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THE STATA JOURNAL

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Reports and other PDF documents

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Abstract. Stata users often need to combine text, tables, and figures. The author’s command, `lpdf`, generates reports and other PDF documents. `lpdf` compiles text stored in global macros, tables stored as dataset tables or \LaTeX table input files, and figures stored as Stata graphs or PDF figure files. \LaTeX must be installed, but familiarity with \LaTeX is not necessary. `lpdf` performs every step through Stata and with Stata syntax. It generates documents in report or article style and portrait or landscape orientation. The default author name, document title, and date can be modified. Further format options include the font and margin sizes. For each table and figure, the width and layout can be adapted. Stata users with \LaTeX skills may benefit from additional possibilities. The `lpdf` ado-file includes two other useful commands called `latexize` and `latext`. `latexize` processes the content of string variables to properly type special characters and symbols in \LaTeX input files. `latext` modifies text stored in global macros in the same way.

Keywords: pr0056, `lpdf`, PDF, reports, documents, combine

1 Introduction

`lpdf` combines text, tables, and figures, as well as titles and footnotes, to create entire documents. The text, tables, and figures must be created beforehand by separate commands. For example, figures can be created by `histogram` and `scatter`, and tables can be created by `tabout` (Watson 2011) and `tdescribe` (currently under review). Paragraphs, titles, and footnotes must be written in a do-file. Once these commands have done their work, `lpdf` will search for the different parts, compile them, and format the final document.

`lpdf` is a Stata command that produces \LaTeX -based PDF files (Lamport 1994); a user does not need to know the \LaTeX syntax or how to open \LaTeX . Originally, I wrote `lpdf` to rapidly generate publication-quality reports from within Stata, but it can also generate other PDF documents. Stata users with advanced \LaTeX skills can further benefit from `lpdf` because fine tuning mature \LaTeX input files might be faster and less taxing than typing all mandatory \LaTeX commands from the beginning.

`lpdf` only needs to know which names to look for. Names of paragraphs, names of tables, and names of figures are typed in the selected order into the *namelist* of the `lpdf` command line. If there is ambiguity—for instance, `lpdf` searches for a specific name and finds a dataset table and a global macro—`lpdf` informs the user. It is not necessary

to type names of titles and footnotes because `lpdf` automatically verifies whether tables and figures have titles and footnotes (more details after the next paragraph).

Text can be stored as global macros. Characters with a special meaning in \LaTeX , such as `%` (this is similar in \LaTeX input files to `//` in Stata do-files), are automatically processed to be properly typed in the PDF document. However, global macros called `tex#` (for example, `global tex1`) are not processed; therefore, Stata users with \LaTeX skills can make full use of the \LaTeX syntax from within Stata.

Tables can be stored as dataset tables (Newson 2012) or \LaTeX table input files. In dataset tables, each column is a string variable, and the `varnames` of all columns belonging to the same table share a common and exclusive prefix: the table name (for example, `table1` includes the variables `table1a`, `table1b`, and `table1c`). Table titles must be stored as global macros named the same as the `table` prefix (for example, if the table is called `table1`, the title must be called `global table1`). Table footnotes must be stored likewise, using extensions from `_1` upward (for example, `global table1.1`, `global table1.2`, etc.).

Figures can be stored as Stata graphs or PDF figure files. Like tables, figure titles must be stored as global macros called by the figure name (for example, `global figure1`). Figure footnotes must be entered likewise, using extensions from `_1` upward (for example, `global figure1.1`, etc.).

Options allow changing the style and orientation, and modifying the title, names of the authors, and dates of the documents. Format options allow adapting the size of the font and the margins and the width and the layout of each figure and table. Further options allow replacing old files, keeping temporary files, and adding \LaTeX packages.

