

**TECHNICAL NOTE**  
**ACCURATELY CALCULATING & REPORTING TRANSFERS TO THE C ACCOUNTS OF**  
**THE FSM & RMI TRUST FUNDS**

## Executive Summary

The Trust Fund Committee (TFC) for each of the Compact Trust Funds (CTF) for the FSM and the RMI has adopted a methodology to transfer funds to the C Account pursuant to Article 16(5)(a) of each Trust Fund Agreement (TFA)<sup>1</sup>. The specific methodology was adopted by resolution (FSM 2011-7 and RMI 2011-7), an approved version of which was released to the Graduate School USA pursuant to TFC resolutions (FSM-2012-10 and RMI-2012-7). The reason for requesting the release of the documented methodology was to allow Graduate School USA EconMAP team members to review and possibly confirm their previously expressed belief that the adopted methodology was flawed. The size and nature of the flaw, as well as the downward bias of the flaw were shared verbally with the CTF Executive Administrator (EA). Upon initial response, the EA defended the methodology for calculating and reporting the periodic transfers the C Account as having been developed by the CTF service provider(s) to whom the matter had been referred. The EA's further assertion was that the matter was not subject to further consideration as it had already been adopted by each TFC.

Hence this EconMAP technical note with technical specifications supported by references to industry standards; hence also the wider sharing of this note beyond just the EA. Our three key findings are:

1. **The methodology is incorrect.** The methodology adopted to calculate transfers to the C account is mathematically incorrect and is inconsistent with financial industry standards.
2. **The methodology introduces an exclusively downward bias.** The specific error introduced in the adopted methodology has led to under-funding of the C Account to-date, and will result in under-funding in each future year for which a transfer to the C Account is called for under Article 16(5)(a) of the TFA. The specific error thus seriously reduces the value and buffering benefit of the C Account in the period after FY2023.
3. **Correction of the methodology is easy and can be retroactively applied.** The introduced error is identified below and an accurate and easily implemented alternative methodology is also identified. Thus, the errors to-date can be corrected and more accurate calculations can be made on behalf of each TFC going forward.

While there is no existing “dispute” by any of the parties to the CTFs, this EconMAP technical note represents an independent call for corrective action by each TFC. The matter is important, since the C account is an important buffer against market volatility during the distribution period after FY2023; however, the matter is not exceedingly urgent since the C Account cannot be called upon until FY2024, at the earliest, under the current terms of each TFA.

## Brief Background on Investment Performance Calculation Methodologies

The industry-standard document for the calculation and reporting of investment performance is the “Global Investment Performance Standards Handbook, 3<sup>rd</sup> edition, 2012.” The handbook is published by the CFA Institute and the defined “GIPS standards” are widely adhered to in the investment management industry both in the U.S. and globally. Citations are made to the Handbook and can be found in the endnotes to this technical note. Before moving to the specific identified flaw in the methodology adopted by each TFC in 2011, it is worth describing the two prominent categories of investment performance reporting.

GIPS standards discuss two methods of calculating returns:

1. **Money-Weighted Return (MWR)**—which measures internal rate of return (IRR) and is also referred to as dollar-weighted return, asset-weighted return and discounted cash flow.
  - The biggest advantage of this methodology is that it discloses the “bottom-line” economic value or gain of an investment;
  - Another advantage is that this methodology includes the impact of cash flows into or out of the portfolio at various times;
  - In colloquial terms this method answers an investing client’s question, “how did my money do?”
2. **Time-Weighted Return (TWR)**—which is used especially when assessing the job that a money manager did for clients because they account for (and eliminate the impact of) external cash flows that, after all, are in the control of the client and not the money manager.
  - The biggest advantage of this methodology is the ability to compare performance of money managers against standard benchmark index performance without regard for cash flow timing or amounts;
  - A severe disadvantage of this methodology is that the reported rate of return can be widely disparate from the total investment return experienced by a client—and this is especially true in the event of higher market volatility and substantial variances in assets exposed to those returns throughout the measurement period;
  - A further disadvantage is that monthly balances are required, at a minimum, as well as asset balances at the date of each transfer into or out of the portfolio; most firms applying this measurement will base their reported returns on daily ending balances.
  - In colloquial terms this method answers an investing client’s question, “how did my money managers do?”

It is perfectly appropriate for the TFC to adopt a Money-Weighted Return methodology for the purposes of the calculations called for in Article 16(5)(a) of each (TFA). As such, no further mention is made of the time-weighted return method used by CTF Investment Adviser, Mercer. The performance reporting methods of Mercer are not called into question in any manner in this technical note.

## Common Methods for Calculating Money-Weighted Returns

1. Original Dietz method—which assumes external cash flows occur at exactly mid-year resulting in a 50 percent weighting to those flows;
2. Modified Dietz method—which is a more sophisticated version of the above, taking into account the size and precise timing of each external cash flow; and
3. Internal Rate of Return (IRR), also known as the dollar-weighted rate of return or the money-weighted rate of return—which also takes the size and precise timing of each external cash flow into consideration. This methodology cannot readily be calculated by hand; however, it is easily completed by an iterative process on hand-held calculators or, more commonly, with an MS-Excel function (XIRR).

