Using LaTeX in reports at Grattan

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Contents

Interpreting code examples

Example code are written using a listing:

```
LaTeX code with some \markup.
\begin{environment}

\end{environment}
```

or inline: `\TeX{}`.

Code examples can be, for want of better terms, *complete* or *illustrative*. **Complete** code means the code should be copied-and-pasted directly into the input file without modification, whereas **illustrative** code should be modified based on the desired output. For example, if an author wishes to increase the gap between columns in the overview by 2 mm, the code excerpt is complete. The author should copy and paste the following, placing it before `\begin{overview}`:

```
\newlength{\overviewextra}
\setlength{\overviewextra}{2mm}
\addtolength{\columnsep}{\overviewextra}
```

Whereas an illustrative version of the following, where the author is offered a choice for the gap between columns, the option is coloured violet, slanted, and delimited with chevrons:

```
\newlength{\overviewextra}
\setlength{\overviewextra}{<extra column width>}
\addtolength{\columnsep}{\overviewextra}
```

Coloured text is simply syntax highlighting and has no special meaning. All TEX documents are written in plain text (although your text editor/IDE may offer or display similar syntax highlighting).

1 Some principles for erstwhile MS Word users

Learning LaTeX as an MS Word user is a frustrating, confusing, rewarding, and ecstatic experience. There are some principles that are inviolate for novices.

1. Don't worry about the appearance of your document as your write. Write what you mean. MS Word is a What You See Is What You Get editor. LaTeX is a What You See Is What You *Mean*.

2. LaTeX takes an author's input and sets out the document's appearance using the author's raw input, the author's advice about how the document should look, and a set of parameters and algorithms that govern tradeoffs concerning document appearance.

3. The `grattan.cls` template is designed so that authors do not have to make any layout or typographic decisions.

4. LaTeX is a butler, not a robot. It may not do exactly as you say, but it will do what you mean. When it doesn't, it either means
   - You given it a nonsensical instruction
   - Your instruction contradicts another instruction
   - Your instruction contravenes good typographic design, as it sees fit

5. LaTeX is a butler, not a slave: it is a partner in document preparation. In general, your responsibilities should not overlap: you decide the content and it decides the form. Where your responsibilities do overlap, you should seek to *advise* LaTeX, not to *order* it. Further, you should be as gentle as possible with your advice. Only forcefully advise when the document will not require amendments and you are sure LaTeX is wrong.

6. Don't manually position figures, tables, or boxes. Let them float in the document. It is nearly certain that the initial placement will be odd. As long you have used a `figure`, `table` or `*box` environment, they will float into good positions. For errant figures, tables, or boxes, wait until the document is completely finished before advising positions.

7. Don't do any of the following:
   a) Insert horizontal or vertical whitespace, including manual line-breaks (except in tables)
   b) page- or column-breaking

8. Do not ignore errors (*i.e.* things that prevent compilation). Any errors which you can't resolve in less than 60 seconds should be referred to Cameron Chisholm or Hugh Parsonage. Preferably attach what you think caused the error.

9. Take note of warnings from time to time. Warnings relating to bibliographies should be fixed immediately. Other warnings are typically just hints that manual intervention may improve the layout – resolving them can be deferred.

10. Beware special characters.

When you want this …	… type this.
$	\$
%	\%
“	`` (button above Tab)
”	''
– (en-dash)	--
— (em-dash)	---

11. The grattan class file assumes your input is encoded in `utf8`. Avoid copying from MS Word to `.tex` files. Otherwise, special characters above will creep in silently. If you must, use `pandoc`.

12. Use `%` for comments.

2 Basics of LaTeX

2.1 Compilation

The process of LaTeX is basically:

1. Start with a plain text file with the file extension `.tex` in a directory/folder
2. Run the `pdflatex` program on that file. That is, type

```
cd path/to/your/directory
```

and then

```
pdflatex file.tex
```

in cmd (Windows) or Terminal (Linux or Mac).

3. The program returns a pdf file or an error.

2.2 Commands and environments

2.2.1 Commands

A **command** starts with a backslash \ followed by one or more charaters. A command may have zero or more mandatory arguments and zero or more optional arguments. For example:

Table 1: Examples of commands and their arguments

Command	Arguments	Description
`\$`	0 mandatory 0 optional	Prints the $ sign
`\textbf`	1 mandatory 0 optional	Prints its argument in boldface.
`\\`	0 mandatory 1 optional	Forces a linebreak, with optional extra space
`\footcite`	1 mandatory 2 optional	Cites its mandatory argument, with optional pre- or post-notes (such as page numbers)
`\footcites`	n mandatory $2n + 2$ optional	Multiple footcites

2.2.2 Environments

An **environment** looks like

```
\begin{environment}
 ...
\end{environment}
```

It may have mandatory or optional arguments, which occur immediately after `\begin{environment}`.

