Reasons for employing an enhanced Internal Rate of Return methodology

The Opturo Internal Rate of Return (IRR) module calculates an Absolute Money IRR, which here will be called "Opturo's IRR". It matches Excel's most advanced Internal Rate of Return calculation (XIRR) with the somewhat rare exceptions, like those discussed below, where XIRR runs into serious problems that "Opturo's IRR" avoids. (Often similar problems are encountered even in the implementation in Excel of its simple version IRR, by the calculation by hand using the approach to IRR taken by Excel and by the financial industry in general, and by the approximation of IRR by a Modified Dietz methodology.) Opturo instead uses "Opturo's IRR" so that it can both provide intuitively informative evaluations of IRR in the situations where Excel is able do so and also provide intuitively informative evaluations of IRR in situations where neither Excel nor the methods that Excel and others commonly employ can do so.

At least in cases where Excel's IRR and XIRR are able to provide any numerical results at all, and where the actual portfolios, and the evolution of theses portfolios that is implied by the Excel's IRR and XIRR, are always definitively long (i.e. have non-negative total market value), Excel's IRR and XIRR for the reporting period always have the same sign as the gain for the period, in agreement with what we intuitively expect to learn from a return and as is appropriate for any money-weighted return measure like IRR. In such cases "Opturo's IRR" exactly agrees with the evaluations of Excel's IRR and XIRR. However, when actual portfolios, or even just when the time series of portfolios constructed from just the cash flows of the actual ones together with their calculated IRR or XIRR, are even just temporally short (i.e. have a negative total market value), the calculated Excel IRR and XIRR for the actual portfolios can become deeply problematic, providing unintuitive results that misinform our intuitions about the degree of success of these actual portfolios. In such cases, "Opturo's IRR" provides sensible results that are emphatically in opposition to the problematic Excel IRR and XIRR results. In particular, contrary to the case for Excel IRR and XIRR (and contrary to Excel's method applied by hand and Modified Dietz), the calculations Opturo employs ensure that any positive "Opturo's IRR" return always implies making money over the period while any negative "Opturo's IRR" return always implies losing money, independent of whether the evolving market value of the portfolio, as actually experienced or as implied by "Opturo's IRR", becomes negative or not.

The examples below (summarized in the accompanying spreadsheet clip titled "Examples Of Problems for XIRR") will display situations where Excel's approach to IRR or XIRR are extremely problematic but are instead appropriately evaluated by "Opturo's IRR".

For XIRR to be successfully applied to a portfolio, Excel requires that some money flows into the portfolio and some flows out, where a positive amount present at the open of the period is counted as a flow in and a negative amount present at the open of the period is counted as a flow out, and where a negative amount remaining at the end of the period is counted as a flow in and a positive amount remaining at the end of the period is counted as a flow out. This is equivalent to viewing the portfolio as coming into existence at the open and going out of existence at the close.

The dates of flows at the close that are employed in the examples shown here are (1/1/01, 1/1/02, 1/1/03, → 1/01/04) and the corresponding flows are designated (a, b, c → d). Here we will use Excel's convention that inflows are negative, outflows positive and the final result is the flow that will bring the portfolio to zero. Thus, an initial negative value ($a < 0$) starts the portfolio off long since a negative value is an inflow, and a final positive value ($d > 0$) means the portfolio closes long since one needs to then take money out to bring the portfolio's value to zero.
Therefore, I will be using the nomenclature (a, b, c, → d) for the following situation:
At the close of Jan 1, 2001, which is equivalent to the open of Jan 2, 2001, an amount 'a' is taken out of an empty portfolio.
Exactly one year later, at the close of Jan 1, 2002, which is equivalent to the open of Jan 2, 2002, an amount ''b is taken out of the portfolio.

Exactly one year later, at the close of Jan 1, 2003, which is equivalent to the open of Jan 2, 2003, an amount 'c' is taken out of the portfolio.
Exactly one year later, at the close of Jan 1, 2004, which is equivalent to the open of Jan 2, 2004, an amount 'd' is taken out of the portfolio, creating a portfolio with zero market value, leaving it empty.

Thus, (-100, 20, 0, → 105) means that $100 was put in at the close of 1/1/01, $20 was withdrawn at the close of 1/1/02 and a withdrawal of 105 at the close of 1/1/04 closed out the portfolio (leaving it with a zero market value) after it got to experience its last investment "gain" (i.e. gain/loss) during 1/1/04.
Or, equivalently, the same (-100, 20, 0, → 105) means that $100 was put in right after the open of 1/2/01, $20 was taken out at the open of 1/2/02 and a withdrawal of $105 right after the open of 1/2/04 closed out the portfolio (leaving it with a zero market value).
Both of these cases describe exactly three years of investment experience.

A) Long only flows:

Consider these cases where all, except any closing, flows are into the portfolio.

1. The XIRR requirement on 2-way flows explicitly excludes the possibility that XIRR can produce a result for the case where money is repeatedly poured into the portfolio, but the portfolio ends bankrupt with zero value at its close. Neither Excel IRR nor XIRR can provide a value in some such case (-100, -500, 0, → 0, with Gain = -600). However, here, "Opturo's IRR", like the IRR calculated by hand, correctly provides the result of -100% return. Modified Dietz gives an answer (-173%) that is considerably more negative than -100%, inappropriately meaning that one did considerably worse than losing all value, even though no shorting was involved.
2. In cases, (-100, -500, 0 → 0.0001, with Gain = -599.9999) and (-100, -500, 0 → 10, with Gain = -590), which are similar to case 1, some negligible or small amount of money remains in the portfolio at the end of the period. Thus, these cases satisfy XIRR's general requirement of having both flows in and flows out. Nevertheless, XIRR's standard seed provides an invalid answer (XIRR = 0% producing an error in the calculated closing market value that is equal in magnitude to the large gain). However, if Excel's IRR and XIRR are given an appropriately guessed different seed they can provide the correct returns of approximately -100% that is obtained by both "Opturo's IRR" and IRR by hand. Modified Dietz again gives problematic answers (around -170%) similar to that of the previous case.

