



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

THE STATA JOURNAL

Editor

H. Joseph Newton
Department of Statistics
Texas A & M University
College Station, Texas 77843
979-845-8817; FAX 979-845-6077
jnewton@stata-journal.com

Associate Editors

Christopher F. Baum
Boston College
Rino Bellocchio
Karolinska Institutet, Sweden and
Univ. degli Studi di Milano-Bicocca, Italy
A. Colin Cameron
University of California–Davis
David Clayton
Cambridge Inst. for Medical Research
Mario A. Cleves
Univ. of Arkansas for Medical Sciences
William D. Dupont
Vanderbilt University
Charles Franklin
University of Wisconsin–Madison
Allan Gregory
Queen's University
James Hardin
University of South Carolina
Ben Jann
ETH Zürich, Switzerland
Stephen Jenkins
University of Essex
Ulrich Kohler
WZB, Berlin
Jens Lauritsen
Odense University Hospital

Stata Press Production Manager

Stata Press Copy Editor

Editor

Nicholas J. Cox
Department of Geography
Durham University
South Road
Durham City DH1 3LE UK
n.j.cox@stata-journal.com

Stanley Lemeshow
Ohio State University
J. Scott Long
Indiana University

Thomas Lumley
University of Washington–Seattle
Roger Newson
Imperial College, London
Marcello Pagano
Harvard School of Public Health
Sophia Rabe-Hesketh
University of California–Berkeley
J. Patrick Royston
MRC Clinical Trials Unit, London
Philip Ryan
University of Adelaide
Mark E. Schaffer
Heriot-Watt University, Edinburgh
Jeroen Weesie
Utrecht University
Nicholas J. G. Winter
University of Virginia
Jeffrey Wooldridge
Michigan State University

Lisa Gilmore
Deirdre Patterson

Copyright Statement: The Stata Journal and the contents of the supporting files (programs, datasets, and help files) are copyright © by StataCorp LP. The contents of the supporting files (programs, datasets, and help files) may be copied or reproduced by any means whatsoever, in whole or in part, as long as any copy or reproduction includes attribution to both (1) the author and (2) the Stata Journal.

The articles appearing in the Stata Journal may be copied or reproduced as printed copies, in whole or in part, as long as any copy or reproduction includes attribution to both (1) the author and (2) the Stata Journal.

Written permission must be obtained from StataCorp if you wish to make electronic copies of the insertions. This precludes placing electronic copies of the Stata Journal, in whole or in part, on publicly accessible web sites, fileservers, or other locations where the copy may be accessed by anyone other than the subscriber.

Users of any of the software, ideas, data, or other materials published in the Stata Journal or the supporting files understand that such use is made without warranty of any kind, by either the Stata Journal, the author, or StataCorp. In particular, there is no warranty of fitness of purpose or merchantability, nor for special, incidental, or consequential damages such as loss of profits. The purpose of the Stata Journal is to promote free communication among Stata users.

The *Stata Journal*, electronic version (ISSN 1536-8734) is a publication of Stata Press. Stata and Mata are registered trademarks of StataCorp LP.

Stata tip 55: Better axis labeling for time points and time intervals

Nicholas J. Cox
Department of Geography
Durham University
Durham City, UK
n.j.cox@durham.ac.uk

Plots of time-series data show time on one axis, usually the horizontal or x axis. Unless the number of time points is small, axis labels are usually given only for selected times. Users quickly find that Stata's default time axis labels are often not suitable for use in public. In fact, the most suitable labels may not correspond to *any* of the data points. This will arise when it is better to label longer time intervals, rather than any individual times in the dataset.

For example,

```
. webuse turksales
```

reads in 40 quarterly observations for 1990q1 to 1999q4 with a response variable of turkey sales. The default time axis labels with both `line sales t` and `tsline sales` are 1990q1, 1992q3, 1995q1, 1997q3, and 2000q1. These are not good choices for any purpose, even exploration of the data in private.

Label choice is partly a matter of taste, but you might well agree with Stata that labeling every time point would be busy and the result difficult to read. With 40 quarterly values, possible choices include one point per year (10 labels) and one point every other year (5 labels). One possibility is to label every fourth quarter, as that is usually the quarter with highest turkey sales. `summarize` reveals that the times range from 120 to 159 quarters (0 means the first quarter of 1960), so we can type

```
. line sales t, xlabel(123(4)159)
```

Note how we use a *numlist*, `123(4)159`, to avoid spelling out every value. The step length is 4 for four quarters. See [U] **11.1.8 numlist** or `help numlist` for more details of *numlists*. This graph too would need more work before publication, as the labels are still crowded. The text of the labels (e.g., 1990q4) may or may not be judged suitable, depending partly on the readership for the graph.