Table 2: Examples of environments

Environment	Arguments	Description
`document`	none	The contents of the document.
`figure`	1 optional	Creates a section of a document which "floats" above the body of the text. Captions and cross-reference labels within a `figure` environment will refer to the figure. The optional argument restricts the placement of the figure on the page.
`quote`	none	Used to designate a long quote with additional margin.
`smallbox`	2 mandatory, 1 optional	Creates a box, limited to one column. The first argument is optional and specifies the position of the box. The second argument is mandatory and specifies the title of the box, the third argument is also mandatory and specifies the cross-reference label of the box.

3 Writing a report

3.1 The preamble

The **preamble** is everything outside the `document` environment. (*i.e.* everything after `\begin{document}`.

In every LaTeX document, you must have

1. The *command* `\documentclass` and a valid document class. In our case, use

   ```
   \documentclass{grattan}
   ```

2. A `document` environment.

That is, every LaTeX document must have the following three lines.

```
\documentclass{<style>}

```

```
\begin{document}

\end{document}
```

3.1.1 Grattan-specific preamble

The grattan package will not compile without additional lines of code. Your preamble must have the following lines.

```
\documentclass{grattan}

\title{<Title of the report>}
\author{<Authors>}

\addbibresource{bibliography.bib}
```

3.1.2 Other requirements

The .tex file must be in a directory containing:

1. The grattan.cls file, which creates the document according to the Grattan template.
2. The bibliography.bib file, containing your bibliography database.
3. The folder FrontPage which must contain:
   a) A file FrontPagePicture
4. The folder logos which must contain:

```
aus-gov-logo-stacked-black-eps-converted-to.pdf
aus-gov-logo-stacked-black.eps
Bhp.pdf
TMF_logo_black.eps
TMF_logo_green-eps-converted-to.pdf
TMF_logo_green.eps
UOM-Pos3D_S_Sm.jpg
UOM-Pos_S_PMS-eps-converted-to.pdf
UOM-Pos_S_PMS.eps
UOM-Rev_H_PMS-eps-converted-to.pdf
UOM-Rev_H_PMS.eps
UOM-Rev_S_PMS-eps-converted-to.pdf
UOM-Rev_S_PMS.eps
Vic_Gov_Logo-eps-converted-to.pdf
Vic_Gov_Logo.eps
```

3.2 Frontmatter

3.2.1 Overview / Summary / Preface

Use

```
\begin{overview}[-35pt]
 ...
\end{overview}
```

for your overview. The `[-35pt]` is a fudge factor that adjusts the position of the title to vertically balance the overview on the page. It may be abolished in future versions.

You can also use `\begin{summary}` as required. If you want to change the name of the frontmatter, ask us — it is straight-forward to amend.

3.2.2 Contents page(s)

Write

```
\contentspage
```

After the `overview` environment. This produces a list of figures and a list of boxes. If you don't want some of these lists, again, ask us — it is straight-forward to omit, but it is a matter for the class file maintainer.

3.3 Body text

3.3.1 Sectioning

To start a new chapter, write

```
\chapter{<chapter title>}
```

Similarly,

```
\section{<section title>}
\subsection{<subsection title>}
\subsubsection{<subsubsection title>}
```

Title commands increment as expected, except for `\subsubsection` which has no counter.

To start an appendix, type .

```
\appendix
```

to mark the end of the main matter and the start of the appendices. Then use `\chapter{<appendix title>}` to title the appendices.

For example:

```
\documentclass{grattan}

\title{Brief report}
\author{Me}

\begin{document}

\begin{overview}
In this report, we found all is well.
\end{overview}
\contentspage
\chapter{Australia is fine}
Australia is fine.
\section{How do we know this}
Grattan analysis of ABS (2016).
\subsection{Limitations of analysis}
Our analysis is wrong.

\chapter{Options for reform}
Tidy desk.
\appendix
\chapter{International comparisons}
\end{document}
```

3.4 Boldface, italics

In general, you should write what you *mean*, not what you want displayed. So avoid directly instructing LaTeX to bold or italicize test. Instead, write macros explaining *why* you are using a different font.

That said, you can use `\textbf{<text>}` to make `text` boldface and `\textit{<text>}` to make `text` italic. You can also use `\emph` to *emphasize* text.

