

IPD Technical Note

Understanding the time-weighted method of calculating investment performance

As used in all IPD benchmark reports and market
indices from December 2004

Issued August 2004



1. Time-weighted returns are now the IPD standard

From December 2004 the IPD method of calculating annual investment returns will be standardised for all reporting worldwide. The old annual money-weighted calculation, which has been used in some countries, will become obsolete, and an annual time-weighted return, produced by chain-linking twelve monthly returns, will become the standard. This principle of calculation is already used by IPD's services in the UK, Canada, Ireland, Italy, Japan, Switzerland and the USA. It is the method of calculation used for many years in the IPD UK monthly index and is consistent with total return calculations used for other asset classes. This method of calculation will apply both to IPD indices and Portfolio Analysis Service reports.

The monthly calculation method will be used in all year-end annual results for the year to December 2004.

2. Why are time-weighted returns better?

Three principal reasons are:

- To ensure comparability with other assets where time-weighted return calculations are the norm.
- To meet client demand for more frequent reporting based on quarterly or half-yearly valuations.
- Conformity with international standards, in particular the Global Investment Performance Standard (GIPS) for real estate.

The trend towards more frequent valuations requires IPD to be able to provide measurement over almost any period on a comparable basis.

This can only be achieved by using a consistent building block of monthly cashflows.

Other important benefits are:

- The ability to offer a better service for portfolios with non-December year ends.
- The time-weighted method avoids distortions caused by the old money-weighted return for sales near year-start and purchases near year-end.
- Identical calculation methodology for all IPD outputs worldwide, greatly expanding the potential for international comparative analyses.

The move to time-weighted returns for all IPD databanks has been made possible by advances in computer technology, which allow IPD to hold much more information than was previously possible. By December 2004, all IPD data will be held in a monthly data structure, so all properties will have records for every month, regardless of their actual valuation frequency.

3. Constructing the monthly databank

The time-weighted return calculation requires monthly cashflows and month-end valuations for every month. Where monthly valuations are not available, IPD will compute estimated values to fill in the gaps between pairs of actual valuations. Two methods are used:

- i. In services where the valuation frequency of contributing funds is synchronised to year-end, IPD will interpolate between actual valuations (in the case of standing investments) or between the actual valuation at either the start or end of the period and the net purchase price or gross sale price for transactions. In either case, if evidence of monthly market movement exists it is used to shape interpolations.
- ii. In services where the valuation frequency of contributing funds and/or the properties held by those funds are spread throughout the year, IPD will hold over valuations from one valuation date to the next. Whilst this introduces an inertial tendency into the figures, it avoids the need for regular restatement that would otherwise result.

On properties without expenditure, annual capital growth calculated by the time-weighted method will be the same regardless of whether higher capital growth occurred at the start or end of the year, but extreme movements may result in small differences in the monthly income returns. This is due to different capital values in the denominator of the return equation.

4. The time-weighted annual total return calculation

Annual total returns are calculated in two stages. Returns are first calculated for each individual month and then compounded over the twelve months for which the return is required.

Step 1: For a single monthly period the total return formula is

$$TR_t = \frac{CV_t - CV_{t-1} - Cexp_t + Crec_t + NI_t}{CV_{t-1} + Cexp_t}$$

where:

- TR_t = total return in month t;
- CV_t = capital value at the end of month t;
- $Cexp_t$ = total capital expenditure during month t (includes all purchase, development and other capital expenditure);
- $Crec_t$ = total capital receipts during month t (includes all sale receipts and other capital receipts);
- NI_t = day-dated rent receivable during the month, net of asset management costs, ground rent and other irrecoverable expenditure.

The formula in effect assumes that capital expenditures take place at the start of the month, while capital receipts and income are receivable at the end of the month. The calculation that will be used from December 2004 simplifies the formula that has been used by IPD in its time-weighted services prior to this date, which assumed that minor capital expenditures, and income flows, were weighted to the mid-point of the month.

Step 2:

Once calculated, this monthly return forms the basic building block for returns over all other periods. Quarterly returns are computed by compounding the returns for three consecutive months, and annual returns by compounding twelve months' returns. Whatever the period, equal weight is given to each month's return. This is why the result is described as 'time-weighted'.

