%old school value

Portfolio Calculation

Time Weighted Return

Introduction

In its most basic form, the objective of tracking performance is to see whether your portfolio is growing.

However, portfolio performance should also provide insight into the performance of the portfolio manager in how well securities are being selected and allocated.

There are many ways to calculate performance - the simplest method being a simple percentage change calculation of the ending and beginning value. However, due to cash flows in and out of a portfolio that affect portfolio values and return calculations, we use the Time Weighted Return for our portfolio calculations.

Contents

Why Time Weighted Returns?

The Time Weighted Return calculates performance based strictly on the manager's actions.

It "ignores" the cash in and out. It only factors in the portfolio manager's actions by breaking up the overall period into subperiods and then linking each subperiod to get the total time weighted return. These subperiods are linked together (compounded) to calculate the total return for the overall period.

In order to calculate performance as accurately as possible, the time weighted subperiods are calculated at the end of each trading day.

We use the same approach and calculation as Interactive Brokers. Buys and sells are accounted for in the same day. The full paper to Interactive Brokers white paper is linked in the “Resources” section.

Formula for Time Weighted Return

The first part of calculating the subperiod return is:

$$RN = \frac{EMV}{BMV + CF} - 1$$

where:

- RN = Subperiod Return
- EMV = Ending Market Value
- BMV = Beginning Market Value
- CF = Cash Flow

Each subperiod return is then linked with the following formula to get the total return.

$$TWR = [(1 + RN) \times (1 + RN) \times \ldots - 1] \times 100$$

Time Weighted Return Example

Example of subperiod returns throughout January.

$$RN = \frac{EMV}{BMV + CF} - 1$$

Date	Beginning Market Value	Ending Market Value	Cash Flow In/Out	Subperiod Return RN
1/1/2017	1,000,000	1,011,537		1.15%
1/10/2017	1,011,537	898,815	(90,000)	-2.47%
1/13/2017	995,411	1,007,543		1.22%
1/22/2017	1,007,543	1,177,447		16.86%
1/26/2017	1,177,447	1,285,122	50,000	4.70%

The subperiod returns are then linked to calculate the total weighted return.

$$TWR = [(1 + RN) \times (1 + RN) \times \ldots - 1] \times 100$$

$$[(1 + 1.15\%) \times (1 + -2.47\%) \times (1 + 1.22\%) \times (1 + 16.86\%) \times (1 + 4.7\%) - 1] \times 100 = 22.19\%$$

If you perform manual return calculations, a subperiod can also be defined as daily, monthly or quarterly periods.

Equal Weighted Portfolio Performance

Within the portfolio performance section of Old School Value, you will see two sets of numbers.

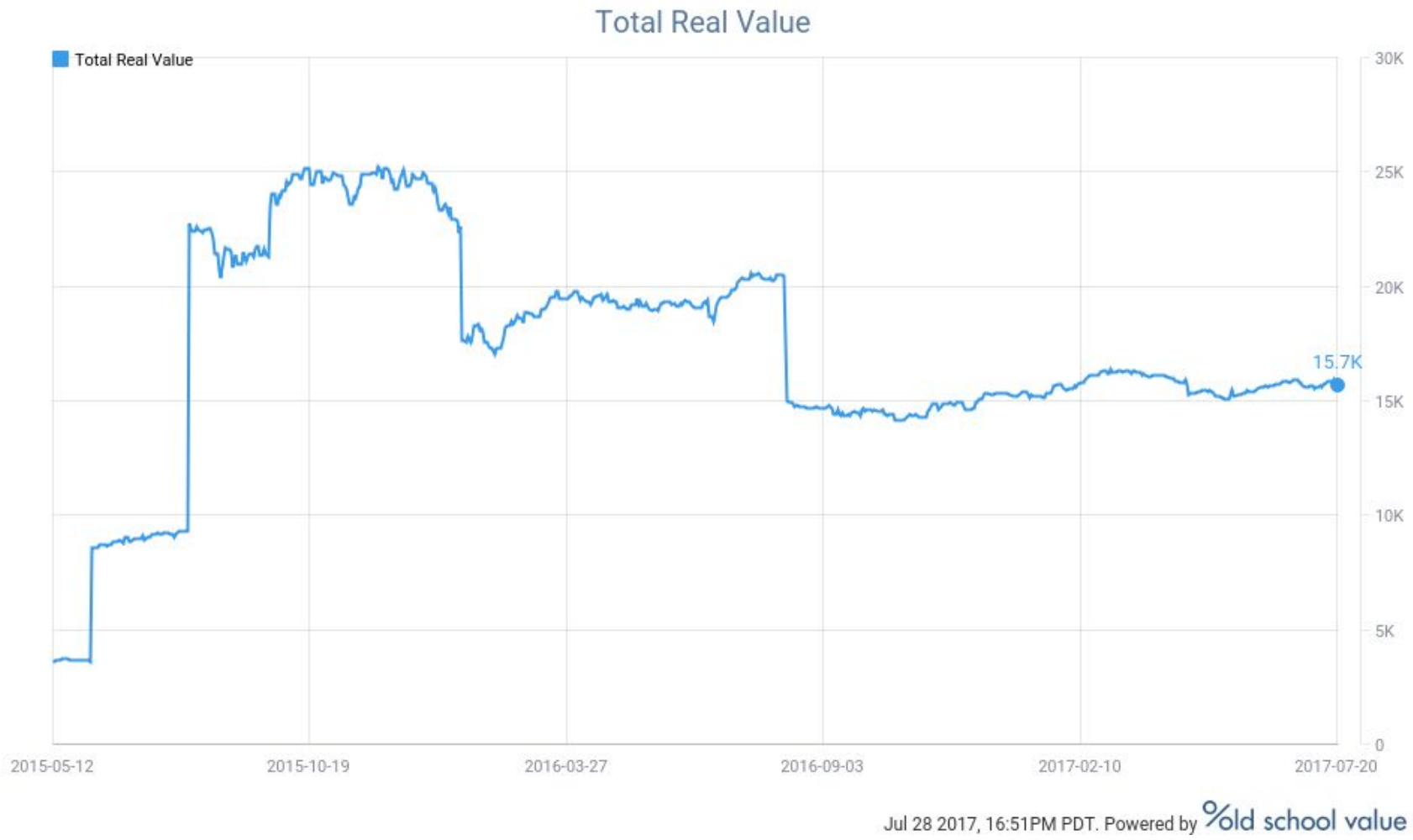
- Total Portfolio Performance & Total Real Value
- Equal Weighted Portfolio Performance & Total Equal Weighted Value