3.5 Paragraphs

Use a blank line to mark a new paragraph. Thus

```
A well-designed GST reform package could support economic
    growth, make the tax and transfer system more progressive
    and give state and Commonwealth governments more budgetary
     options.

Proposals to extend or broaden Australia's 10 per cent goods
    and services tax (GST) have been perennial. Current
    governments face many challenges, such as funding growing
    healthcare costs, reducing deficits, and cutting
    inefficient taxes. A higher GST could fund any of these
    initiatives -- although perhaps not all of them.
```

3.6 Numbered / bulleted lists

Use `enumerate` and `itemize`

```
\begin{enumerate}
 \item First numbered item
 \item Second numbered item
 \begin{enumerate}
  \item First item in a nested list
 \end{enumerate}
 \item Third numbered item
\end{enumerate}

\begin{itemize}
  \item First bulleted item
  \item Second bulleted item
  \begin{itemize}
   \item First nested bulleted item.
  \end{itemize}
\end{itemize}
```

3.7 Floats

3.7.1 Figures

Before you insert a figure, you need to create your image. This can either be done directly through a scripting language (like R or python), through LaTeX directly (as through Ti*k*Z), or through an external program. Your file should be a pdf, though almost all image types are supported. If you are going through an external program, ensure the file is moved to the atlas directory of your report. This directory should be placed in the same directory as your `.tex` file. The directory should be called something evocative, like `figure`, as it is in this manual.

Once the image is ready, use the following structure to insert a figure.

```
\begin{figure}
 \Caption{<main caption>}%
 {<secondary caption/y-axis label>}{<cross-reference key>}
 \includegraphics[width=\columnwidth]{figure/image-filename}
 \notes{<Notes of the chart>}

 \source{<Source information>}
\end{figure}
```

3.7.2 Tables

Tables are tricky in LaTeX. Use the `tabularx` environment for a table with a specific width. Let `\columnwidth` be the table's width.

```
\begin{tabularx}{\columnwidth}{<alignment parameters>}
 \toprule
 Header1 & Header2 & Header3 \\
 \midrule
 First row & First row & First row \\
 Second row & Second row & Second row \\
 ...
 Last row & Last row & Last row
 \bottomrule
\end{tabularx}
```

The `<alignment parameters>` determine the alignment of the columns, `l` for left-aligned, `c` for centre-aligned, `r` for right-aligned. Others are available. Use the double-backslash `\\` to move to the next row and the ampersand `&` to move to the next column. Use `\toprule` before the first row, `\bottomrule` after the last row, and `\midrule` to separate the headers from the rest of the table.

More advanced

`\cmidrule(lr){<m-n>}`	to denote a horizontal rule between the mth and nth columns. The `(lr)` specifies that the horizontal rule should stop just short of the edges of the columns, to ensure adjacent `\cmidrules` have a visual breath between them.
`\multicolumn{<n>}{<al.>}{<text>}`	Puts the `<text>` in a 'merged' cell from the current cell across nth columns with horizontal alignment `<al.>`

```
\newcommand{\tblHead}[2][c]{\bfseries\begin{tabular}[#1]{@{}
    l@{}}#2\end{tabular}}
\newcommand{\tblHeadR}[2][c]{\bfseries\begin{tabular}[#1]{@
    {}>{\raggedleft}p{\linewidth}@{}}#2\end{tabular}}

\begin{table}
\caption{Budgetary impact of income tax rate changes}\label{
    tbl:tax_cuts}
\begin{tabularx}{\columnwidth}{lr>{\raggedleft
    \arraybackslash}X}
\toprule
\tblHead{Tax bracket} & \tblHead{Current tax rate} &
    \tblHeadR{Budgetary impact of 1 percentage point change
    (2015-16)}\\
\midrule
\$0-\$18,200 & 0\% & \\
\$18,201 - \$37,000 & 19\% & \$1.9\\
\$37,001 - \$80,000 & 32.5\% & \$2.3\\
\$80,001 - \$180,000& 37\% & \$1.3\\
\$180,001 + & 45\% & \$0.7\\
\bottomrule
\end{tabularx}

\notes{Excludes Temporary Budget Repair Levy (2\%\ for those
     earning over \$180,000 until 2016-17)}

\source{Grattan analysis ATO 2\%\ sample file (2013). See
    \url{https://grattan.shinyapps.io/Changing_income_taxes/
    Forty_three_app.Rmd}}
\end{table}
```

3.8 Boxes

3.8.1 smallbox

Use \begin{smallbox} to insert a box intended to fit on one column. There are two mandatory arguments.

```
\begin{smallbox}{<title of the box>}{box:<cross-ref key>}
 <contents of the box>
\end{smallbox}
```

3.8.2 bigbox*

Use `\begin{bigbox*}` to denote a big box.[1] The text will flow around the box.

