Resultssets to resultstables revisited

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- A **resultsset** is a Stata dataset created as output by a Stata program.
- They are nowadays created in **resultsframes**[1], but can also be listed, written to a file, or overwritten over the input dataset.
- Resultsset–generating SSC packages include `parmest`, `xcollapse`, `xcontract`, `descsave`, `xdir`, `xframedir`, and `xsvmat`.
- And, like other Stata datasets, resultssets can be input into “SQL–like” operations, using `append`, `merge`, `joinby`, and `cross` in official Stata, or the SSC packages `keyby`, `addinby`, `expgen`, and `xframeappend`, to output **secondary resultssets**.

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- Statisticians make their living producing **resultsplots** and/or **resultstables**.
- And a string variable needs to be encoded to numeric in order to be plotted.
- And a numeric variable needs to be decoded to string in order to be tabulated.
- Resultssets (unlike Stata tables and graphs) are therefore a sensible **common currency** for results, as their variables can be used equally to make resultsplots and/or resultstables. encoding and/or decoding when necessary.
- SSC packages used include `sencode`[3], `factext`, and `fvregen` for encoding, and `sdecode` and its family of dependents `bmjcip`, `factmerg`, `ingap`, and `insingap` for decoding.

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Example in `example1.do`: Statistics for quantitative variables by US origin in the `xauto` data

- The SSC package `xauto` creates an extended version of the `auto` data supplied with official Stata.
- We will use it to generate a secondary `xcollapse` resultsset, containing statistics on the list of 10 quantitative variables `price npm rep78 trunk headroom tons length turn displacement gear_ratio`, broken down by origin of car model (US or non–US).
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The secondary resultsset to be converted

This was created by `xframeappend`ing 10 `xcollapse` resultsframes, one for each quantitative variable. We then `sencode`d the string ID variable `idstr` to create the variable `quanvar`:

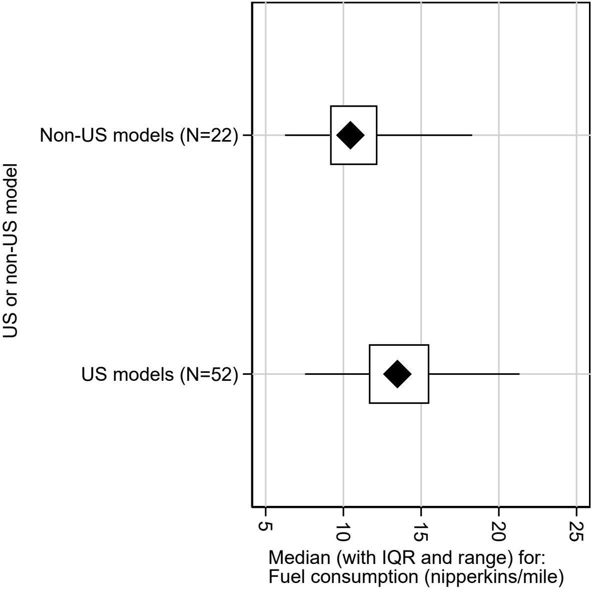
```
. desc, fu;

Contains data
 Observations:            20
    Variables:            10
---------------------------------------------------------------------------------------------------
Variable      Storage   Display    Value
    name         type    format    label      Variable label
---------------------------------------------------------------------------------------------------
quanvar         byte    %-34.0g    quanvar    Quantitative variable
us              byte    %-8.0g     us         US or non-US model
N               byte    %8.0g                 (count) X
mean            float   %8.2f                 (mean) X
sd              float   %8.2f                 (sd) X
p0              float   %8.2f                 (min) X
p25             float   %8.2f                 (p 25) X
p50             float   %8.2f                 (p 50) X
p75             float   %8.2f                 (p 75) X
p100            float   %8.2f                 (max) X
---------------------------------------------------------------------------------------------------
Sorted by: quanvar  us
     Note: Dataset has changed since last saved.
```

We see that the dataset has 1 observation per quantitative variable per car model origin group (non–US or US), and data on statistics.

A resultsplot from our resultsset

- This plot was produced from our resultsset, using the SSC packages `sdecode`, `sencode`, and `eclplot`.
- And there are many other things we can do with resultssets!
- *However*, today we concentrate on multi–page tables in `.docx` documents, which clinical trial committees like.



