to reveal themselves publicly in class at the end of the project. The class response was enthusiastic, with a buzz about "I knew you were the mole" or "I want to be the mole."

In the second iteration of assignments, only three of seven group moles revealed themselves in class at the end of the projects. In the second iteration, there were four obvious free riders identified within the groups with the unrevealed moles. The offending students were almost chastised in the mole reports, and by three of the four group leaders in the affected groups. The lack of moles coming forward publicly created an even more intense buzz about the identity of the moles, and why they were not revealing themselves.

In the two iterations of projects following, the free-ridership was virtually eliminated except in two cases (repeat offenders). Their identification was reinforced by their different groups and their evaluation reflected their lack of contribution in the groups. For most other free riders, a single warning was enough to motivate them to change their ways.

Moles, in general, were very good at reporting detailed activities of the group and identifying free rider problems. In only one case, the mole was likely friends with the free rider, but in the leader's reports and the group's evaluation of one another, the free rider was identified in an obvious way. The incident was discussed in class, without identifying the people involved, which seemed to take care of any future repetition of the problem. It also indicated to the mole in question that they had been found out, and no question was ever raised by them concerning their grade, which reflected the lack of reporting the free rider.

Overall, student enthusiasm for the course and for the group study and case content was much greater when the "mole" was introduced into the mix. The link to reality TV popularity probably helped as much as anything, and the heightened interest in the course resulted in generally higher quality work and possible alleviation of the free rider problem.

Conclusion

This particular study is, of course, anecdotal, with little likelihood of any scientific conclusions. The results observed and presented, however, reveal a pattern of behaviors under each of the group strategies. As educators, professors often seek new ways of approaching particular courses, and solutions to some of the problems associated with non-traditional teaching methods.

The feedback from both students taking the course and completing the course, and from professional managers with whom the strategy was shared, has been positive. It would be interesting to see how others might employ the technique, and even refine it further to fit their own students' learning rubric.

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1. I would like to give credit to Jeremy Martin, who initially suggested the corporate mole strategy to me in January 2009.

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A Primer on Financial Calculators

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Like it or not, business calculators have become a necessity of every day life for our students. This paper is not meant to condone or condemn the practice of employing calculators to teach a subject (or topic area), but to aid both the teacher and the student in the function and use of financial calculators. The objective of this paper is to test the most popular financial calculators for basic problem solving, accuracy and ease of use. We also present elementary primers to the basic usage of each of the calculators discussed. The primers represent an easy to understand, step by step instruction which could make teaching easier for the instructor and learning easier for the student.

Many business classes use financial calculators as a teaching tool. As a result, faculty members are frequently required to spend classroom time instructing students on the use of their calculators as a prerequisite to employing the calculators for analysis and decision making. Instruction in the use of calculators may be a more formidable task than expected. The enormity of the task is better understood when the number of calculator manufacturers, the number of models and the complexity of operation is taken into consideration. One also has to keep in mind that most calculators require different key strokes to solve identical problems.

Covering calculator functions in class may take time away from other teaching objectives. In order to save time, some professors insist their students become self-taught in the usage of their instrument. Other instructors will state that their students only purchase a specific calculator if they expect to obtain aid in its use from that instructor. As business calculators have become more powerful and more complicated, the learning curve for their usage has increased. This paper compares the use of the most popular financial calculators and includes a one page primer for each calculator model tested. The one page primer can be duplicated and given to students to accelerate their learning curve and increase their understanding.

The authors recognize that most employers require students to have a rudimentary knowledge of calculator usage and that the use of tables to calculate items such as the time value of money may be a thing of the past. Many of the textbooks in finance no longer have financial tables (although all of the textbooks that the authors examined have simplified calculator instruction). The authors of this paper also hold no position on the use of financial calculators in the classroom. This paper is designed to help faculty move more quickly out of calculator functions into more meaningful discussions, and to help students solve basic financial problems using calculators. The one page primers in the appendices of this paper (available at www.jfcr.org) may be printed and distributed by the professor to assist students in understanding the use of their calculators.

The financial calculator has been on the academic scene since the mid-seventies when the early hand held calculators were developed. Since that time there have been many revisions and modifications to the instrument. The early hand held calculators had LED (light emitting diodes) and limited calculating power. They were energy inefficient and not known for long battery life. Today's hand held financial calculators are light years away from the earlier models. Even compared to the calculators of ten years ago, today's calculators are much more sophisticated. This paper compares the most popular financial calculators available today and also provides a one page primer on each to help guide students (and instructors) in the use of the various calculator models. Most of the calculators required different key strokes to solve identical problems. This paper will be of use to those individuals looking for a quick starter for the correct keystrokes needed to solve common financial problems.