`lpdf`, like `frmtable` (Gallup 2012), can put premature table output into the right shape. Formatting tables is the unique purpose of `frmtable` but only an additional feature of `lpdf`. `lpdf` also combines building units of publication quality, such as tables generated by `tabout`. `frmtable` processes information stored as matrices, while `lpdf` orders and combines information stored as global macros, string variables, \LaTeX input files, Stata graphs, and other PDF files. However, `lpdf` can also work in combination with `frmtable`: information stored as a matrix can be formatted and stored as a \LaTeX input file with `frmtable` and then combined with text and figures with `lpdf`. Likewise, Results window output can be translated into a PDF by `translator(Results2pdf)` and then combined with other output by `lpdf`. However, the former examples will have much higher quality.

2 The `lpdf` command

2.1 Syntax

```
lpdf namelist using filename [ , article landscape title(string)
    authors(string) date(string) font(#) side(#) top(#) bottom(#) replace
    texkeep texreplace figkeep figreplace packages(string) ]
```

The width of tables and figures can be resized by adding `_mm#` at the end of their name in the *namelist* (for example, `pdf table1.mm150 using ...`). `#` corresponds to the new table or figure width in millimeters and can neither be below 20 nor be above the page width. In tables entered as L^AT_EX input files, the width must be defined within the file.

2.2 Options

`article` generates PDF documents in article style. The default generates PDF documents in report style.

`landscape` generates PDF documents in landscape orientation. The default generates PDF documents in portrait orientation.

`title(string)` replaces the title. The title defaults to the *filename*.

`authors(string)` replaces the author name. The author name defaults to the current computer user ID (`c(username)` in Stata).

`date(string)` replaces the date. The date in the title page defaults to the last date `lpdf` was run.

`font(#)` sets the font size to 10, 11, or 12. The default is `font(11)`.

`side(#)` adds or removes centimeters to the left and right margins. The default is `side(2)`. The width of tables and figures defaults to the text width.

`top(#)` adds or removes centimeters to the top margin. Margin values may range from `-2` to the middle of the page `-2`. Values are rounded to 1 millimeter.

`bottom(#)` adds or removes centimeters to the bottom margin. Margin values may range from `-2` to the middle of the page `-2`. Values are rounded to 1 millimeter.

`replace` allows the overwriting of existing PDF documents. A new L^AT_EX input file and new PDF figure files can only be kept if old files are absent or can be overwritten. However, if old files can be overwritten, new files are not automatically kept.

`texkeep` keeps the temporary L^AT_EX input file. This allows Stata users with L^AT_EX skills to further modify the document and speeds up the process if `lpdf` is rerun. The default generates the main PDF document. This process includes writing a temporary L^AT_EX input file. In addition, a separate temporary PDF figure file is generated from each Stata graph included in the main PDF document. Given that the original idea of `lpdf` is to perform each step automatically from within Stata, temporary files are erased at the end of the process. If the folder in which the main PDF document is being generated contains an equally named L^AT_EX input file, the already existing version of the L^AT_EX input file is used to generate the main PDF document rather than accidentally overwriting it. The same applies to Stata graphs that are already present as PDF versions.

`texreplace` allows the overwriting of a L^AT_EX input file, which is in the same folder and has the same name as the main PDF document generated.

`figkeep` keeps all temporary PDF figure files. This allows submitting figures as separate files, which is often required. It also speeds up the process if `lpdf` is rerun. Specifying `figkeep` without `figreplace` (or `texkeep` without `texreplace`) will not change anything for those files that have already been kept.

`figreplace` allows the overwriting of any PDF files that are in the same folder and have the same name as the Stata graphs to be included in the main PDF document. Specifying `figreplace` without `figkeep` (or `texreplace` without `texkeep`) may erase files after overwriting and using them.

`packages(string)` adds packages to those that are used by `lpdf`. By default, these are `{tabularx}`, `{array}`, `{graphicx}`, `[latin1]{inputenc}`, and `{calc}`. In addition, `packages()` includes any L^AT_EX command in the preamble. Nonpackage commands must be written out, whereas packages can be written as `[options]{package}` without needing to specify `\usepackage`.

2.3 Requirements

The `lpdf` package contains the `latexize` and `lertext` commands, which are necessary to run `lpdf`. These commands might also be useful in other situations. `latexize` converts special characters of string variables, such as #, \$, or %, in a way that they are properly printed by L^AT_EX. `lertext` does the same but for text stored in global macros instead of string variables.

