Explanatory Variables

Optional Data · https://dev.forecastpro.com/documentation/forecast-pro-trac/optional-data/explanatory-variables/

Explanatory variable files are used to import explanatory variables (i.e., independent variables) that you wish to include in a dynamic regression or machine learning model.

Forecast Pro allows you to specify two types of explanatory variables—global and item-specific. A global explanatory variable consists of a single time series (set of values) which can be included in a dynamic regression or machine learning model for any item on the Navigator. An item-specific explanatory variable consists of a set of time series each of which is associated to a specific item on the Navigator.

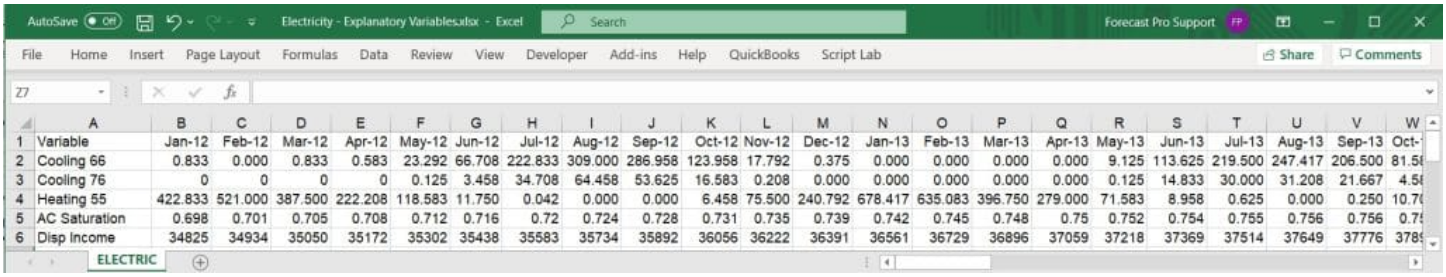
To illustrate the difference, consider a variable like holidays, which will likely be the same for all items within a hierarchy and therefore should be defined as a global variable. Contrast holidays with a variable like price, which will likely take on different values for different items and therefore should be defined as an item-specific variable. In this context “items” is being used to include both end items and aggregate levels in the hierarchy.

Explanatory variables *must* include values for the historic period. Ideally, you would also include forecast values for your explanatory variable, but you are not required to do so. If an explanatory variable does not have values provided for the complete forecast period, you can use the “automatically extend” option to instruct Forecast Pro to forecast explanatory variables (using expert selection) where necessary.

Global Explanatory Variables

Setting up global variables is straightforward. The first column is labeled Variable and contains the name of the explanatory variable. The remaining columns are labeled with dates and contain the date values. These date values should match what is used in Forecast Pro (e.g. the dates shown in the Numeric Output view).

The sample file shown below, “*Electricity - Explanatory Variables.xlsx*”, is provided with the software.