However, there is another choice: label time intervals (years) and mark the boundaries between those time intervals by ticks. Consider 1990. The four quarters in Stata's units are 120, 121, 122, and 123. Thus we could put text showing the year at a midpoint of 121.5 and ticks showing year boundaries at 119.5 and 123.5. For all years, we should use the *numlist* idea again with the following command to produce figure 1.

```
. line sales t, xtick(119.5(4)159.5, tlength(*1.5))  
> xlabel(121.5(4)157.5, noticks format(%tqCY)) xtitle("")
```

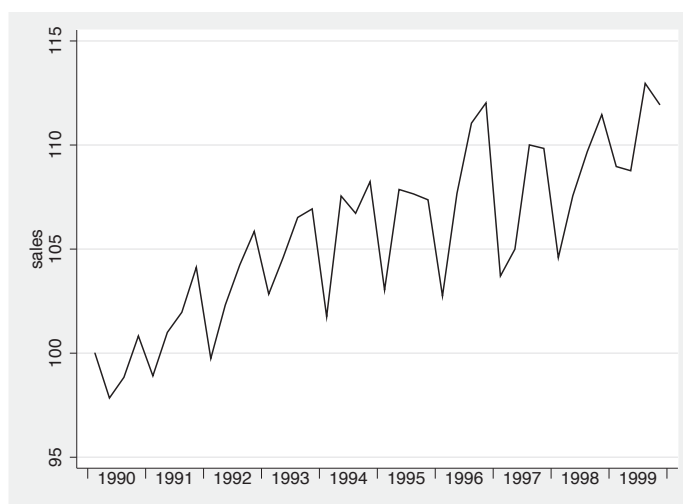


Figure 1: Turkey sales in each quarter. Time axis labels show years (with ticks suppressed) and time axis ticks show year ends.

The most important details here are suppressing the ticks for the axis labels and specifying a format for them. Cosmetic additions include lengthening the ticks compared with the default and suppressing the axis title, which would otherwise be the variable name `t` (or a variable label if it existed). It is usually clear from the labels what is being shown. Other possibilities include changing the text size for the axis label, changing the angle at which the axis label is shown, and suppressing the century by using a format like `%tqY`. Those may not be especially attractive, but nevertheless might be forced upon you by practicalities.

The main idea is clearly more general. The axis labels and the axis ticks need not correspond to each other, and it might be good to have fewer labels than ticks for longer series. Monthly and half-yearly data naturally yield to the same method, but use 12 or 2 and not 4 as the step length. Weekly and daily data are more awkward but still manageable.

If you were producing many similar graphs, you might want to automate this process to some degree. The mental arithmetic might easily be more challenging than in the turkey example. Let us imagine daily data for several years. Thus we could put ticks every January 1 and year labels every July 1. That will be adequate precision in practice. Find the first and last years in your data, if necessary by a command like `gen year = year(date)` followed by `summarize`. Suppose again that the years are 1990–1999. We can put the needed dates in local macros with a loop:

```
. forvalues y = 1990/1999 {
    local jan `jan' `=mdy(1,1,`y')'
    local jul `jul' `=mdy(7,1,`y')'
}
```

Each time around the loop the daily dates for January 1 and July 1 in each year are calculated on the fly with a call to the `mdy()` function and added to a macro. For more details, see [P] **forvalues** and [P] **macro**, the corresponding help files, or Cox (2002). Once done, the graph command is something like

```
. line whatever date, xlabel(`jul', format(%tdCY) noticks)
> xtick(`jan', tlength(*1.5))
```

A key requirement is that the local macros used in the graph command must be visible, by virtue of being in the same interactive session, do-file, or program. That is in essence what **local** means.

Calendar years, meaning here Western calendar years, are clearly not the only possibilities. You could use other boundaries and midpoints for years or other periods defined by other criteria (e.g., academic, financial, fiscal, hydrological, political, religious).

Reference

Cox, N. J. 2002. Speaking Stata: How to face lists with fortitude. *Stata Journal* 2: 202–222.