External Stata commands required to run `lpdf` are the `texdoc` command (Jann 2009), the `listtab` command (Newson 2009), and the `sjlatex` package from the *Stata Journal*. L^AT_EX for Windows can be downloaded from <http://www.miktex.org>. L^AT_EX for Mac operating system can be downloaded from <http://www.tug.org/mactex>. `lpdf` requires Stata 11.2 or later.

2.4 Syntax of latexize and lertext

```
latexize varlist [if] [in]
```

```
lertext namelist [if] [in]
```

3 Main example

This example shows how to generate an interim recruitment report. Steps 1 to 5 must be performed with commands different from `lpdf`. `lpdf` performs the final step, which is ordering and combining the separate building units to an entire document and formatting it to one of publication quality.

3.1 Step 1—Store the text of the document in global macros

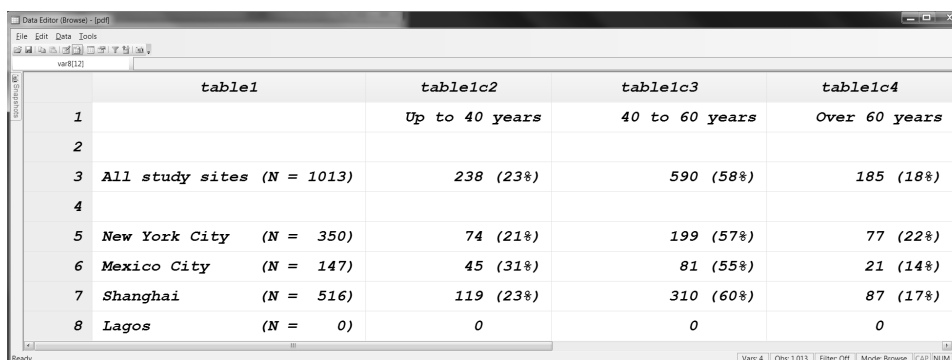
Syntax:

```
. global t1 "This interim recruitment report includes the period from the 1st
> January 2012 to the 31st March 2012. During this period, 1,013 participants
> have been recruited. Lagos is not yet recruiting."
. global t2 " "
```

Note that the global macro `t2` will add a vertical space. If more vertical spaces were needed, `t2` could be included several times in the *namelist* of `lpdf` (please see the last step).

3.2 Step 2—Prepare the tables of the document in the dataset

The following tables have been prepared as string variables in the Stata dataset in Newson (2012):



	<i>table1</i>	<i>table1c2</i>	<i>table1c3</i>	<i>table1c4</i>
1		<i>Up to 40 years</i>	<i>40 to 60 years</i>	<i>Over 60 years</i>
2				
3	<i>All study sites (N = 1013)</i>	<i>238 (23%)</i>	<i>590 (58%)</i>	<i>185 (18%)</i>
4				
5	<i>New York City (N = 350)</i>	<i>74 (21%)</i>	<i>199 (57%)</i>	<i>77 (22%)</i>
6	<i>Mexico City (N = 147)</i>	<i>45 (31%)</i>	<i>81 (55%)</i>	<i>21 (14%)</i>
7	<i>Shanghai (N = 516)</i>	<i>119 (23%)</i>	<i>310 (60%)</i>	<i>87 (17%)</i>
8	<i>Lagos (N = 0)</i>	<i>0</i>	<i>0</i>	<i>0</i>

	<i>table2</i>	<i>table2c2</i>	<i>table2c3</i>
1		<i>Females</i>	<i>Males</i>
2			
3	<i>All study sites</i>	507 (50%)	506 (50%)
4			
5	<i>New York City</i>	173 (49%)	177 (51%)
6	<i>Mexico City</i>	67 (46%)	80 (54%)
7	<i>Shanghai</i>	267 (52%)	249 (48%)
8	<i>Lagos</i>	0	0

Note that both tables are stored in the same dataset. However, `lpdf` will distinguish between `table1` and `table2` because the *varnames* of `table1` all have a prefix of `table1`, whereas the variables of `table2` all have a prefix of `table2`.