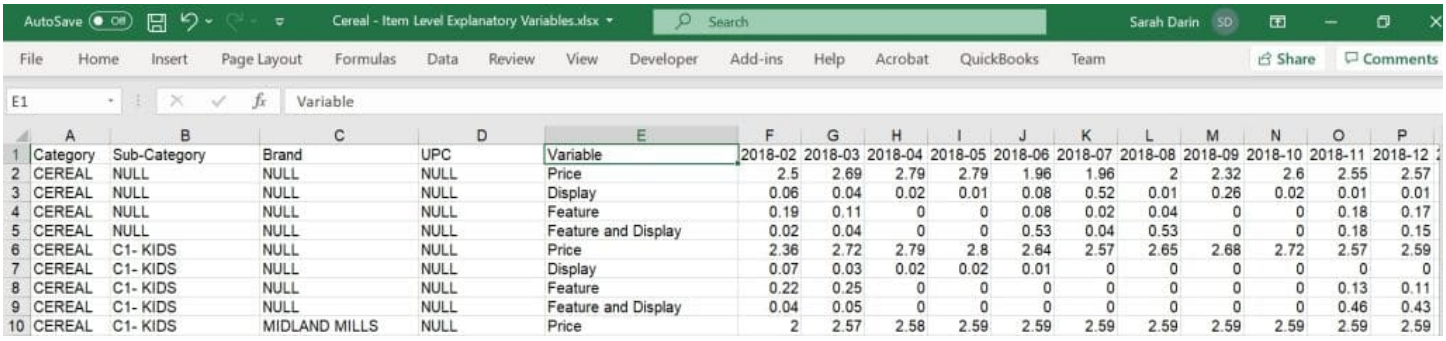


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Variable	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-
2	Cooling 66	0.833	0.000	0.833	0.583	23.292	66.708	222.833	309.000	286.958	123.958	17.792	0.375	0.000	0.000	0.000	0.000	9.125	113.625	219.500	247.417	206.500	81.5
3	Cooling 76	0	0	0	0	0.125	3.458	34.708	64.458	53.625	16.583	0.208	0.000	0.000	0.000	0.000	0.000	0.125	14.833	30.000	31.208	21.667	4.5
4	Heating 55	422.833	521.000	387.500	222.208	118.583	11.750	0.042	0.000	0.000	6.458	75.500	240.792	678.417	635.083	396.750	279.000	71.583	8.958	0.625	0.000	0.250	10.7
5	AC Saturation	0.698	0.701	0.705	0.708	0.712	0.716	0.72	0.724	0.728	0.731	0.735	0.739	0.742	0.745	0.748	0.75	0.752	0.754	0.755	0.756	0.756	0.7
6	Disp Income	34825	34934	35050	35172	35302	35438	35583	35734	35892	36056	36222	36391	36561	36729	36896	37059	37218	37369	37514	37649	37776	378

Item-specific Explanatory Variables

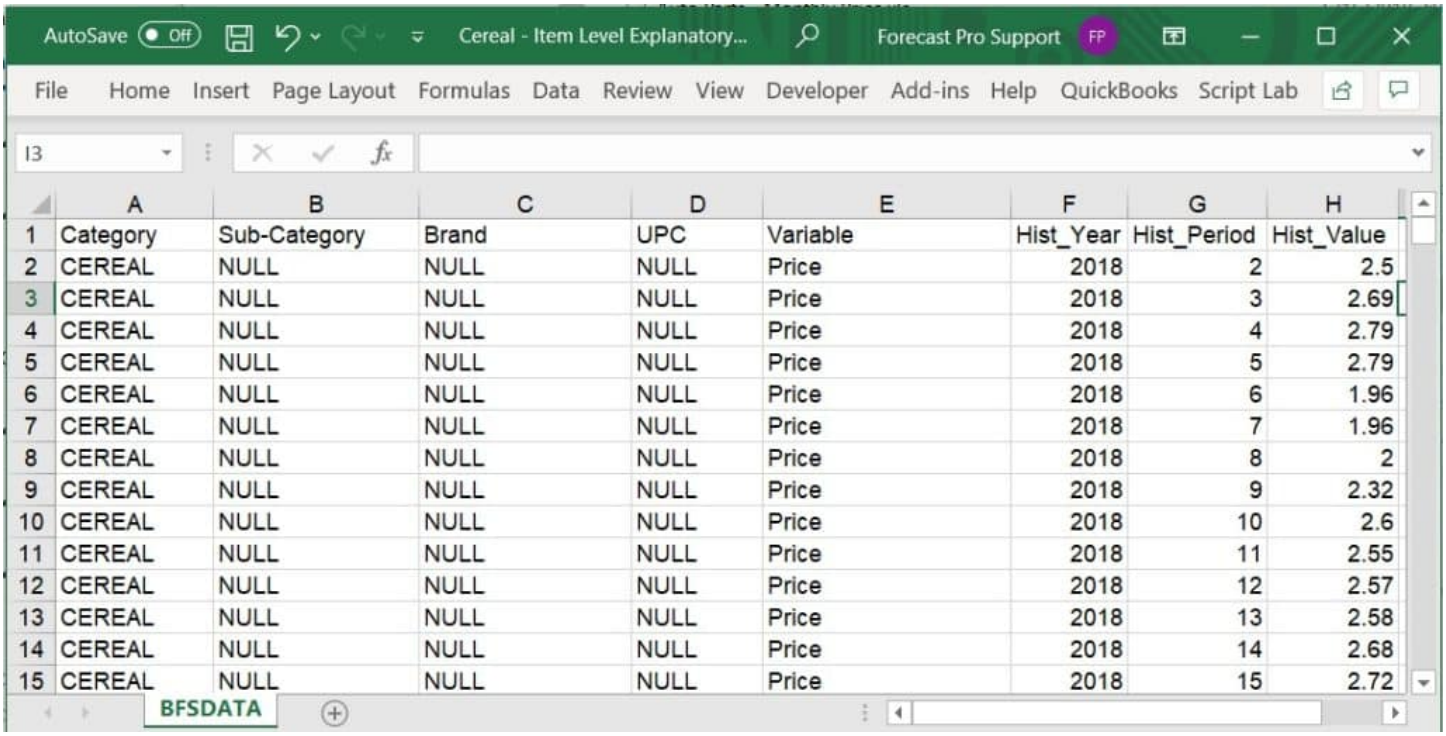
The item-specific explanatory variable setup is the same as the Global variable setup, except the file includes the attribute fields used in the historic data setup. The first few columns (columns A-D in the example below) list the attributes, the next column (column E below) is labeled Variable and contains the name of the explanatory variable, and the remaining columns are labeled with dates and contain the date values (consistent with Forecast Pro, as described above).

