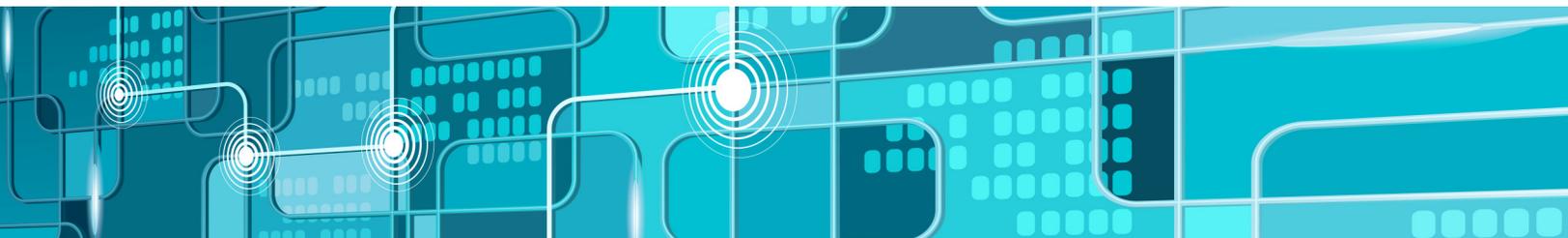


# Floating NAV Money Market Funds

## Background and Instructions for the Constant vs. Floating NAV Hypothetical Calculator



The following are instructions for the “[Constant vs. Floating NAV Hypothetical Calculator](#)” Microsoft Excel® workbook.

These instructions will assist those who are designing, modifying, or constructing systems to support floating NAV money market funds (MMFs). Other less-technical readers may benefit from the examples created to understand the impact of floating NAV MMFs on shareholder transactions and account balances.

## Display and Transaction Considerations

### Background

Final money market fund (MMF) rules require institutional prime and tax-exempt money market funds to adopt basis point pricing, or rounding to 1/100th of a percent of the target net asset value (NAV). For purposes of this discussion, target NAV is assumed to be \$1.00, which is expressed as \$1.0000 under basis point pricing (e.g., rounding to 1/100th of a cent). Other basis point pricing options for floating NAV MMFs include \$10.000 and \$100.00.

Adoption of a four-decimal floating NAV can cause MMF transactional and account fractional share balances to exceed two decimal places (the current standard for MMFs with \$1.00 constant NAVs subject to penny-rounding). While final MMF rules do not prescribe the number of fractional share positions to use when representing floating NAV MMF fund shares to investors, all other floating NAV funds use three-decimal share positions (1/1000th of a share—e.g., 2.543 shares).

With these changes, recordkeeping, trading, and other systems supporting floating NAV MMFs will need to be evaluated and potentially modified to display four-decimal NAVs and three-decimal fractional shares for transactions and account share balances.

Equally important is understanding how these two elements (four-decimal NAVs and expanded fractional shares) can affect the calculation of transaction and account shares. To improve precision, many systems use expanded (e.g., four to nine or more) *fractional share positions* when calculating shares and subsequently round or truncate the result for display (e.g., three decimal places). The *number of fractional share positions used* for calculation purposes and the use of *rounding* and/or *truncation* is often based on a system’s core design. These variables are elaborated upon below:

- » **Number of fractional share positions used:** Transaction shares are calculated by dividing transaction dollars by NAV. Many systems will carry the calculated shares into expanded fractional shares (e.g., four to nine or more positions). This value is then modified, through rounding or truncation, to determine the transaction shares displayed. Variances in the number of fractional share positions used for rounding could contribute to different results for the same transaction processed on two different systems.

- » **Rounding:** The process of evaluating a fractional numerical value of shares by replacing it with an approximately equal—but shorter and simpler—value. For instance, 1.003 shares is the three-decimal rounded value of any number from 1.00250 to 1.00349.
- » **Truncation:** The process of approximating a decimal number by dropping all decimal places past a certain point. For instance, 1.003 shares is the three-decimal truncated value of any number from 1.00300 to 1.00399.

As this simple example illustrates, a displayed value of 1.003 could represent any value between 1.00250 and 1.00399, depending on whether systems round or truncate. These discrepancies in share balances caused by different mathematical treatment, while most often minor, can create reconciliation issues between parties (e.g., intermediaries and funds). These differences (breakage) can become more frequent and/or pronounced when working with larger share balances—as with the institutional MMF accounts that will be subject to a floating NAV. Funds and intermediaries have extensive experience in reconciling any breakage that may occur with floating NAV funds today; such reconciliation activities will now need to extend to floating NAV MMFs.