Note the Original Dietz method is no longer deemed to meet industry standards<sup>2</sup>, but is presented below to identify the likely source of the introduced error in the TFC-adopted methodology:

### Original Dietz Method<sup>3</sup>

$$R_{OD} = \frac{EMV - BMV - CF}{BMV + CF/2} \text{ Where:}$$

$R_{OD}$  = Original Dietz rate of return  
 $EMV$  = ending market value  
 $BMV$  = beginning market value  
 $CF$  = external flow(s)

### Modified Dietz Method<sup>4</sup>

$$R_{MD} = \frac{EMV - BMV - CF}{BMV + CF * w_d} \text{ Where:}$$

$R_{MD}$  = Modified Dietz rate of return  
 $EMV$  = ending market value  
 $BMV$  = beginning market value  
 $CF$  = external flow(s)  
 $w_d$  = the day-weight of (each) CF

### Incorrect Method<sup>5</sup>—as adopted by each TFC

$$R_{CTF} = \frac{EMV - BMV - CF}{BMV + CF * w_d + AI/2} \text{ Where:}$$

$R_{CTF}$  = “C Account transfer” rate of return  
 $EMV$  = ending market value  
 $BMV$  = beginning market value  
 $CF$  = external flow(s)  
 $w_d$  = the day-weight of (each) CF  
 $AI$  = annual increase in net assets

External flows are defined as capital (cash or investments) that enters or exits a portfolio.<sup>6</sup>

Internal flows include interest, dividends, realized and unrealized gains.

## Identifying the Introduced Error in the TFC-Adopted Methodology

Working backwards from the formula that is implicit in the methodology adopted by each TFC, it appears the methodology used is a hybrid of two methods, specifically the “Original Dietz” method blended with the “Modified Dietz” method. As shown above in the yellow-highlighted denominator terms on the previous page, it appears that the TFC was presented with a proposed methodology that added an extra term to the denominator of the equation. It also appears the extra term mimics the estimation approach equivalent to that used in the Original Dietz method.

Unfortunately, the “hybrid” adopted equation is fouled by the addition of the extra term. It seems likely that the CTF service provider(s) to whom the task of designing a methodology for C Account calculations was referred chose to treat income earned during the year within each CTF as an additional external transfer. This is simply wrong. By industry standard the external cash flows referred to in the return calculations are defined as “capital (cash or investments) that enters or exits a portfolio<sup>7</sup>.”

The GIPS Handbook also states very clearly that capital employed is “the denominator of the return calculations and is defined as the ‘weighted-average equity’ during the measurement period. **Capital employed does not include any income return or capital return earned during the measurement period.**”<sup>8</sup> Such earnings during the year (in the form of interest, dividends, realized and unrealized gains) should, by industry-standard definition, be treated as internal transfers and thus should not enter into the denominator.

## A Simple Example to Provide Context

As a means of demonstrating the impact of the incorrectly introduced term in the denominator of the TFC-adopted methodology, we can use a simple example covering one year, with no external transfers and a positive rate of return.

It should be easy to agree that in the case where the Beginning Market Value (BMV) = 100 and the Ending Market Value (EMV) = 120, the investment income for the year is 20

Applying the Modified Dietz method looks like this:

$$R_{MD} = \frac{120 - 100}{100} = 20 \text{ percent}$$

Applying the TFC-adopted method results in a lower calculated rate than above:

$$R_{CTF} = \frac{120 - 100}{100 + (20/2)} = 18.2 \text{ percent}$$

Again, there is no industry-standard methodology that calls for the introduction of the yellow-highlighted term above. Readers will surely understand that the dollar-weighted single-year return in this simple example is, in fact, 20 percent and not the lesser 18.2 percent rate calculated with the TFC-adopted method.

## Describing the Impact and Materiality of the Introduced Error

The effect of the introduced error is not random with respect to the size of periodic transfers to the C account. Rather, in any year with positive returns the addition of a positive value to the denominator of the equation will reduce the calculated result. The size of the introduced error will be larger in proportional terms the greater the outperformance above the 6 percent threshold in specific years. More importantly, the size of the introduced error in the amount to transfer to the C Account will also grow in absolute terms as the size of the Trust Fund increases. Table 1 shows the different rate of return calculations between the TFC-adopted method and the most accurate method (IRR) for the FSM. Table 2 shows the same for the RMI. Each table also shows the difference in calculated amounts to transfer to the C account.