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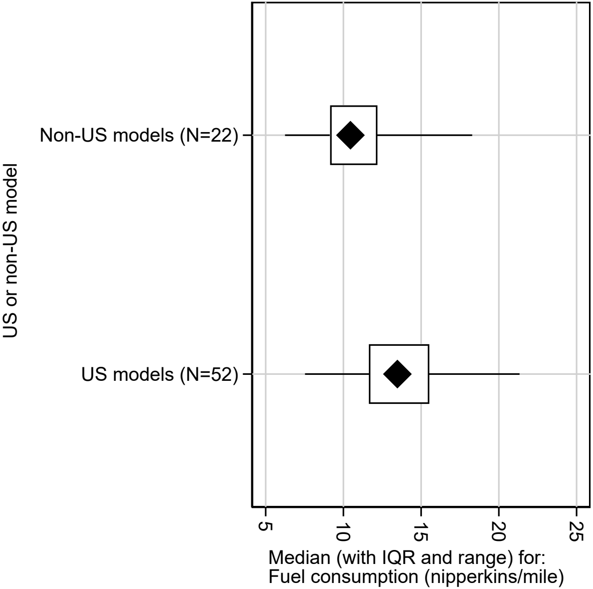

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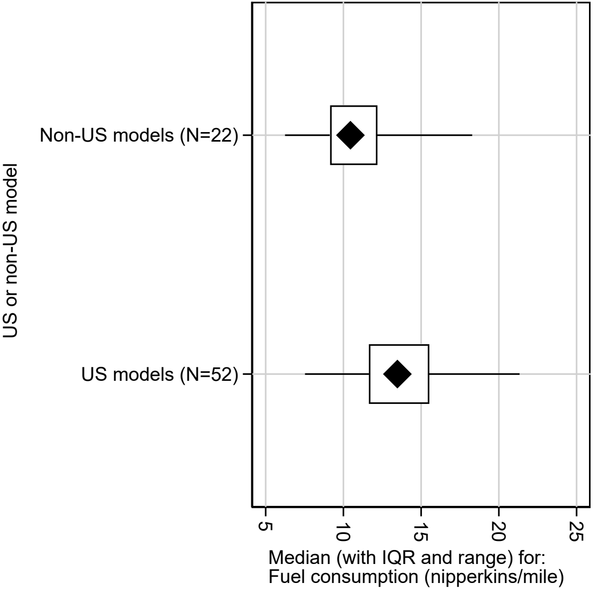

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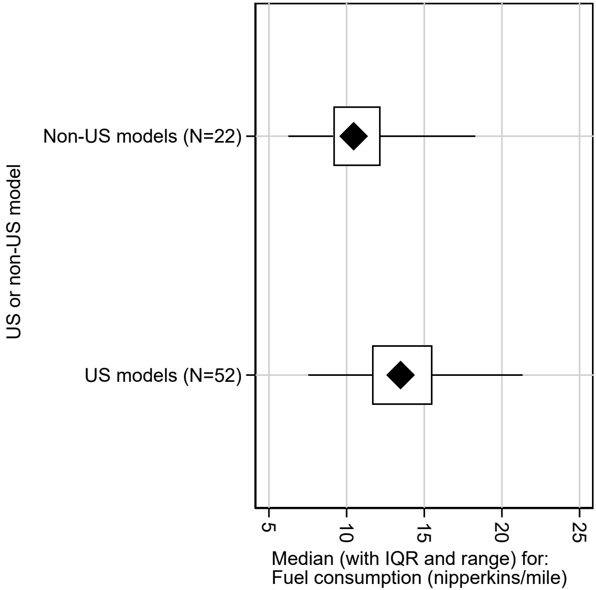

Resultssets to resultstables: decoding, listing and other steps

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- The process *usually* starts with decoding, using the `sdecode` family of SSC packages.
- And it *always* ends with listing, using the SSC packages `docxtab` (for tables in `.docx` documents) or `listtab` (for tables in Markdown, HTML, LaTeX, plain TeX, or `.rtf` documents).
- *However*, there may be other steps between decoding and listing, involving `reshape`ing (`long` or `wide`), appending, merging, characterizing (to define table–column headers), inserting gap observations, and/or grouping rows into pages in multi–page tables.
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Steps in converting a resultsset to a resultstable

These 11 steps are given in the order in which they *usually* happen. There are SSC modules for each step.

