James to the door. "Just make sure you remain active and up to date. By the way, I have a list of reading materials if you would like some more information about the annuity method and capital budgeting."

"I will and please send me that list. You and the CPA chapter may have just saved my firm a client and perhaps me a job. Thanks for your help."

Encouraged, James hurries back to his office to prepare for his meeting with Frank White. Promptly at 9:00 a.m. Friday morning, Frank comes in with his brother, Steve. Without Dr. Clayton's help, James would have been apprehensive. But, he finally understands what had caused all the confusion. As he calmly and patiently apologizes and explains the reworked financial statement and solution to his client, he admits that even accountants are not perfect and make mistakes. James thinks to himself, "Client relations, that's something else they never told us about in school."

Later the next week, following his report on the meeting to Linda Robinson, James is pleasantly surprised when one of the partners congratulates him on his handling of the situation. The partner, Nancy Craddock, also, remarks, "James, because of the favorable reaction of your client, we are going to

recommend the annuity method to some of our other clients who have had trouble with their evaluations of continuing performance and doubts about the validity of their capital budgeting decisions."

Appendix

During the first summer term of 2001, the short story was distributed to a group of 46 students taking Principles of Managerial Accounting. The students were asked to read the case after a chapter on capital budgeting techniques was covered. The following is a cross-section of student comments.

- It was like I was being taught without knowing it. It read like a short story, but I was actually learning capital budgeting without really realizing it.
- I liked how the story told of a real life situation and how accountants go about correcting themselves. It also allowed you to better understand how capital budgeting models apply to everyday accounting.
- The story was helpful in understanding capital budgeting in a sense of relating to a real life situation. I prefer that method of teaching because I can understand better.
- I liked the idea accounting could be explained as more than just hypothetical numbers. Placing classroom theory in practical situations allows for more clarity to application.
- This story made me want to learn more about budgeting, rate of return and investments.
- I liked the fact it was not full of non-understandable words and their uses.
- It shows how complicated accounting can really be. If the CPA can't get it right, how can I?
- I liked the way it was presented in a casual, easy to understand story. I also liked that one person doesn't always have all the answers. I liked it was written like a conversation between two people.
- The thing I liked best was the fact that the story provided real life application to accounting. It wasn't just a list of definitions; it was a real situation.
- I liked the fact that us as students can see what we are learning put into real life situations, instead of us not knowing how to use the material away from class.
- I like the idea that the accountant had enough nerve to tell somebody that he was in trouble. He didn't wait until it was too far gone before he let anyone know of the problem.
- The story was very interesting. It caught my attention from the beginning and it was not boring. It had humor that was good and it gave me the interest to keep reading.
- The short story format too out some of the monotony sometimes found in accounting textbooks.
- I found the story to be interesting because it showed that everyone is human. It also showed that people should not be afraid to ask for help, and always keep the lines of communication open.
- I liked the fact it was in literature format and not problems. I found the story very helpful and informative.

Dr. Clayton's Reading List

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