THE DIFFERENT CALCULATORS

The calculators chosen for this study represent the most popular models used in finance classes, both undergraduate and graduate. The calculators had to be promoted by their name, or by the manufacturer, as suitable for solving "business and financial" problems. The calculators also had to be available at outlets that students would frequent and were purchased from (or available at) Wal-Mart, Office Depot, K-mart and student and university run book stores. Online sellers were not used.

The calculators used for this paper were all portable hand held models. Some of the calculators were very obvious updates of previous models, that are now more powerful and more energy efficient. There are also the "new" kids on the block (the calculators from new manufacturers that hope to make a dent in the market) and the most recent addition to the calculator families, the graphing calculators. The graphing calculators are easily identifiable by their oversized display screens.

Many of the calculators tested have "sister" models that perform the basic problem solving with the same applicative key stroke. The alternative models are bracketed in the following list. The eight calculators examined in this paper are the Hewlett Packard's HP 10bII Business Calculator, HP 12c Platinum 25th Anniversary Edition Financial Calculator (also the HP 12c Financial Programmable Calculator), HP 17bii+ Financial Business Calculator, the Texas Instrument's BA II Plus Professional (also the BA II Plus), the TI 84 Plus Silver Edition (also the TI 83 and 83 Plus) the Casio fx-9750G PLUS (also the Casio fx-9850G PLUS), the LeWorld Financial Calculator and the Ativa AT 10. The various models vary greatly in price. The most expensive models are the HP12c, the HP17b and the TI 84 Plus Silver editions. Their prices range from $100 - $120 depending on the store. In the $40 - $60 range, there are the HP 10bII, the Casio fx-9750g, and the TI BAII Plus Professional. The Ativa AT 10 costs around $20, and the Le World calculator's price is in the $15 range. The Casio is the least expensive choice for graphing calculators. The Le World business calculator is the least expensive in the financial calculator category. Current textbooks realize that the rapid change in calculator models prohibit them from focusing on a particular model. Most textbooks including Ross, Westerfield, and Jordan; Keown and Martin, Petty and Scott Jr; and Brigham and Houston discuss the general principles of calculator use, but do not provide detailed instructions. These textbooks do have a reference to web sites designed to help students use their calculators better. Unfortunately, to access the materials, students must register with a password available only to new text book buyers. This system locks many students out of the web sites because they purchased a used textbook.

To compare models, similar time value of money problems were calculated using each model. The list of eight problems included a future value of a present amount, a present value of an annuity, finding interest rates, finding the number of periods, bond pricing, cash flow analysis, a yield to maturity, and a loan amortization. On a separate page, beta calculations employing these calculators are also formatted.

Computing the future value of a present amount is the simplest time value calculation. In this case, we examined the effect of investing $5,000 at an 8% APR for 10 years. Typing 10 into the N button, 8 into the interest rate button, and -5,000 into the present value is similar for all of the calculators except the Ativa AT 10. The Ativa AT 10 does not use negative signs, so the 5,000 is entered as a positive number. Each of the calculators examined was able to compute $10,794.62 as the future value. While the exact keystrokes differed, all of the models allowed quick data entry and calculation.

To test the present value of an annuity, the authors chose a car loan problem with $22,000 present value paid over 5 years at an APR of 6% compounded monthly. While all of the calculators examined required data entry including 60 payments, and $22,000 for the present value, the interest rate could be either 6, or .5 depending on the payment frequency chosen. Entering a payment per year of 12 would mandate that a 6% interest rate is entered. Alternatively, dividing the APR by 12 periods provides a monthly interest rate of .5%. For this article, the authors assumed that the payment per year is always set to 12, and that the annual interest rate is divided by the compounding periods (12). All models found the correct payment of $425.32 per month, and were relatively simple to use.

A stock price moving from $25 to $75 in 10 years implies a compound interest rate of 11.61% per year. This calculation requires a -25 in the present value and 75 as the future value input. With N set to 10, computing the interest rate provides the correct answer for most models. A key step for all calculators except the Ativa AT 10 is to ensure that the signs for the present value and the future value are not identical (one has to be positive and the other negative). Since the Ativa AT 10 uses all positive numbers in its entry, it is incapable of computing the interest rate over an investment horizon, and could not be used to answer the problem.