Step type	*SSC modules used*	*Importance*
Decode non–key variables to table cells	`sdecode` and dependents	Semi–compulsory
Reshape to long	`xrelong`	Optional
Append extra table rows	`xframeappend`, `factmerg`	Optional
Characterize table columns	`chardef`, `xrewide`	Optional
Reshape to wide	`xrewide`	Optional
Merge in extra table columns	`addinby`, `fraddinby`	Optional
Decode key variables to table row label	`sdecode` and dependents	Semi–compulsory
Characterize table row label	`chardef`	Optional
Insert gap observations	`insingap`, `ingap`	Optional
Group observations into pages	`ltop`	Optional
List table	`listtab`, `docxtab`	Compulsory

The “Compulsory” step (listing) is always necessary. The 2 “Semi–compulsory” steps (decoding) are *nearly* always necessary. The “Optional” steps are *frequently* absent (because, fortunately, *most* tables are simple). To find out more about the SSC modules, use `findit` in Stata.

Example: Decode and reshape to long

- We start making our resultstable by decoding our statistics variables.
- This is done using the `msdecode` module of the `sdecode` package, which can input multiple numeric statistics variables to output a string variable displaying a decoded **“vector–statistic”**, like a variable range in parentheses.
- This creates new string variables `stat1`, `stat2`, `stat3`, and `stat4`, displaying, respectively, the sample number, the mean (with SD), the median (with IQR), and the range.
- We then use the module `xrelong`, an extension of `reshape long`, which creates a long version of our resultsset, with an extra labelled key variable `statseq` and a single displayed statistic value variable `stat`.
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The code for decoding and reshaping to long

The code to do this was as follows:

```
msdecode N, gene(stat1);
msdecode mean sd, delim(" (") suff(")") gene(stat2);
msdecode p50 p25 p75, delim(" (" ", ") suff(")")
  gene(stat3);
msdecode p0 p100, pref("(") delim(", ") suff(")")
  gene(stat4);
lab def statseq 1 "N" 2 "Mean (SD)" 3 "Median (IQR)"
  4 "Range";
drop N mean sd p*;
xrelong stat, i(quanvar us) j(statseq) jlabel(statseq);
jformat statseq stat;
lab var statseq "Statistic sequence";
lab var stat "Statistic value";
desc, fu;
```

We start by using `msdecode` to decode our 8 numeric statistics to 4 string variables, drop the numeric variables, and use `xrelong`, with the option `jlabel(statseq)`, to reshape the dataset to long (with labelled *j*–values). The SSC package `jformat` left–justifies the new variables.

The resultssetset decoded and reshaped to long

We `list`ed the new long dataset:

```
. by quanvar: list us statseq stat, abbr(32) sepby(quanvar us);

--------------------------------------------------------------------------------------------
-> quanvar = Price

     +------------------------------------------------------+
     | us       statseq         stat                        |
     |------------------------------------------------------|
  1. | Non-US   N               22                          |
  2. | Non-US   Mean (SD)       6384.68 (2621.92)           |
  3. | Non-US   Median (IQR)    5759.00 (4499.00, 7140.00)  |
  4. | Non-US   Range           (3748.00, 12990.00)         |
     |------------------------------------------------------|
  5. | US       N               52                          |
  6. | US       Mean (SD)       6072.42 (3097.10)           |
  7. | US       Median (IQR)    4782.50 (4184.00, 6234.00)  |
  8. | US       Range           (3291.00, 15906.00)         |
     +------------------------------------------------------+

--------------------------------------------------------------------------------------------
-> quanvar = Fuel consumption (nipperkins/mile)

     +------------------------------------------------+
     | us       statseq         stat                  |
     |------------------------------------------------|
  1. | Non-US   N               22                    |
  2. | Non-US   Mean (SD)       11.04 (2.93)          |
  3. | Non-US   Median (IQR)    10.45 (9.14, 12.19)   |
  4. | Non-US   Range           (6.24, 18.29)         |
```

The long format allows dissimilar vector–statistics to be stacked.