B) Balanced Flows:

Consider cases where, starting and ending long, large amounts are flipped in and out in the middle of the period.

In these cases, (-100, 1000, -1000, →2, with Gain = -98) and (-100, 1000, -1000, →1, with Gain = -99), large amounts are flipped in the middle of the period, but the gain is significantly negative (-$98 and -$99). Here, XIRR cannot calculate results, even though the restriction that some inputs have opposite sign that Excel requires is not violated. In these cases, with significant losses, IRR (and similarly for modified Dietz) results in a positive return (+12%) whereas, "Opturo's IRR" is appropriately negative (-9%) for these cases with large losses. While that alone is decisive in favor of "Opturo's IRR", it can also be noted that Excel's IRR becomes more positive (12.47 →+12.59%) when the closing value goes down causing more money to be lost, whereas "Opturo's IRR" correctly becomes more negative (-8.91% → -9.00%) as the closing value goes down and even more is lost.

C) Starting long and ending short:

Consider cases where a portfolio opens long, after which a large withdrawal is made and the portfolio ends short (perhaps over a period where investment gain and losses are consistently negligible) (-100, 200, 0, →-100, with Gain = 0), (-100, 200, 0, →-101, with Gain = -1) and (-100, 200, 0, →-99, with Gain = 1).

In these cases, with zero or close to zero gains, we would expect zero or close to zero returns that are slightly positive when the gains are slightly positive and slightly negative when the gains are slightly negative, and that is exactly what "Opturo's IRR" consistently provides. XIRR unhelpfully provides no result for the case with negative gain (even though XIRR's restriction is not violated) and a grossly inappropriate large positive return (> 60%) in the two other cases. While Excel's IRR appropriately provides returns close to zero, they inappropriately are of the wrong sign and again decrease (+1.01% → -0.99%) as the gain increases (-1 → 1).

D) Starting short and ending long:

1. First consider cases where the portfolio starts short and money is injected to cover the short, but then ends long with a considerable positive gain (100, -100, 0, →100, with Gain = +100) and (100, -100, 0, →110, with Gain = +110).
   In these cases, we would expect a positive return that increases as the amount of the gain increases, and that is exactly what "Opturo's IRR" consistently provides (61.76% and 66.14%). However, neither Excel's IRR nor XIRR can provide a return (even though XIRR's restriction is not violated) and according to the unreasonable results of IRR calculated by hand, you repeatedly lose much more than all your holdings (-175%) and still end up gaining $100 or more.

2. Alternately, consider a case where the fund starts short, then injects a large amount of cash larger than the initial short, and ends long (100, -500, 0, →162), while having a loss (Gain = -$238) for the whole period. In this situation with both positive and negative flows during the time period of the example as required by Excel for XIRR, Excel produces unintuitive results. That is, XIRR's best representation has a huge positive return (393%) on this large loss. And when using its standard seed, Excel's IRR does the same. Excel's IRR needs a negative seed in order to provide a reasonable answer (-39.27%). Here, "Opturo's IRR" provides a negative return (-32.21%) consistent with the large loss.

E) Both starting and ending short:

In particular, consider a case where the fund starts short, experiences a larger withdrawal and ends short (100, 500, 0, →-100), giving a large positive gain (Gain = $500). Thus, this case also satisfies the general restriction required by XIRR.

In this case with a large positive gain, for the seeds where XIRR returns any results at all the returns are, confusedly, either very close to zero (10^-7%) for its standard seed (implying a large error in its ending market value) or very negative (-57.08%) when given a negative seed. Excel's IRR cannot return any value at all and both hand-calculated IRR and Modified Dietz provide returns that are, inappropriately, very negative (-147% and -154%). However, "Opturo's IRR" reasonably provides a large positive return (132.55%).

Summary:

XIRR often cannot provide any results (A1, Bi, Bii, Cii, D1i, D1ii) or provides clearly wrong results (Ci, D2, E) for all seeds that produce results. Excel's IRR often cannot provide results (A1, D1i, D1ii, E) or provides results that are wrong for its standard seed (D2) or both wrong and move in the wrong direction (Bi → Bii and Cii →Ci → Ciii). Excel's approach to IRR when calculated by hand provides results that are wrong (E) or both wrong and move in the wrong direction (Bi → Bii, Cii →Ci → Ciii and D1i → D1ii).
The Modified Dietz calculations often have the wrong sign (Bi, Bii, Cii, Ciii, D1i, D1ii and E) and always, except for Ci when it agrees with "Opturo's IRR" that the answer is zero, produce large errors in the closing market values it projects.

It is these kinds of problems that make all the approaches to IRR employed by Excel unreliable, and inappropriate for any case in which there is a possibility of any actual or implied negative market values. And that is in addition to all the cases where they provide no result at all. So, unless such negative values are definitively ruled out, Excel's approaches to IRR, whether carried out by Excel to get IRR or XIRR, or by hand, must not be relied upon in cases where anything of significance is at stake. Modified Dietz is also inappropriate in many cases.

While often agreeing with Excel's approach, there are many cases where "Opturo's IRR" differs from all standard approaches, often significantly. And in those cases, "Opturo's IRR" provides the intuitive and properly informative result. Therefore, when one does not know what kind of cases are going to show up, "Opturo's IRR" is just a much more reliable measure of the success of a portfolio than anything provided by Modified Dietz, Excel or Excel-like methods for the calculation of an internal rate of return.