**Table 1: FSM Comparing Actual Rate of Return Calculations and C Account Transfers to Corrected Values (relevant years to-date)**

	<b>TFC-Adopted Method</b>	<b>GIPS-Compliant IRR</b>	<b>TFC \$ Transfer to C Account</b>	<b>Corrected \$ Transfer to C Account</b>	<b>\$ Difference</b>
FY06*	6.99%	7.21%	818,926	972,540	153,614
FY07	16.51%	18.00%	11,894,331	12,456,528	562,197
FY10	10.46%	11.04%	7,503,665	8,036,666	533,001
FY12	14.78%	15.92%	20,966,806	21,994,730	1,027,924
FY13	13.47%	14.45%	22,592,935	23,822,822	1,229,887
<b>Total through FY13:</b>			<b>63,776,663</b>	<b>67,283,285</b>	<b>3,506,622</b>

\*For FY06: the FSM CTF was only invested for a portion of the year (RMI CTF was invested all of FY06)

**Table 2: RMI Comparing Actual Rate of Return Calculations and C Account Transfers to Corrected Values (relevant years to-date)**

	<b>TFC-Adopted Method</b>	<b>GIPS-Compliant IRR</b>	<b>TFC \$ Transfer to C Account</b>	<b>Corrected \$ Transfer to C Account</b>	<b>\$ Difference</b>
FY06	11.8**	11.63	2,729,840**	3,136,314	406,474
FY07	14.17	15.26	6,350,625	6,682,018	331,393
FY10	8.23	8.59	2,385,038	2,657,266	272,228
FY12	16.92	18.43	16,470,495	17,208,844	738,349
FY13	12.98	13.85	13,376,114	14,102,789	726,675
<b>Total through FY13:</b>			<b>41,312,112</b>	<b>43,787,232</b>	<b>2,475,120</b>

\*\*For FY06: there is a double-error of unknown origin. The wrong rate is reported and the amount transferred is inconsistent with that erroneous rate; EconMAP estimates that the TFC-adopted rate should have been reported as 10.99% and the transfer should have been \$2,939,965.

## Concluding Recommendation

The introduced error can be easily corrected. There is no great urgency to make the corrections since the C Account will not be called upon until FY2024. It should be noted that the correction called for in this technical note does not result from a different interpretation of the terms of each TFA. There is no dispute about the definition of the TFA-defined “Annual Income.” In fact, there is no dispute about the numerator of the above described equations. The one and only rationale for correcting the methodology comes down to basic math. It is simply fortuitous for the parties to the CTFs that the correction will also increase the magnitude of C Account transfers to date and through FY2022, thus improving the buffering capacity of the C Account should it fail to reach its maximum level.

If the TFC chooses to adopt a corrected methodology, the choice is between the Modified Dietz method described above, and the IRR method referred to above. The former method is subject to hand calculation and is a close estimate for the FSM and a slightly less close estimate for the RMI (since the RMI has mid-year contributions in addition to beginning of year contributions). The IRR method is easily calculated using a standard MS-Excel formula named XIRR. Both methods involve the same basic data: beginning value, ending value, external transfers with the date of each transfer. Note the external transfers will be limited to contributions (from whatever sources) during the accumulation period. Looking beyond FY2022, pursuant to Article 16(5)(a) of each TFA, the calculation of a money-weighted rate of return for the purposes of making transfers to the C Account will never again be required.

In the interest of greatest accuracy and ease of calculation, we recommend the adoption of the IRR methodology and the correction of C Account balances at each TFC’s earliest convenience.

## Endnotes

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<sup>1</sup> Article 16(5)(a) of each TFA states, “[The C Account] shall be created at the same time as the A Account and, beginning in Fiscal Year 2004, through Fiscal Year 2022, any annual Income on the Fund over six percent (6%) shall be deposited in the C Account...”

<sup>2</sup> GIPS Handbook 2012, Chapter 3-2 Calculation Methodology, p. 109; “examples of acceptable day-weighted methods are the Modified Dietz and Internal Rate of Return (IRR) methods.” Thus the formerly acceptable Original Dietz method is no longer compliant.

<sup>3</sup> GIPS Handbook 2012, Chapter 3-2 Calculation Methodology, p. 109-110; simplified for a one-year period and a single external cash flow.

<sup>4</sup> GIPS Handbook 2012, Chapter 3-2 Calculation Methodology, p. 110; simplified for a one-year period and a single external cash flow.

<sup>5</sup> Resolution RMI-2011-7 and Resolution FSM-2011-7, August 2011, Attachment A, p.1; converted to equation format from the “Calculation Method for the C Account Transfer Amount.”

<sup>6</sup> GIPS Handbook 2012, section V, GIPS Glossary, p. 46; in the definition of EXTERNAL CASH FLOW.

<sup>7</sup> GIPS Handbook 2012, section V, GIPS Glossary, p. 46; in the definition of EXTERNAL CASH FLOW.

<sup>8</sup> GIPS Handbook 2012, section V, GIPS Glossary, p. 44; in the definition of CAPITAL EMPLOYED.

[GIPS Handbook 2012 can be found at: [www.cfapubs.org/toc/ccb/2012/2012/4](http://www.cfapubs.org/toc/ccb/2012/2012/4) ]