Example: Reshaping to wide and adding gap rows

- We continued by using `xrewide` (an extension of `reshape wide`), with the options `i(quanvar statseq) j(us) cjlabel(varname)`, to create a dataset with 1 observation per quantitative variable per output vector–statistic, and data on that statistic in non–US and US models (side by side).
- We then created a string row label variable `rowlabel` by `sdecode`ing `statseq`.
- We then inserted gap observations using `insingap`, adding a gap observation at the start of each quantitative variable.
- This creates a dataset with 5 observations per quantitative variable, the first a gap observation and the other 4 containing data on the 4 vector–statistics in non–US and US models.

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- We then created a string row label variable `rowlabel` by `sdecode`ing `statseq`.
- We then inserted gap observations using `insingap`, adding a gap observation at the start of each quantitative variable.
- This creates a dataset with 5 observations per quantitative variable, the first a gap observation and the other 4 containing data on the 4 vector–statistics in non–US and US models.

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The dataset reshaped to wide with added gap rows

The new dataset, when `list`ed, started like this:

```
. list rowlabel stat0 stat1, abbr(32) subvar sepby(quanvar) clean noobs;

                  Quantitative variable   Non-US                       US
                                 Price:
                                      N   22                           52
                              Mean (SD)   6384.68 (2621.92)            6072.42 (3097.10)
                           Median (IQR)   5759.00 (4499.00, 7140.00)   4782.50 (4184.00, 6234
                                  Range   (3748.00, 12990.00)          (3291.00, 15906.00)
    Fuel consumption (nipperkins/mile):
                                      N   22                           52
                              Mean (SD)   11.04 (2.93)                 13.61 (3.13)
                           Median (IQR)   10.45 (9.14, 12.19)          13.47 (11.64, 15.53)
                                  Range   (6.24, 18.29)                (7.53, 21.33)
                    Repair record 1978:
                                      N   21                           48
                              Mean (SD)   4.29 (0.72)                  3.02 (0.84)
                           Median (IQR)   4.00 (4.00, 5.00)            3.00 (3.00, 3.00)
                                  Range   (3.00, 5.00)                 (1.00, 5.00)
                 Trunk space (cu. ft.):
                                      N   22                           52
                              Mean (SD)   11.41 (3.22)                 14.75 (4.31)
                           Median (IQR)   11.00 (9.00, 14.00)          16.00 (11.00, 17.00)
                                  Range   (5.00, 16.00)                (7.00, 23.00)
```

This looks *a bit* more like a resultstable! *However*. . .

Grouping table rows into pages using `ltop`

- … there are 5 observations (including gap observations) for each of 10 quantitative variables. These 50 rows might be too many for one page of our A4 `.docx` output!
- Fortunately, the SSC package `ltop` ("lines to pages") creates a page sequence variable, grouping table rows into pages.
- `ltop` has an option `maxlperp(#)`, specifying the maximum lines per page.
- It has an option `iby(`*`varlist`*`)`, specifying internal by–groups that must not be split between pages.
- And it can have a `weight` expression, specifying that some table rows might be taller than others.

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Example: Grouping rows into pages

We use `ltop` to create a new page sequence variable `pageseq`, with maximum lines per page set by `maxlperp(40)`, inner by–groups corresponding to values of `quanvar`, and weights equal to `gapobs+1`, where `gapobs` is a binary indicator that an observation is a gap row. We then use `xcontract` to display numbers of rows on each page:

```
. ltop pageseq [weight=gapobs+1], iby(quanvar)
>   maxlperp(40);
(frequency weights assumed)

. xcontract pageseq, list(, abbr(32));


     +-----------------------------+
     | pageseq   _freq   _percent |
     |-----------------------------|
  1. |       1      30      60.00 |
  2. |       2      20      40.00 |
     +-----------------------------+
```

We see that 30 table rows are on Page 1 and that 20 are on Page 2. Note that the weights allow a gap row to be twice as tall as other rows.

Making the final .docx document

- We now have a dataset with 1 observation per table row, with the rows grouped into pages.
- *So*, we can now write a document–generating section to write that dataset to a document `example1.docx`, looping over pages and creating a multi–page "Table XYZ".
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The presentation, and the example do–file, can be downloaded from the conference website. The packages can be downloaded from SSC.