



Exposures and weights in FIA

Andrew Colin

Flametree Technologies

August 2024

INTRODUCTION

FIA's interactive reports can be configured to show a range of relative and absolute measures for security holdings and exposures. This document describes how FIA calculates and uses these quantities.

EXPOSURES IN FIA

FIA can display two measures of the monetary exposure of a security, a sector or a portfolio:

- Market value
- Effective exposure

Market value and effective exposure are denominated in a currency such as USD, JPY or INR, depending on the securities held.

For the majority of securities, market value and effective exposure always have the same value. The exception is for futures and some derivatives contracts.

DIFFERENCE BETWEEN MARKET VALUE AND EFFECTIVE EXPOSURE

A futures contract provides exposure to the value of an underlying security (for instance, a currency, a bond, an equity, an equity index) without the need to actually hold that security. By owning futures contracts, one can benefit from changes in the price of the underlying without having to buy or sell that instrument.

To deal in futures contracts, one provides lay out some margin to cover potential losses. However, this margin is typically stored as a deposit in a separate zero-interest account and does not contribute to the portfolio's exposure or P/L.

The effective exposure of a futures contract is the exposure of the underlying security. However, its market exposure is always zero.



EXAMPLE

A portfolio holds the following instruments:

Instrument	Market exposure	Effective exposure	Return
Cash	\$1m	\$1m	1%
NASDAQ future	\$0m	\$1m	1%

The return of the portfolio is given by

$$R = \frac{\$1mm \times 1\% + \$1mm \times 1\%}{\$1mm + \$0mm} = 2\%$$

The inclusion of the equity future has *leveraged* the return of the portfolio. The owner has benefitted from the return of the future, without having to lay out capital to buy the underlying instrument. In this case, the return is double that of the individual assets held.

WEIGHTS IN FIA

It is often convenient to consider weights, instead of exposures, where weights represent a normalised set of exposures. The use of weights allows portfolios and benchmarks to be compared on a per-sector basis, and also provides clearer insight into where the exposures of a portfolio exist.

FIA offers the following weight measures:

MARKET VALUE WEIGHT

Mnemonic: MV_W

Description: Normalised market value

Calculation: $MV_W_i = \frac{MV_i}{\sum_i MV_i}$, where MV_i is the effective exposure of security i

Notes: The sum of all market value weights is always 1.

EFFECTIVE EXPOSURE WEIGHT

Mnemonic: EE_W

Description: Normalised effective exposure

Calculation: $EE_W_i = \frac{EE_i}{\sum_i EE_i}$, where EE_i is the effective exposure of security i

Notes: The sum of all effective exposure weights is always 1.

WEIGHT/ASSET ALLOCATION

Mnemonic: AA

Description: Weights of securities that can be combined with returns to give contribution



Calculation: $AA_i = \frac{EE_i}{\sum_i MV_i}$, where MV_i is the market exposure of security i , and EE_i is its effective exposure.

Notes: The sum of all asset allocations may not equal 1. However, the product of a security's asset allocation and its return will always equal the security's contribution, irrespective of its market exposure.

This measure therefore conveys a clearer picture of a security's exposure in a portfolio than does market value weight, which may be zero despite the security generating a non-zero contribution to the portfolio's overall return.

AVERAGE ASSET ALLOCATION

Mnemonic: W_A

Description: Average value of asset allocation over time

Calculation: $W_{A_i} = \frac{\sum_t AA_i^t}{n}$, where AA_i^t is the asset allocation of security i at time t , and n is the number of time intervals.

EXAMPLE

Sectors	Market value	Effective exposure	MV weight	EE weight	Weight	Average weight	Base return	Base contribution
SECURITY	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio
CASH	\$1,000.00	\$1,000.00	50.0000%	100.0000%	50.0000%	50.0000%	1.0000%	0.5000%
EQUITY	\$1,000.00	\$1,000.00	50.0000%	100.0000%	50.0000%	50.0000%	2.0000%	1.0000%
FUTURE	\$0.00	(\$1,000.00)	0.0000%	(100.0000%)	(50.0000%)	(50.0000%)	(3.0000%)	1.5000%
SUMMARY	\$2,000.00	\$1,000.00	100.0000%	100.0000%	50.0000%	50.0000%	3.0000%	3.0000%

The portfolio shown is long \$1000 of cash and an equity, and is short \$1000 a future. The returns of each asset are shown in the column 'Base return', and its exposures in column 'Effective exposure'.

- The market value of the future is zero, but its effective exposure is -\$1000.
- 'MV weight' is the normalised market value.
- 'EE weight' is the normalised effective exposure.
- 'Weight' is calculated as shown above. For instance, the future's weight is given by its effective exposure (-\$1000) divided by the portfolio's market value (\$2000), which gives a weight of -50%.
- 'Average weight' is the same as weight, as this calculation is only run over a single interval.
- For each security, 'Base contribution' is given by the product of 'Weight' and 'Base return'.