A final consideration for floating NAV MMFs pertains to calculation and payment of debit transactions (e.g., redemption, exchange, or transfer out of fund shares). Shareholders will expect proceeds received from debit transactions placed in dollars to equal the dollar amount that was placed. However, funds, intermediaries, and shareholders could experience penny-breakage on what is paid to the shareholder due to rounding. This occurs because a four-decimal NAV is used to calculate the corresponding share debit, but a two-decimal currency is used to derive a payment amount from the shares calculated.

## Workbook Instructions

### Introduction

A subgroup of the ICI Operations MMF working group on the four-decimal NAV constructed a Microsoft Excel® workbook with the following goals in mind:

- » to demonstrate potential recordkeeping and trading system effects of the move to a floating, basis-point priced NAV, and
- » to illustrate how use of fractional shares, rounding, and truncation in calculations can affect calculated shares.

The workbook is for illustrative purposes only. Each firm should make independent decisions, if any, based on the information in the workbook. Please refer to the information below to assist in using and understanding the workbook and its features.

### Transactions—Detailed Calculations

The *transaction—detailed calculations* tab allows users to configure two scenarios (options 1 and 2) under a floating NAV MMF environment and compare to how MMFs are processed today (e.g., current state: two-decimal constant NAV environment, three-decimal place share display). Before using this spreadsheet, it is important for users to understand how the systems being compared use *rounding*, *truncation*, and the *number of fractional share positions used* for transaction calculation.

### Hypothetical Transaction History

The spreadsheet is predicated upon user-provided hypothetical transaction history, which forms the basis of calculations for current state, option 1 and option 2. Each history line consists of three variables (outlined below). NOTE: Share-based transaction history is not supported.

TRANSACTION TYPE	TRANSACTION AMOUNT	FLOATING NAV
Buy	\$500,000,000.00	\$1.0036
Buy	\$3,777,300.00	\$1.0044
Buy	\$296,719,530.37	\$0.9987

1. **Transaction type:** Select “buy” or “sell” as the two options. Exchanges are not supported, per se, but can be represented as buy/sell transactions. Dividend reinvestments should be treated as a “buy” transaction.
2. **Transaction \$ amount:** Input the dollar amount of the transaction as a *positive* number, with two decimal places. Sell transactions *should not* be entered as negative dollar amounts.
3. **Floating NAV:** Input the four-decimal NAV that should be applied to the corresponding “transaction \$ amount.” The value entered should be between \$0.9951 and \$1.0049.

4. **Beginning shares (optional):** Input a beginning share balance (greater than or equal to zero) for the hypothetical transaction history. This is defaulted to 1,000,000.000 shares.

### Calculation Parameters for Two Scenarios: Option 1 and Option 2

For each scenario, users can indicate, by Microsoft Excel® command, whether to use rounding (ROUND) or truncation (TRUNC), along with specifying decimal places, in conjunction with various parameters. A sample of a parameter table (cells in yellow can be modified) and field definitions are provided below.

OPTION 1: PARAMETERS FOR ROUNDING/TRUNCATION		
CATEGORY	ROUND OR TRUNCATE?	DECIMAL PLACES?
NAV	Round	4
Display: Transaction shares and ending share balance	Round	3
Calculation: Transaction shares	Round	6
Final amount paid	Round	2

1. **NAV:** Final MMF reform prescribes use of a rounded basis point price-based NAV. This spreadsheet was built under the assumption of a \$1.0000 target NAV for option 1 and 2, so it defaults to “4” decimal places. Additional basis point pricing options raised in conversations include a \$10.000 target and \$100.00 target.
2. **Display—transaction shares and ending share balance:** Systems typically display fractional shares in floating NAV funds online, in files, or on confirmations/statements with three decimal places (e.g., 2.543, or the thousandths position). For this reason, the spreadsheet defaults to “3” decimal places. The spreadsheet assumes that all outward display of shares (e.g., online, in files, confirmations/statements) would use this factor for display.
3. **Calculation—transaction shares:** Systems often use a different (typically more granular/greater) number of fractional shares when calculating transaction shares (e.g., transaction dollars divided by NAV), prior to rounding or truncating the value for outward display. For example, a system may allow up to nine decimal places for transaction calculation, before the shares are rounded/truncated to display three decimal places. In the example stated here, the parameter would be set to “9.”
4. **Final amount paid:** For “sell” transactions, this parameter indicates how redemption shares (after multiplied by the four-decimal NAV) are mathematically converted back into two-decimal (penny-based) currency (e.g., dollars and cents) for payment purposes.