The tables used in this example were generated with `tdescribe`, a command that is currently under review.

3.3 Step 3—Store the titles and footnotes of the tables in global macros

Syntax:

```
. global table1 "Participants by study site and age group"
. global table1_1 "The denominator is the total per study site."
. global table1_2 "There are no participants with missing age."
. global table2 "Participants by study site and gender"
. global table2_1 "$table1_2"
. global table2_2 "There are no participants with missing gender."
```

Note that these macros are named with the table name plus the extension `_#`, where `#` stands for a positive integer. This allows `lpdf` to recognize the content as the titles and footnotes of the tables.

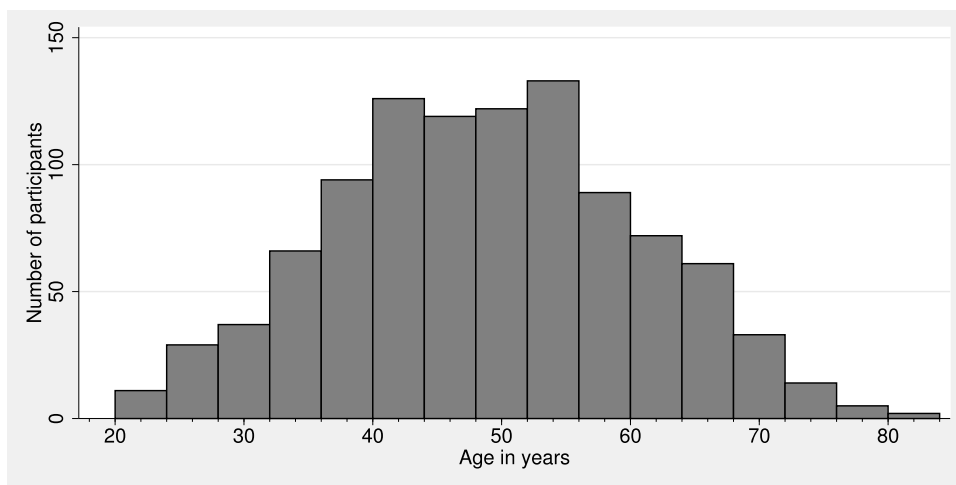
3.4 Step 4—Save the figure of the document

Syntax:

```
. graph save figure1.gph
```

The histogram used in this example was generated with `histogram`, a basic Stata command.

Note that the figure must be saved in the same folder in which the PDF document is generated.



3.5 Step 5—Store the titles and footnotes of the figure in global macros

Syntax:

```
. global figure1 "Number of participants by age in years"  
. global figure1.1 "$table1.3"
```

Note that these macros are named with the figure name plus the extension `._#`. This allows `lpdf` to recognize the content as the title and footnote of the figure.

3.6 Last step—Generate the document

Syntax:

```
. lpdf t1 t2 table1 table2_mm120 figure1 using example,  
> title(Querim Study - 1st quarter recruitment report)  
> authors(Dr. R. Student) date(April 5, 2012) side(0.3)
```

Note that `table2` is entered with an `_mm120` extension to reduce its width to 120 millimeters.

The margin is enlarged by 0.3 centimeters on both sides of the document.

3.7 Result

The Results window output of `lpdf` is

```
. lpdf t1 t2 table1 table2_mm120 figure1 using example,  
> title(Querim Study - 1st quarter recruitment report) authors(Dr. R. Student)  
> date(April 5, 2012) side(0.3)  
    ... including `table1` ...  
    ... including `table2` ...  
    ... creating `figure1` pdf figure file ...  
pdf written to example.pdf
```

The PDF document is displayed on the next two pages.

Querim Study - 1st Quarter Recruitment Report

Dr. R. Student

April 5, 2012

This interim recruitment report includes the period from the 1st January 2012 to the 31st March 2012. During this period, 1,013 participants have been recruited. Lagos is not yet recruiting.

