

**codebook** — Describe data contents

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## Description

codebook examines the variable names, labels, and data to produce a codebook describing the dataset.

## Quick start

Codebook of all variables in the dataset  
`codebook`

Codebook of variables `v1`, `v2`, and `v3`  
`codebook v1 v2 v3`

Codebook of all variables starting with `code`  
`codebook code*`

Include dataset name, last saved date, and variable notes in the codebook  
`codebook, header notes`

Report problems with labels, constant-valued variables, embedded spaces and binary 0 in string variables, and noninteger date variables  
`codebook, problems`

Codebook for dataset with English and Spanish variable and value labels using label languages `en` and `es`  
`codebook, languages(en es)`

## Menu

Data > Describe data > Describe data contents (codebook)

## Syntax

```
codebook [ varlist ] [ if ] [ in ] [ , options ]
```

<i>options</i>	Description
Options	
<code>all</code>	print complete report without missing values
<code>header</code>	print dataset name and last saved date
<code>notes</code>	print any notes attached to variables
<code>mv</code>	report pattern of missing values
<code>tabulate(#)</code>	set tables/summary statistics threshold; default is <code>tabulate(9)</code>
<code>problems</code>	report potential problems in dataset
<code>detail</code>	display detailed report on the variables; only with <code>problems</code>
<code>compact</code>	display compact report on the variables
<code>dots</code>	display a dot for each variable processed; only with <code>compact</code>
Languages	
<code>languages[(<i>namelist</i>)]</code>	use with multilingual datasets; see <a href="#">[D] label language</a> for details

## Options

### Options

`all` is equivalent to specifying the `header` and `notes` options. It provides a complete report, which excludes only performing `mv`.

`header` adds to the top of the output a header that lists the dataset name, the date that the dataset was last saved, etc.

`notes` lists any notes attached to the variables; see [\[D\] notes](#).

`mv` specifies that `codebook` search the data to determine the pattern of missing values. This is a CPU-intensive task.

`tabulate(#)` specifies the number of unique values of the variables to use to determine whether a variable is categorical or continuous. Missing values are not included in this count. The default is 9; when there are more than nine unique values, the variable is classified as continuous. Extended missing values will be included in the tabulation.

`problems` specifies that a summary report is produced describing potential problems that have been diagnosed:

- Variables that are labeled with an undefined value label
- Incompletely value-labeled variables
- Variables that are constant, including always missing
- Leading, trailing, and embedded spaces in string variables
- Embedded binary 0 (\0) in string variables
- Noninteger-valued date variables

See the discussion of these problems and advice on overcoming them following [example 5](#).

`detail` may be specified only with the `problems` option. It specifies that the detailed report on the variables not be suppressed.

`compact` specifies that a compact report on the variables be displayed. `compact` may not be specified with any options other than `dots`.

`dots` specifies that a dot be displayed for every variable processed. `dots` may be specified only with `compact`.

#### Languages

`languages`[(*namelist*)] is for use with multilingual datasets; see [D] [label language](#). It indicates that the codebook pertains to the languages in *namelist* or to all defined languages if no such list is specified as an argument to `languages()`. The output of `codebook` lists the data label and variable labels in these languages and which value labels are attached to variables in these languages.

Problems are diagnosed in all of these languages, as well. The problem report does not provide details in which language problems occur. We advise you to rerun `codebook` for problematic variables; specify `detail` to produce the problem report again.

If you have a multilingual dataset but do not specify `languages()`, all output, including the problem report, is shown in the “active” language.

## Remarks and examples

[stata.com](http://www.stata.com)

`codebook`, without arguments, is most usefully combined with `log` to produce a printed listing for enclosure in a notebook documenting the data; see [U] [15 Saving and printing output—log files](#). `codebook` is, however, also useful interactively, because you can specify one or a few variables.

### ▷ Example 1

`codebook` examines the data in producing its results. For variables that `codebook` thinks are continuous, it presents the mean; the standard deviation; and the 10th, 25th, 50th, 75th, and 90th percentiles. For variables that it thinks are categorical, it presents a tabulation. In part, `codebook` makes this determination by counting the number of unique values of the variable. If the number is nine or fewer, `codebook` reports a tabulation; otherwise, it reports summary statistics.

