

A Shift in Time: Using SAS® Date Alignment Operators

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ABSTRACT

SAS Date Alignment operators provide a powerful suite of tools for “shifting” date and/or time from their default intervals to the customized intervals you specify. For example, SAS date alignment operators can be used to count the number of fiscal years between two dates, rather than counting the number of calendar years between two dates. Date Alignment Operators can be applied by anyone who works with date, time or datetime variables, and are of particular use/relevance to SAS users who apply SAS/ETS™ module procedures to their data.

INTRODUCTION

The SAS System stores dates and times as integers (numbers). The “reference date” for a SAS date variable is January 1, 1960 while the “reference time” for a SAS time variable is midnight. A SAS “datetime variable” is the number of seconds from midnight January 1, 1960. A wide range of SAS programming language functions and other tools are available in BASE SAS Software to work with variables representing dates and/or times. In most cases, a Format is used to portray the values of a SAS date, or time or datetime variable in procedure-generated output. Finally, a wide range of SAS Procedures can analyze and forecast values “forming a time series.” Most of these procedures are found in the Econometrics and Time Series (ETS) Module of the SAS System.

One common task performed on time series data is to count the number of intervals that have elapsed between two points in time; another is to aggregate (or interpolate) a series from one sampling frequency (or interval) to another. The SAS System supports the following intervals for date and time variables: YEAR, SEMIYEAR, QTR [quarter], MONTH, SEMIMONTH, TENDAY, DAY, HOUR, MINUTE and SECOND.

Supplying an optional multiplier and/or subperiod index to the specified interval allows you to “shift” the default interval to one of your own choosing.

INTERVALS, MULTIPLIERS AND SUBPERIODS

Many SAS users are already familiar with using an Interval Alignment Operator with a SAS date functions such as INTCK, which counts the number of specified intervals between two date, time or datetime values. For example,

```
YEARS_ELAPSED = INTCK( 'YEAR' , '18dec1956'd , today ( ) );
```

assigns to the variable on the left hand side of the assignment statement the number of year interval boundaries that have been “crossed” between the dates represented by the “from” and “to” arguments to the INTCK Function. Without more, the YEAR interval boundary “assumes” the user wants to count the number of “years starting in January” between the “from” and “to” date arguments.

What many SAS Software users don't know, and what this paper addresses, is the structure of the interval argument, which actually has three parts. Once we know what those three parts are, it becomes easy to create a “shift in time” and calculate customized intervals between two date or time periods.

The INTERVAL Argument

A date or time Interval Argument has three parts: 1) the time interval's name (e.g., YEAR); 2) the optional *multiplier*, and, 3) the optional *subperiod starting index* specifying that the interval is to be shifted to a later starting point than is supplied by the default value.

The default value of the multiplier and the subperiod are both 1 (one). Therefore, when the YEAR interval argument was supplied in the assignment statement above, SAS interpreted it as YEAR1.1, or the number of one-year intervals starting in January.

Using, for example, the interval MONTH2 would specify two month periods. YEAR2 specifies two year periods.

The superperiod starting index (which I like to call the “shifter”) is quite useful. For example, specifying YEAR.10 means “years starting in October,” or the start of the Federal Fiscal Year in the United States. YEAR4.11 specifies four year periods starting in November, or the amount of time between Presidential elections in the United States

CONCLUSION

Date alignment operators are often an overlooked, but very useful tool for SAS users. Additional examples and details will be presented in my presentation in the Coder's Corner section at SUGI 30.

REFERENCES

SAS Institute, Inc., 2004, *SAS/ETS® 9.1 Users Guide*, Cary, NC: SAS Institute, Inc.

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