When you have a figure in a big box, you must use

```
\begin{figure}[H]
 ...
\end{figure}
```

to insert a figure.

Note the `[H]` which specifies that the figure is to be placed here (or rather, *HERE!*).

3.9 Footnotes and referencing

Use the command `\footnote` to mark a footnote. Use `\textcite` within a footnote.

3.9.1 `bibliography.bib`

The `bibliography.bib` file is a plain text containing the bibliography databases. The database contains several lines for each entry:

```
@type{<key>,
 author={<author name>},
 title={<title>},
 year={<year>}
}
```

There are several elements to a bibliography:

`@type` This specifies the type of reference, such as an article, report, book.

`<key>` This is a string of text or numbers (no spaces or special characters) which represent the *key* which is referenced in the text (as I will show below).

`author=<author name>` each of these lines designate the fields of the reference

3.9.2 Citations

Use `\footcite{key}` to cite an entry in the database. The citation will appear in a footnote. Use `\footcite{key1}{key2}` to cite multiple entries in the same footnote.

[1] The * reflects a convention in LaTeX for a two-column float in an environment name.

Use `\footcite[][18--24]{<key>}` to add a page reference (in this case, pages 18–24) as a postnote the citation.

Use `\textcite{<key>}` to cite a key if you don't want in a footnote. Similarly `\textcites` and `\textcite[][18--24]{key}` as with footcite.

4 More advanced macros

4.1 New commands

Use `\newcommand` to create a new command.

```
\newcommand{<command name>}{<what the command does>}
\newcommand{<command name>}[number of arguments]{<what the
    command does as a function of #>}
```

For example,

```
\newcommand{\eg}{\emph{e.g.}}
```

Creates a newcommand `\eg` which prints *e.g.* when it is called. Another one I often use is:

```
\newcommand{\gao}{Grattan analysis of}
```

Slightly more advanced is

```
\newcommand{\defi}[1]{\textbf{#1}\index{#1}}
```

This makes the argument of `\defi` bold and places it in the index.

5 Compiling a final document

5.1 Citations and references

1. If your file is called `YourReport.tex`

   ```
   texify --pdf --clean YourReport.tex
   ```

2. Update bibliography

   ```
   biber YourReport
   ```

   Note that you should not provide the extension for `biber`.

3. Re-run:

   ```
   texify --pdf --clean YourReport.tex
   ```

6 Known bugs in the `grattan.cls` file

6.1 Big boxes

6.1.1 Caption baseline does not match matching column baseline

Solved: http://tex.stackexchange.com/questions/305450/align-caption-baseline-in-second

6.2 Footnotes in big boxes extend across the entire page

7 pdflink errors

Use `\nocite{*}` and delete all auxiliary files to escape the error.

Part I.
Notes for the typesetter

8 Moving floats

1. If the author would prefer a float (figure, table, or box) to be placed in a different location in the document, you as the typesetter must first understand why the output routine has placed the figure where it has.
2. If it is clear that the output routine has averted a substantial typographic sin by placing the figure there, the author should be told of this.
3. Otherwise, the first step is to move the errant float forward or backward one or two paragraphs as required, noting that the order in which floats of the same type (*e.g.* figure) occur in the source file is preserved in the final document.
4. Next consider, in the following order:
   a) providing the options `[htb]` as required to the float environment
   b) providing the same options to the errant float's predecessor
   c) providing the same options to both the errant float and its predecessor
5. At this point, if the figure remains steadfast, you have encountered a very unusual situtation, and I would encourage you to accept the result.
6. Otherwise: you should consider rewording captions or the surrounding text.
7. Next consider the use of `\FloatBarrier`

8. Then consider the option `!`.
9. As an emergency measure, you can manually place the figure using the option `H`.
10. As a last resort, consider using primitive TEX to manually place the figure with respect to the page. This should be the very last step in a publication.

9 Bad page break

Consider using:

1. `\pagebreak[0]` at a good/better place for line breaking:
2. `\enlargethispage{<n>\baselineskip}` or `\enlargethispage*{<n>\baselineskip}` where n is an integer multiple of $1/4$.

10 Excessive whitespace between paragraphs

This occurs

1. Reposition floats if useful.
2. Use `\oneraggedpage`:

```
% one page ragged bottom
\makeatletter
\newcommand{\oneraggedpage}{\let\mytextbottom\@textbottom
  \let\mytexttop\@texttop
  \raggedbottom
  \afterpage{%
  \global\let\@textbottom\mytextbottom
  \global\let\@texttop\mytexttop}}
```

3. Finally, use `\raggedbottom` on the entire document. Review.