Total Portfolio Performance & Total Real Value

The chart and calculations for Total Portfolio Performance and Total Real Value calculate the returns based on your actual portfolio weightings.

It tracks how the actual value of the portfolio is growing.

In this example, the starting value of the portfolio $3,600 but grew to $15,700 after cash flows in and out.

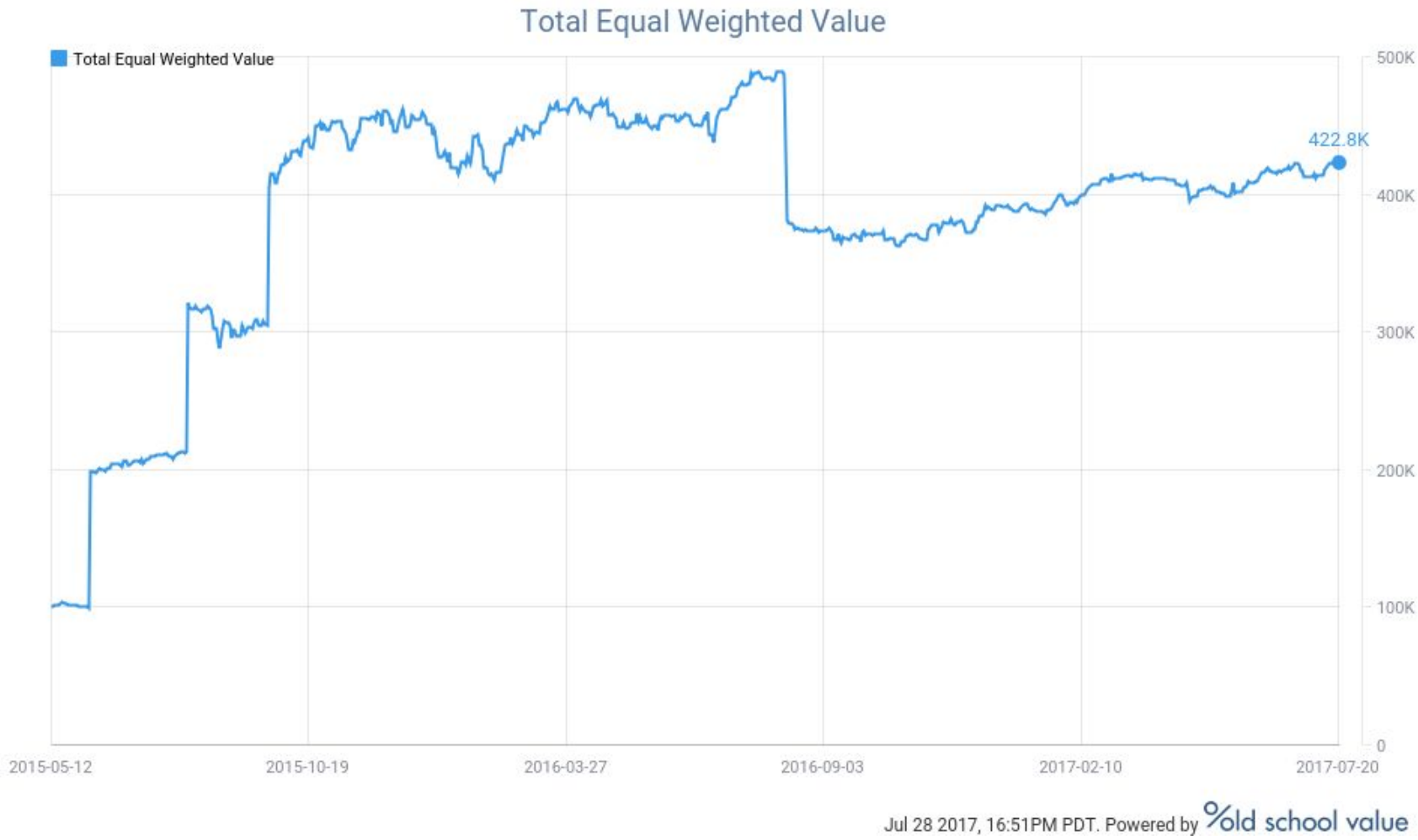


Equal Weighted Portfolio Performance & Total Equal Weighted Value

The Equal Weighted calculation takes the value of the portfolio, the stocks you hold, the number of shares and creates an equally weighted portfolio with $100,000.

In this way, it provides a clearer picture of how well the portfolio manager selects securities.

This chart shows the same portfolio as above, equally weighted across a beginning $100,000 value.



The ending value of the portfolio is $422,800, which shows the manager has done a great job of picking successful stocks.

Resources

- AAII's explanation of various portfolio performance calculation methods
- Interactive Brokers approach to performance calculations
- Money Weighted Return using the modified Dietz method