The sample file shown below, "*Cereal- Item Level Explanatory Variables.xlsx*", is provided with the software.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Category	Sub-Category	Brand	UPC	Variable	2018-02	2018-03	2018-04	2018-05	2018-06	2018-07	2018-08	2018-09	2018-10	2018-11	2018-12
2	CEREAL	NULL	NULL	NULL	Price	2.5	2.69	2.79	2.79	1.96	1.96	2	2.32	2.6	2.55	2.57
3	CEREAL	NULL	NULL	NULL	Display	0.06	0.04	0.02	0.01	0.08	0.52	0.01	0.26	0.02	0.01	0.01
4	CEREAL	NULL	NULL	NULL	Feature	0.19	0.11	0	0	0.08	0.02	0.04	0	0	0.18	0.17
5	CEREAL	NULL	NULL	NULL	Feature and Display	0.02	0.04	0	0	0.53	0.04	0.53	0	0	0.18	0.15
6	CEREAL	C1- KIDS	NULL	NULL	Price	2.36	2.72	2.79	2.8	2.64	2.57	2.65	2.68	2.72	2.57	2.59
7	CEREAL	C1- KIDS	NULL	NULL	Display	0.07	0.03	0.02	0.02	0.01	0	0	0	0	0	0
8	CEREAL	C1- KIDS	NULL	NULL	Feature	0.22	0.25	0	0	0	0	0	0	0	0.13	0.11
9	CEREAL	C1- KIDS	NULL	NULL	Feature and Display	0.04	0.05	0	0	0	0	0	0	0	0.46	0.43
10	CEREAL	C1- KIDS	MIDLAND MILLS	NULL	Price	2	2.57	2.58	2.59	2.59	2.59	2.59	2.59	2.59	2.59	2.59

The examples shown above use a row format spreadsheet. Explanatory variables may also be imported using all other formats supported for input files (e.g., transaction spreadsheet, ODBC, etc.). ODBC requires the same layout as a transaction spreadsheet. An example of item-specific transaction explanatory variables, "*Cereal- Item Level Explanatory Variables - Transactions.xlsx*", is provided with the software and shown below.



	A	B	C	D	E	F	G	H
1	Category	Sub-Category	Brand	UPC	Variable	Hist_Year	Hist_Period	Hist_Value
2	CEREAL	NULL	NULL	NULL	Price	2018	2	2.5
3	CEREAL	NULL	NULL	NULL	Price	2018	3	2.69
4	CEREAL	NULL	NULL	NULL	Price	2018	4	2.79
5	CEREAL	NULL	NULL	NULL	Price	2018	5	2.79
6	CEREAL	NULL	NULL	NULL	Price	2018	6	1.96
7	CEREAL	NULL	NULL	NULL	Price	2018	7	1.96
8	CEREAL	NULL	NULL	NULL	Price	2018	8	2
9	CEREAL	NULL	NULL	NULL	Price	2018	9	2.32
10	CEREAL	NULL	NULL	NULL	Price	2018	10	2.6
11	CEREAL	NULL	NULL	NULL	Price	2018	11	2.55
12	CEREAL	NULL	NULL	NULL	Price	2018	12	2.57
13	CEREAL	NULL	NULL	NULL	Price	2018	13	2.58
14	CEREAL	NULL	NULL	NULL	Price	2018	14	2.68
15	CEREAL	NULL	NULL	NULL	Price	2018	15	2.72

Notice that the attribute fields are in the first four columns. The attribute columns are followed by a column for the explanatory variable name. This column must be labeled *Variable*. The last 3 columns, *Hist_Year*, *Hist_Period* and *Hist_Value*, are number fields identifying the year, period and values respectively.