To calculate quarterly and annual returns it is necessary first to construct an index from the monthly values. Starting from a base value of 100, each successive index value is calculated by multiplying the preceding index value by (1+ growth rate), where the percentage growth rate is expressed as a decimal.

The annual return is calculated as the percentage change in the index (X_t) over the relevant twelve months.

$$\text{Annual total return} = \left[\left(\frac{X_{t+12}}{X_t} \right) - 1 \right] * 100$$

5. Calculating Capital growth and Income return

The same principles apply to the calculation of capital growth (more accurately referred to as the capital return) and income return. Monthly capital growth is thus defined by the formula

$$CVG_t = \frac{CV_t - CV_{t-1} - Cexp_t + Crec_t}{CV_{t-1} + Cexp_t}$$

and monthly income return as

$$IR_t = \frac{NI_t}{CV_{t-1} + Cexp_t}$$

Once again, capital growth and income return for longer periods are derived by chain-linking their constituent monthly returns. Calculated in this way, capital growth and income return for a period longer than one month may not sum exactly to total return. This is because of the way that capital and income interact (through a cross product) in the compounding of total returns. This method of calculating income return replaces the residual method applied by IPD prior to December 2004.

6. What is a standing investment?

Annual index results and all IPD standard research publications are based on standing investment properties. These have at least two valuations during the year and exclude the effect of buying, selling and development. Index figures also exclude properties where terms of ownership, or specific events such as major capital expenditure, mean that changes in value through the year may have been influenced by non-market factors. These rules are designed to make the Index a measure of the return to be expected from held investments without active management, and thus a fair basis for comparison across asset classes and between markets.

In the time-weighted methodology, the definition of a standing investment is not restricted to properties with a valuation at the start and finish of the measurement period. Other properties may contribute to standing investment returns for a part of the period if they have a valuation after (or before) an excluding event. A property will qualify for inclusion between any pair of actual valuations, so valuation frequency is important in determining its status. The following table illustrates how properties with differing valuation frequency are treated.

Properties included in IPD annual indices

Valuation frequency	Property sold 15 May	Property bought 15 July
Annual	excluded	excluded
Quarterly	included for months Jan-Mar	included for months Oct-Dec
Monthly	included for months Jan-Apr	included for months Aug-Dec

This methodology ensures consistency between IPD indices and the benchmarks used in the Portfolio Analysis Services, and between Annual indices and those produced on a monthly or quarterly basis.

7. Annual Benchmark Reports

From December 2004, IPD Annual Benchmark Reports in those services not currently using the time-weighted methodology will move to the standard total return calculation. The format and content of annual reports will also change to accommodate the changes in methodology.

Annual Benchmark Reports use actual portfolio valuation data, so that the only element of estimation is the generation of monthly values between the actual year-end figures submitted. All values generated by IPD are derived from actual valuations or transaction prices at either end of the period, and

the timing of growth through the year has only minimal impact on the final return.

The new basis of calculation precisely identifies the status of properties and the sources of returns throughout the year. A property that has been transacted or developed during the course of the year and is valued on a monthly or quarterly basis can contribute to the portfolio's standing investment return (as defined above) for the remainder of the period. However, in calculating the contribution from different activities IPD assigns properties with a single classification that summarises their status over the entire period of measurement. In an annual analysis each property is assigned a 'summary status' for the year, depending on whether it is has been purchased, sold, or developed at some point during that year.

8. How does time-weighted performance differ from the old money weighted returns?

Since the old IPD money-weighted and the new time-weighted annual return formulae both assume that income is reinvested, there is no systematic difference between return on the two bases. At a portfolio level, differences are likely to be greatest for those that have been growing or shrinking rapidly over the period being measured, in particular where significant transactions have occurred near the start or end of the year. The differences are due to the fact that the time-weighted formula removes some of the distortions caused by the old methodology.

The formula now treats transactions exactly the same regardless of the month in which they take place. There is no longer any incentive for portfolio managers to delay transactions because of the effect that timing will have on measurement.

Actual monthly valuations give the most accurate time-weighted annual returns. Values calculated by IPD provide the best estimates of true time-weighted returns for annually or quarterly valued portfolios.

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