## Workbook Results and Printing

Workbook results are displayed on two tabs: *Transaction—detailed calculations* and *Compare option 1 and 2*. The workbook uses the hypothetical transaction history and calculation parameters provided to construct sample shareholder account history for today's constant \$1.00/share NAV MMF, and the two scenarios designated. Numbers appearing in red indicate a negative number.

### Transaction—Detailed Calculations Results

The same fields are displayed for current state, option 1 and option 2 scenarios except where otherwise noted. The following provides definition of each calculated field result. Fields from the spreadsheet, and related calculation parameters used, referenced in the definitions below are presented in italics.

1. **Constant NAV (“today” scenario only):** Defaults to \$1.00.
2. **Transaction shares calculation or transaction shares calculation:** *Transaction \$ amount* divided by the NAV (*constant NAV* in the “today” scenario; *floating NAV* for options 1 and 2). The *transaction shares: calculation* parameter is applied to the value displayed.
3. **Transaction shares display:** *transaction shares calculation* with the *display: transaction shares and ending share balance* parameter applied.
4. **Ending share balance:** The adjusted balance of the shareholder position as affected by the hypothetical transaction history. The *display: transaction shares and ending share balance* parameter is applied.

For “sell” transactions, the shareholder is expecting to receive proceeds equal to the *transaction \$ amount* entered in the hypothetical transaction history. The following three fields facilitate comparing *transaction \$ amount* to calculated proceeds that are derived by multiplying displayed transaction shares by the four-decimal NAV, and then adjusting to a two-decimal, currency-based payment. A difference indicates the impact of rounding or truncation:

1. **Transaction shares display\*FNAV:** Value resulting from multiplying the *transaction shares display* by the *floating NAV*. The *NAV* parameter is applied.
2. **Final amount paid:** *Transaction shares display\*FNAV* with the *final amount paid* parameter applied. This converts the value into an amount paid in dollars and cents (two decimal places).
3. **Difference?:** Upon comparing *final amount paid* to *transaction \$ amount*, indicates whether a difference exists by displaying “YES” or “NO.” If “YES,” breakage has occurred.

## Compare Option 1 and 2 Results

To assist in the comparison of options 1 and 2, the *compare option 1 and 2* tab presents the calculation parameters, hypothetical transaction history, and related values for *transaction shares display*, *ending share balance*, and *final amount paid*. Differences in any of these areas highlight how rounding and truncation can create differences between systems. Previous field descriptions apply to this tab, as well as the following “new” fields:

1. **Unaltered transaction shares:** Reflects the *transaction \$ amount* divided by *floating NAV* without applying any rounding or truncation parameters to the value.
2. **Difference:** When comparing *transaction shares display* and *ending share balance*, option 1 is subtracted from option 2. Therefore, a positive number means that option 2 exceeds option 1; a negative number (in parentheses) means that option 1 exceeds option 2.
3. **Payment variance (sells only comparison):** *payment variance* compares both option 1 and option 2 *final amount paid* to the *transaction \$ amount*. It will indicate one of four values:
  - NONE: *The final amount paid* for option 1 and option 2 match the *transaction \$ amount*.
  - Option 1: *The final amount paid* for option 1 does not match the *transaction \$ amount*.
  - Option 2: *The final amount paid* for option 2 does not match the *transaction \$ amount*.
  - BOTH: *The final amount paid* for both option 1 and option 2 does not match the *transaction \$ amount*.

## Workbook Printing

The workbook printing is governed by Microsoft Excel® printing controls.

- By default, the active tab on the spreadsheet prints.
- To select more than one tab for printing, press Ctrl and select the tabs to print.
- Print ranges have been set on the *transaction—detailed calculations* tab to print three (3) pages, each corresponding to the current state, option 1, and option 2 scenarios (including related *hypothetical transaction history*).