



Modelling equity futures in FIA

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INTRODUCTION

Equity and index futures are widely used by investment managers to hedge or speculate against expected price changes in the underlying instrument.

This paper describes how to model equity futures in Flametree's attribution system, FIA. For information on how to model bond futures, please refer to the companion paper 'Modelling bond futures in FIA', available on the Flametree website.

WHAT IS AN EQUITY FUTURE?

In brief, an equity future is a derivative security that supplies the exposure of a particular equity or index without the need to hold that physical security. In other words, it provides the effective exposure of the stock without the market exposure. To illustrate what this means, consider the following examples.

EXAMPLE

A portfolio holds the following instruments:

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

The return of the portfolio is given by

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

The inclusion of the equity future has leveraged the return and risk of the portfolio. In this case, the return is doubled.

THE CASH OFFSET

An equity future generates the return of the underlying stock, but without the exposure. One way to model this is to treat the future as having two legs:



- A stock leg
- A cash offset leg, with equal and opposite market exposure to the stock leg.

SETTING UP AN EQUITY FUTURE

Summarising, an equity future is set up as follows:

- A holding in the stock
- An equal but opposite cash holding, called the cash offset

Note that the cash offset is merely an accounting convenience that allows us to model the zero market exposure feature of the futures contract. It should be kept separate from other physical cash holdings in the portfolio, and does not generate interest.

WORKING WITHOUT CASH OFFSETS

FIA offers an alternative route to the cash offset approach when modelling equity futures. If required, the futures contract can be modelled as a one-leg security without the need to supply a cash offset.

To do this, set up the future using the same characteristics as the stock, but set the **effective exposure** flag in the future's security definition to zero (its default value is one). FIA's returns reports will then give the same results as if a cash offset had been supplied, but without the appearance of that offset in the portfolio's holdings reports.



EXAMPLES

The following examples illustrate various ways in which a simple portfolio containing an equity future can be set up in FIA. Data files for these examples are available from Flametree upon request, together with configuration settings.



WORKING WITH A CASH OFFSET

Security master table

Security ID	Security name	Type		Pricing function		Effective exposure		Currency
CASH	CASH	SecurityType=CASH		FT_CASH		1		AUD
FUTURE	FUTURE	SecurityType=FUTURE		FT_EQUITY		1		AUD
OFFSET_CASH	OFFSET_CASH	SecurityType=CASH		FT_CASH		1		AUD

Weights and returns table

Date	Portfolio	Security	Weight	Base return	Local return
1/01/2024	PTF	FUTURE	100	0	0
31/03/2024	PTF	FUTURE	100	0.1	0.1
31/03/2024	PTF	CASH	100	0	0
31/03/2024	PTF	OFFSET_CASH	-100	0	0

NOTES

Here, the effective exposure flag of the stock is set to 1 and a cash offset, with weight equal and opposite to that of the stock, is supplied.



WORKING WITHOUT A CASH OFFSET

Security master table

Security ID	Security name	Type		Pricing function		Effective exposure		Currency
CASH	CASH	SecurityType=CASH		FT_CASH		1		AUD
FUTURE	FUTURE	SecurityType=FUTURE		FT_EQUITY		0		AUD

Weights and returns table

Date	Portfolio	Security	Weight	Base return	Local return
1/01/2024	PTF	FUTURE	100	0	0
31/03/2024	PTF	FUTURE	100	0.1	0.1
31/03/2024	PTF	CASH	100	0	0

NOTES

Here, the effective exposure flag of the stock is set to 0. No cash offset is used.