The last basic time value annuity calculation involved finding how long it takes to grow, or spend, a certain amount of money. Using a retirement example, the calculators computed how long it takes to spend $500,000 if we make withdrawals of $65,000 per year, while earning a 7% APR. By entering 500,000 as the present value, -65000 as the payment, and 7 as the interest rate, the calculators computed an N of 11.43 years. The annuity runs out part of the way through the 11th year. The Ativa AT 10 computes 11 years because it rounds to the closest number. This answer is financially incorrect.

Finding the yield on a bond is similar to the interest rate problem. In the example, the authors used an 8 year bond with a 12% semi-annual coupon payment. The price of the bond is $1,233.05 and the face value is assumed to be $1,000.

Because payments are semi-annual, the N is set to 16 (8 years x 2 payments per year = 16 periods), and the payment is set to $60.00 ($120/2 = $60.00 semi-annually). After the present and future values are entered, the interest rate is computed to be 4%. Since the payment per year was not used, this answer is a 6 month (semi-annual) interest rate. In order to obtain the annual interest rate the semi-annual interest rate must be multiplied by 2 (4% x 2 = 8% annually). All of the calculators except the Ativa AT 10 AT 10 were able to compute this answer.

All of the basic time value functions can be easily computed on all of the models examined except the Ativa AT 10. They are comparable in function, ease of use, and accuracy. The only perceived differences are that the HP models use fewer keystrokes, but the Texas Instruments models remember past data so secondary calculations such as changing the interest rate can be more easily and quickly computed. The TI 83 and the Casio fx-9575G have large screens which allow users to see all data entries, and thus reduce the possibility of keying errors.

The uneven cash flow function works very differently in each of the models tested. In the test problem, $200,000 was invested. A return of $40,000 was received in the first period. This return then grew by $10,000 per year, to $80,000 over the subsequent 5 years. With an discount rate of 10% the calculators computed a payback period of 3.71 years, a net present value (NPV) or $20,249.49, an internal rate of return (IRR) of 13.45%, and a modified internal rate of return (MIRR) of 12.14. The Ativa AT 10 is not capable of computing uneven cash flow calculations. The Casio fx - 9750G enters the cash flows into a list, then uses a menu driven system to calculate all of the results (Note: An incorrect payback period was obtained). The TI 83, 84 and 84 silver models can use a command to calculate the NPV. The cash flows can also be entered into a list feature and referenced in the NPV function. While this method uses the fewest keystrokes to accomplish the result, remembering the order in which to enter the data can be daunting. All of the HP series calculators perform this function similarly. The Cfj button on the HP keypad allows the user to enter the cash flows. Typing each cash flow followed by the input button (Cfj) enters the data. This was the fastest data entry method for the calculators tested. The calculator does have the drawbacks of not having the ability of allowing the user review the data entered. The HP models do calculate NPR and IRR, but they do not compute the payback, or the MIRR with the push of a single button. The LeWorld and the BAII + Professional have similar data entry systems. In an uneven cash flow section, cash flows, and the number of consecutive times they appear are entered. With visible cues, data entry is fairly intuitive. Once entered, they can be reviewed for correctness. While both compute the NPV and IRR, only the BAII+ Pro computes the payback and MIRR with the push of a single button.

In the loan amortization test problem, the goal was to find; 1) the interest paid on the loan for a certain period, 2) the principle paid on the loan for a certain period and,3) the balance of the loan. For the test problem, the authors used a 1 year, $2,000 loan with a 12% APR, compounded monthly. All of the calculators first required calculating the monthly payments using the standard functions discussed above. Inputting the monthly payment of $177.70 as the payment, each calculator was able to prepare amortization schedules. All of the calculators except the Ativa AT 10 have functions that allow finding the interest and principal over a series of payments and the balance at any amortization point. While the ease and logic of the data entry vary by calculator, each model requires several keys to access the answers at each step.

In addition to calculating basic finance functions, the calculators were also examined for their ability to run regressions and compute beta. All of the finance calculators except the Ativa AT 10 can calculate beta. The BA II+, the TI83, 84, the Casio fx9750-G, the HP17b2 and the LeWorld have fairly easy to use menu systems that store the data, and calculate the results. The HP10Bii and the HP 12c manuals are both more complicated and offer little guidance on keystrokes or procedures for finding beta. Finding beta with any calculator is not intuitive and it is strongly recommended that the user have access to an instructional guide.

In summary, each of the calculators examined except the Ativa AT 10 is acceptable for finance classes. The overall lowest cost of any finance calculator is the LeWorld financial calculator. It works in a similarly keystroke fashion to the BAII+. While some offer larger screens and menu driven operation, the basic operation of all of the models the authors examined were similar despite the price differences.

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The one-page handouts for each calculator model are available at www.jfcr.org in the downloads section for JITF.