`codebook` distinguishes the standard missing values (`.`) and the extended missing values (`.a` through `.z`, denoted by `.*`). If extended missing values are found, `codebook` reports the number of distinct missing value codes that occurred in that variable. Missing values are ignored with the `tabulate` option when determining whether a variable is treated as continuous or categorical.

```
. use http://www.stata-press.com/data/r15/educ3
(ccdb46, 52-54)

. codebook fips division, all

      Dataset:  http://www.stata-press.com/data/r15/educ3.dta
      Last saved: 6 Mar 2016 22:20
      Label:  ccdb46, 52-54
      Number of variables: 42
      Number of observations: 956
      Size: 145,312 bytes ignoring labels, etc.

_dta:
  1. confirmed data with steve on 7/22
```

---

```
fips state/place code
```

---

```
      type:  numeric (long)
      range:  [10060,560050]
      unique values: 956
      mean: 256495
      std. dev: 156998
      percentiles: 10% 25% 50% 75% 90%
                   61462 120426 252848 391360 482530
```

---

```
division Census Division
```

---

```
      type:  numeric (int)
      label:  division
      range:  [1,9]
      unique values: 9
      unique mv codes: 2
      tabulation:  Freq.  Numeric  Label
                   69      1  N. Eng.
                   97      2  Mid Atl
                   202     3  E.N.C.
                   78      4  W.N.C.
                   115     5  S. Atl.
                   46      6  E.S.C.
                   89      7  W.S.C.
                   59      8  Mountain
                   195     9  Pacific
                   4      .
                   2      .a
```

Because `division` has nine unique nonmissing values, `codebook` reported a tabulation. If `division` had contained one more unique nonmissing value, `codebook` would have switched to reporting summary statistics, unless we had included the `tabulate(#)` option.

## Example 2

The mv option is useful. It instructs codebook to search the data to determine patterns of missing values. Different kinds of missing values are not distinguished in the patterns.

```
. use http://www.stata-press.com/data/r15/citytemp
(City Temperature Data)
. codebook cooldd heatdd tempjan tempjuly, mv
```

---

<code>cooldd</code>	Cooling degree days
---------------------	---------------------

---

```

      type:  numeric (int)
      range:  [0,4389]
unique values: 438
      mean:   1240.41
      std. dev: 937.668
percentiles:  10%    25%    50%    75%    90%
               411    615    940    1566   2761
missing values:  heatdd==mv <-> cooldd==mv
                  tempjan==mv --> cooldd==mv
                  tempjuly==mv --> cooldd==mv
```

---

<code>heatdd</code>	Heating degree days
---------------------	---------------------

---

```

      type:  numeric (int)
      range:  [0,10816]
unique values: 471
      mean:   4425.53
      std. dev: 2199.6
percentiles:  10%    25%    50%    75%    90%
               1510   2460   4950   6232   6919
missing values:  cooldd==mv <-> heatdd==mv
                  tempjan==mv --> heatdd==mv
                  tempjuly==mv --> heatdd==mv
```

---

<code>tempjan</code>	Average January temperature
----------------------	-----------------------------

---

```

      type:  numeric (float)
      range:  [2.2,72.6]
unique values: 310
      mean:   35.749
      std. dev: 14.1881
percentiles:  10%    25%    50%    75%    90%
               20.2   25.1   31.3   47.8   55.1
missing values:  tempjuly==mv <-> tempjan==mv
```

---

tempjuly	Average July temperature				
type:	numeric (float)				
range:	[58.1,93.6]	units:	.1		
unique values:	196	missing .:	2/956		
mean:	75.0538				
std. dev:	5.49504				
percentiles:	10%	25%	50%	75%	90%
	68.8	71.8	74.25	78.7	82.3
missing values:	tempjan==mv <-> tempjuly==mv				

---

codebook reports that if `tempjan` is missing, `tempjuly` is also missing, and vice versa. In the output for the `cooldd` variable, codebook also reports that the pattern of missing values is the same for `cooldd` and `heatdd`. In both cases, the correspondence is indicated with “<->”.

For `cooldd`, codebook also states that “`tempjan==mv --> cooldd==mv`”. The one-way arrow means that a missing `tempjan` value implies a missing `cooldd` value but that a missing `cooldd` value does not necessarily imply a missing `tempjan` value. ◀

Another feature of codebook—this one for numeric variables—is that it can determine the units of the variable. For instance, in the [example](#) above, `tempjan` and `tempjuly` both have units of 0.1, meaning that temperature is recorded to tenths of a degree. codebook handles precision considerations in making this determination (`tempjan` and `tempjuly` are floats; see [\[U\] 13.12 Precision and problems therein](#)). If we had a variable in our dataset recorded in 100s (for example, 21,500 or 36,800), codebook would have reported the units as 100. If we had a variable that took on only values divisible by 5 (5, 10, 15, etc.), codebook would have reported the units as 5.