Table 1: Participants by study site and age group

	Up to 40 years	40 to 60 years	Over 60 years
All study sites	238 (23%)	590 (58%)	185 (18%)
New York City	74 (21%)	199 (57%)	77 (22%)
Mexico City	45 (31%)	81 (55%)	21 (14%)
Shanghai	119 (23%)	310 (60%)	87 (17%)
Lagos	0	0	0

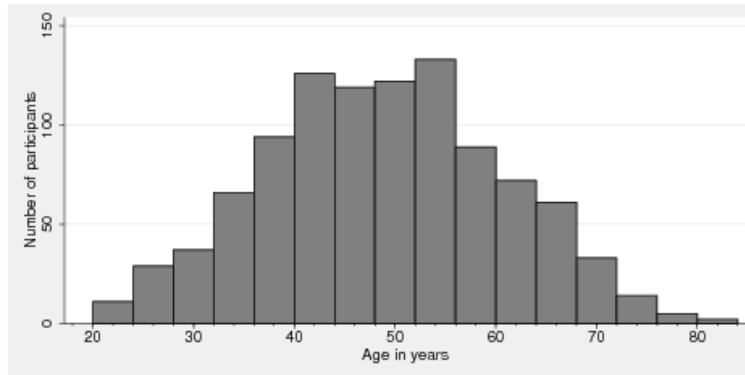
The denominator is the total per study site.
There are no participants with missing age.

Table 2: Participants by study site and gender

	Females	Males
All study sites	507 (50%)	506 (50%)
New York City	173 (49%)	177 (51%)
Mexico City	67 (46%)	80 (54%)
Shanghai	267 (52%)	249 (48%)
Lagos	0	0

The denominator is the total per study site.
There are no participants with missing gender.

Figure 1: Number of participants by age in years



There are no participants with missing age.

4 Additional possibilities requiring L^AT_EX knowledge

The primary idea of `lpdf` is to allow Stata users to generate PDF documents without having to learn L^AT_EX. For this reason, global macros included in the document are processed with the `lATEX` command, thereby ensuring that the users do not have to bother about characters that initiate or end L^AT_EX commands or that have other particular functions in L^AT_EX. The inconvenience is that global macros processed with the `lATEX` command can only store plain text.

The secondary idea is to combine the virtues of `texdoc` (Jann 2009) and `listtab` (Newson 2009) to more rapidly generate PDF documents while still allowing refinement. For this reason, global macros called `tex#` (for example, `global tex1`) are not processed with `lATEX`. Although a command working without knowledge of L^AT_EX but offering additional possibilities with L^AT_EX might help users become familiar with L^AT_EX, it is beyond the scope of this article to provide a full list of possibilities available in the latter case. The following examples may help Stata users not yet familiar with L^AT_EX:

- To start a new page, type `global tex1 "\clearpage"`.
- To start displaying text in bold, type `global tex2 "\begin{bfseries}"`.
- To end displaying text in bold, type `global tex3 "\end{bfseries}"`.
- To start and end displaying text in italics, type `global tex4 "\begin{itshape}"` and `global tex5 "\end{itshape}"`.
- To start and end displaying larger text, type `global tex6 "\begin{large}"` and `global tex7 "\end{large}"`.

Note that the global macros `tex1` to `tex7` can be included multiple times in the *namelist* of `lpdf`, thereby ensuring that any command must be defined only once.

5 Formatting dataset tables without L^AT_EX syntax

All formatting in the following examples is performed on the tables of the main example (section 3). Once the different building units have been generated (steps 1 to 5 of the main example), one of the following formatting examples can be run before performing the final step (final step of the main example). The result is the same document as in the main example, but with differently formatted tables. For the sake of space, I show only the tables in the following examples.

5.1 Example 1—Removing the frame from table1

Purpose and explanation:

If the last column of a table is equal to "" or "-", the frame of the table is removed.

Syntax: `generate table1x = ""`

	Up to 40 years	40 to 60 years	Over 60 years
All study sites	238 (23%)	590 (58%)	185 (18%)
New York City	74 (21%)	199 (57%)	77 (22%)
Mexico City	45 (31%)	81 (55%)	21 (14%)
Shanghai	119 (23%)	310 (60%)	87 (17%)
Lagos	0	0	0

5.2 Example 2—Example 1 with addition of a horizontal line under the third row of table1

Purpose and explanation:

If the last column is equal to "" or "-", a horizontal line is added below each row with "-".