### ▷ Example 3

We can use the `label language` command (see [\[D\] label language](#)) and the `label` command (see [\[D\] label](#)) to create German value labels for our `auto` dataset. These labels are reported by codebook:

```
. use http://www.stata-press.com/data/r15/auto
(1978 Automobile Data)
. label language en, rename
(language default renamed en)
. label language de, new
(language de now current language)
. label data "1978 Automobile Daten"
. label variable foreign "Art Auto"
. label values foreign origin_de
. label define origin_de 0 "Innen" 1 "Ausländisch"
```

```
. codebook foreign
```

---

```
foreign Art Auto
```

---

```

      type: numeric (byte)
      label: origin_de
      range: [0,1]
unique values: 2
                        units: 1
                        missing.: 0/74
      tabulation: Freq.  Numeric  Label
                   52      0  Innen
                   22      1  Ausländisch
```

```
. codebook foreign, languages(en de)
```

---

```
foreign      in en: Car type
             in de: Art Auto
```

---

```

      type: numeric (byte)
      label in en: origin
      label in de: origin_de
      range: [0,1]
unique values: 2
                        units: 1
                        missing.: 0/74
      tabulation: Freq. Numeric  origin      origin_de
                   52      0  Domestic    Innen
                   22      1  Foreign      Ausländisch
```

With the `languages()` option, the value labels are shown in the specified active and available languages.

◀

## ▶ Example 4

`codebook, compact` summarizes the variables in your dataset, including variable labels. It is an alternative to the `summarize` command.

```
. use http://www.stata-press.com/data/r15/auto
(1978 Automobile Data)
```

```
. codebook, compact
```

Variable	Obs	Unique	Mean	Min	Max	Label
make	74	74	.	.	.	Make and Model
price	74	74	6165.257	3291	15906	Price
mpg	74	21	21.2973	12	41	Mileage (mpg)
rep78	69	5	3.405797	1	5	Repair Record 1978
headroom	74	8	2.993243	1.5	5	Headroom (in.)
trunk	74	18	13.75676	5	23	Trunk space (cu. ft.)
weight	74	64	3019.459	1760	4840	Weight (lbs.)
length	74	47	187.9324	142	233	Length (in.)
turn	74	18	39.64865	31	51	Turn Circle (ft.)
displacement	74	31	197.2973	79	425	Displacement (cu. in.)
gear_ratio	74	36	3.014865	2.19	3.89	Gear Ratio
foreign	74	2	.2972973	0	1	Car type

---

```
. summarize
```

Variable	Obs	Mean	Std. Dev.	Min	Max
make	0				
price	74	6165.257	2949.496	3291	15906
mpg	74	21.2973	5.785503	12	41
rep78	69	3.405797	.9899323	1	5
headroom	74	2.993243	.8459948	1.5	5
trunk	74	13.75676	4.277404	5	23
weight	74	3019.459	777.1936	1760	4840
length	74	187.9324	22.26634	142	233
turn	74	39.64865	4.399354	31	51
displacement	74	197.2973	91.83722	79	425
gear_ratio	74	3.014865	.4562871	2.19	3.89
foreign	74	.2972973	.4601885	0	1



## ► Example 5

When codebook determines that neither a tabulation nor a listing of summary statistics is appropriate, for instance, for a string variable or for a numeric variable taking on many labeled values, it reports a few examples instead.

```
. use http://www.stata-press.com/data/r15/funnyvar
. codebook name
```

---

```
name (unlabeled)
```

---

```

           type: string (str5), but longest is str3
unique values: 10                missing "": 0/10
examples:   "1 0"
            "3"
            "5"
            "7"

warning: variable has embedded blanks
```

codebook is also on the lookout for common problems that might cause you to make errors when dealing with the data. For string variables, this includes leading, embedded, and trailing blanks and embedded binary 0 (N0). In the output above, codebook informed us that name includes embedded blanks. If name had leading or trailing blanks, it would have mentioned that, too.

When variables are value labeled, codebook performs two checks. First, if a value label *labname* is associated with a variable, codebook checks whether *labname* is actually defined. Second, it checks whether all values are value labeled. Partial labeling of a variable may mean that the label was defined incorrectly (for instance, the variable has values 0 and 1, but the value label maps 1 to “male” and 2 to “female”) or that the variable was defined incorrectly (for example, a variable *gender* with three values). codebook checks whether date variables are integer valued.

If the *problems* option is specified, codebook does not provide detailed descriptions of each variable but reports only the potential problems in the data.



```
. codebook, problems
  Potential problems in dataset http://www.stata-press.com/data/r15/
> funnyvar.dta
```

potential problem	variables
constant (or all missing) vars	human planet
vars with nonexistent label	educ
incompletely labeled vars	gender
str# vars that may be compressed	name address city country planet
string vars with leading blanks	city country
string vars with trailing blanks	planet
string vars with embedded blanks	name address
string vars with embedded \0	mugshot
noninteger-valued date vars	birthdate

◀

In the example above, `codebook, problems` reported various potential problems with the dataset. These problems include

- Constant variables, including variables that are always missing

Variables that are constant, taking the same value in all observations, or that are always missing, are often superfluous. Such variables, however, may also indicate problems. For instance, variables that are always missing may occur when importing data with an incorrect input specification. Such variables may also occur if you generate a new variable for a subset of the data, selected with an expression that is false for all observations.

Advice: Carefully check the origin of constant variables. If you are saving a constant variable, be sure to [compress](#) the variable to use minimal storage.

- Variables with nonexistent value labels

Stata treats value labels as separate objects that can be attached to one or more variables. A problem may arise if variables are linked to value labels that are not yet defined or if an incorrect value label name was used.

Advice: Attach the correct value label, or [label define](#) the value label. See [\[D\] label](#).

- Incompletely labeled variables

A variable is called “incompletely value labeled” if the variable is value labeled but no mapping is provided for some values of the variable. An example is a variable with values 0, 1, and 2 and value labels for 1, 2, and 3. This situation usually indicates an error, either in the data or in the value label.

Advice: Change either the data or the value label.

- String variables that may be compressed

The storage space used by a string variable is determined by its data type; see [\[D\] data types](#). For instance, the storage type `str20` indicates that 20 bytes are used per observation. If the declared storage type exceeds your requirements, memory and disk space is wasted.

Advice: Use [compress](#) to store the data as compactly as possible.

- String variables with leading or trailing blanks

In most applications, leading and trailing spaces do not affect the meaning of variables but are probably side effects from importing the data or from data manipulation. Spurious

leading and trailing spaces force Stata to use more memory than required. In addition, manipulating strings with leading and trailing spaces is harder.

Advice: Remove leading and trailing blanks from a string variable `s` by typing

```
replace s = strtrim(s)
```

See [FN] **String functions**.

- String variables with embedded blanks

String variables with embedded blanks are often appropriate; however, sometimes they indicate problems importing the data.

Advice: Verify that blanks are meaningful in the variables.

- String variables with embedded binary 0 (\0)

String variables with embedded binary 0 (\0) are allowed; however, caution should be used when working with them as some commands and functions may only work with the plain-text portion of a binary string, ignoring anything after the first binary 0.

Advice: Be aware of binary strings in your data and whether you are manipulating them in a way that is only appropriate with plain-text values.

- Noninteger-valued date variables

Stata's **date and time formats** were designed for use with integer values but will work with noninteger values.

Advice: Carefully inspect the nature of the noninteger values. If noninteger values in a variable are the consequence of roundoff error, you may want to round the variable to the nearest integer.

```
replace time = round(time)
```

Of course, more problems not reported by **codebook** are possible. These might include

- Numerical data stored as strings

After importing data into Stata, you may discover that some string variables can actually be interpreted as numbers. Stata can do much more with numerical data than with string data. Moreover, string representation usually makes less efficient use of computer resources. **destring** will convert string variables to numeric.

A string variable may contain a “field” with numeric information. An example is an address variable that contains the street name followed by the house number. The Stata string functions can extract the relevant substring.

- Categorical variables stored as strings

Most statistical commands do not allow string variables. Moreover, string variables that take only a limited number of distinct values are an inefficient storage method. Use value-labeled numeric values instead. These are easily created with **encode**.

- Duplicate observations

See [D] **duplicates**.

- Observations that are always missing

Drop observations that are missing for all variables in *varlist* using the `rownonmiss()` `egen` function:

```
egen nobs = rownonmiss(varlist)
```

```
drop if nobs==0
```

Specify `_all` for *varlist* if only observations that are always missing should be dropped.

## Stored results

codebook stores the following lists of variables with potential problems in `r()`:

Macros

<code>r(cons)</code>	constant (or missing)
<code>r(labelnotfound)</code>	undefined value labeled
<code>r(notlabeled)</code>	value labeled but with unlabeled categories
<code>r(str_type)</code>	compressible
<code>r(str_leading)</code>	leading blanks
<code>r(str_trailing)</code>	trailing blanks
<code>r(str_embedded)</code>	embedded blanks
<code>r(str_embedded0)</code>	embedded binary 0 (\0)
<code>r(realdate)</code>	noninteger dates

## References

- Cox, N. J. 2008. [Speaking Stata: Distinct observations](#). *Stata Journal* 8: 557–568.
- . 2012. [Software Updates: Speaking Stata: Distinct observations](#). *Stata Journal* 12: 352.
- Long, J. S. 2009. *The Workflow of Data Analysis Using Stata*. College Station, TX: Stata Press.

## Also see

- [D] [describe](#) — Describe data in memory or in file
- [D] [ds](#) — List variables matching name patterns or other characteristics
- [D] [inspect](#) — Display simple summary of data’s attributes
- [D] [labelbook](#) — Label utilities
- [D] [notes](#) — Place notes in data
- [D] [split](#) — Split string variables into parts
- [U] [15 Saving and printing output—log files](#)