Syntax: `generate table1x = "-" in 3`

	Up to 40 years	40 to 60 years	Over 60 years
All study sites	238 (23%)	590 (58%)	185 (18%)
New York City	74 (21%)	199 (57%)	77 (22%)
Mexico City	45 (31%)	81 (55%)	21 (14%)
Shanghai	119 (23%)	310 (60%)	87 (17%)
Lagos	0	0	0

5.3 Example 3—Example 2 with addition of a vertical line after the first column of table1

Purpose and explanation:

If the last row is equal to "" or "|", a horizontal line is added after each column with "|".

Syntax: `generate table1x = "_" in 3`
`replace table1 = "|" in 9`

	Up to 40 years	40 to 60 years	Over 60 years
All study sites	238 (23%)	590 (58%)	185 (18%)
New York City	74 (21%)	199 (57%)	77 (22%)
Mexico City	45 (31%)	81 (55%)	21 (14%)
Shanghai	119 (23%)	310 (60%)	87 (17%)
Lagos	0	0	0

5.4 Example 4—Example 3 without removing the frame

Purpose and explanation:

A "+" in the cell crossing the last column and the last row reinserts the lines at the top and the left of the table.

A "|" in this cell would only reinsert the line at the left of the table (not shown).

A "-" in this cell would only reinsert the line at the top of the table (not shown).

Syntax: `generate table1x = "_" if _n==3 | _n==8`
`replace table1 = "|" in 9`
`replace table1c4 = "|" in 9`
`replace table1x = "+" in 9`

	Up to 40 years	40 to 60 years	Over 60 years
All study sites	238 (23%)	590 (58%)	185 (18%)
New York City	74 (21%)	199 (57%)	77 (22%)
Mexico City	45 (31%)	81 (55%)	21 (14%)
Shanghai	119 (23%)	310 (60%)	87 (17%)
Lagos	0	0	0

5.5 Example 5—Displaying table1 in a roman font

Purpose and explanation:

If the column widths are not consistent, no typewriter font is used for summary measures, because proper alignment of digits is no longer assumed.

```
Syntax:  foreach a of varlist table1* {
          replace 'a' = trim(itrim('a')) if trim(itrim('a'))!="
        }
```

	Up to 40 years	40 to 60 years	Over 60 years
All study sites	238 (23%)	590 (58%)	185 (18%)
New York City	74 (21%)	199 (57%)	77 (22%)
Mexico City	45 (31%)	81 (55%)	21 (14%)
Shanghai	119 (23%)	310 (60%)	87 (17%)
Lagos	0	0	0

5.6 Example 6—Centering the first column of table1

Purpose and explanation:

If the first dataset column is equal to "", the first displayed column is treated as a summary measure column instead of a heading column.

```
Syntax:  generate table1x = ""
          order table1x, before(table1)
```

	Up to 40 years	40 to 60 years	Over 60 years
All study sites	238 (23%)	590 (58%)	185 (18%)
New York City	74 (21%)	199 (57%)	77 (22%)
Mexico City	45 (31%)	81 (55%)	21 (14%)
Shanghai	119 (23%)	310 (60%)	87 (17%)
Lagos	0	0	0

5.7 Example 7—Resizing the width of the footnote of table2

Purpose and explanation:

If the name of a global macro is equal to a table name followed by an underscore and the content of this macro is a number, this number is interpreted by `lpdf` as the size of the footnote of the table in millimeters.

Syntax: `global table2_ = 4`

	Females	Males	
All study sites	507 (50%)	506 (50%)	The denominator is the total per study site. There are no participants with missing gender.
New York City	173 (49%)	177 (51%)	
Mexico City	67 (46%)	80 (54%)	
Shanghai	267 (52%)	249 (48%)	
Lagos	0	0	

The footnote, now forty millimeters wide, appears to the right of the table.

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7 References

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