

R, Sweave and Beamer

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Downloading packages

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- R is found here:
`http://cran.parentingamerica.com`
- For Windows, find either TeX Live or MiKTeX here:
`http://www.tug.org/texlive/acquire-netinstall.html`
`http://miktex.org/download`
- For Mac OSX, find MacTex here:
`http://tug.org/mactex/`
- Beamer should already be preloaded. If not it may be found here:
`https://bitbucket.org/rivanvx/beamer/wiki/Home`

See the following resources for introductory tutorials and examples for Beamer:

- <http://www.math.umbc.edu/~rouben/beamer/>
- http://www.informatik.uni-freiburg.de/~frank/ENG/latex-course/latex-course-3/latex-course-3_en.html
- <http://users.stat.umn.edu/~sandy/courses/8801/handouts/03.Beamer/beamer.pdf>
- <http://www.wekaleamstudios.co.uk/supplementary-material/>

Section 1

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The Ggplot2 package

Ggplot2

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Data

I am using CANSIM 202-0802 data to produce these graphs
in R version 3.0.1

Find the data here:

[http://www.statcan.gc.ca/tables-tableaux/
sum-som/101/cst01/famil41a-eng.htm](http://www.statcan.gc.ca/tables-tableaux/sum-som/101/cst01/famil41a-eng.htm)

Example 1, Line graph

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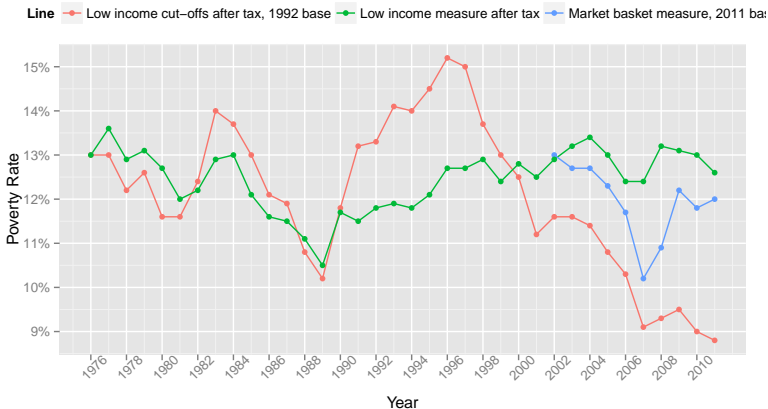
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Canadian Poverty Measures



Example 2, Boxplots

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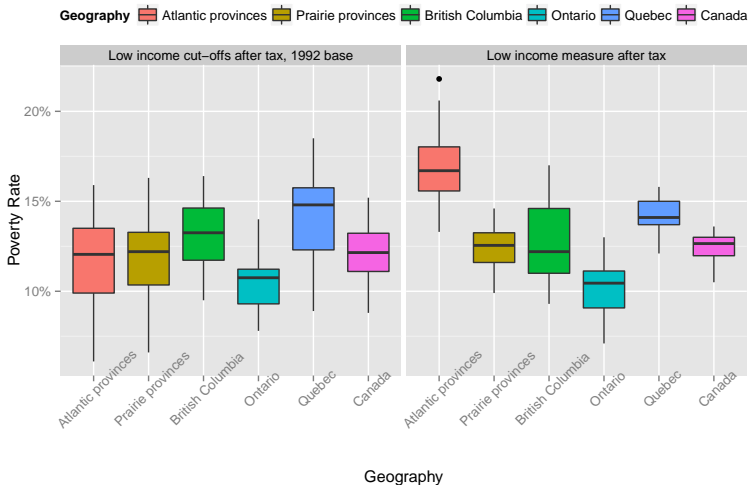
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Poverty variance across broader geography



Example 3 Pie Charts

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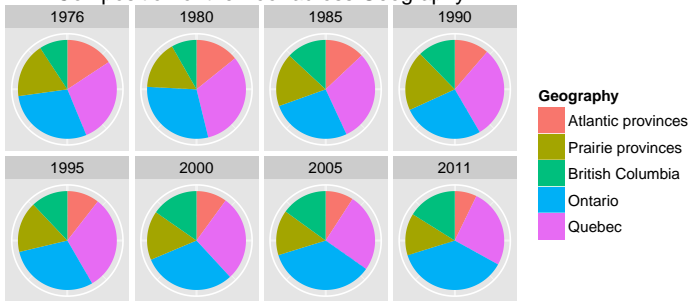
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Composition of the Poor across Geography



GGplot code

All these plots start with the same code

```
ggplot (data=DATA, aes (x=X, y=Y, fill=FILL,  
                           colour=COLOUR))
```

- DATA = self explanatory, our dataframe
- X = What we want to plot on the x-axis
- Y = What we want to plot on the y-axis
- FILL = For our 3rd variable to create sections/bins ontop of the x and y axes.
- COLOUR = Similar to FILL, it is created to map a third variable onto the plot.
- Notice, this alone is not sufficient to create a plot. We have specified the parameters, but now must specify what type of plot we want

Geom code

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Geom line, Geom boxplot, Geom point, Geom bar

Here we pick which plots we want to use. Many arguments within the geom functions are very similar to the ones in the ggplot argument. Notice, if you have correctly specified your x, y and the third variable, you can leave `geom_()` blank

- `geom_line()` : Line graph
- `geom_boxplot()` : Side-by-side boxplots
- `geom_bar(stat='identity')` : Bar charts/histogram
- `geom_area()` : Area plot

Miscellaneous code

Now with our plots we can tidy up the labels, axes, scales and legends

Inputs	Explanation
• <code>ylab</code>	• Title for y-axis
• <code>xlab</code>	• Title for x-axis
• <code>ggtitle</code>	• Main Title
• <code>guides</code>	• Controls legend
• <code>theme</code>	• Remove or angle ticks
• <code>scale_y_continuous</code>	• Control y-axis breaks and ticks
• <code>scale_x_discrete</code>	• Control x-axis breaks and ticks

Example output

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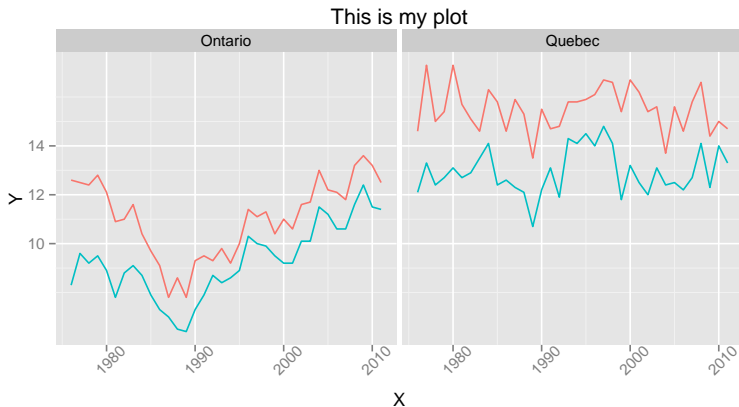
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Example code explanation

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From our dataset *DATA*, we graph the variable *Year* on the x-axis and the variable *Value* on the y-axis. We assign a separate color for every factor level of the variable *Population*.

```
ggplot (data=DATA, aes (x=Year, y=Value, colour=Population)) +
```

We specify that we want a line graph, and title the plot.

```
geom_line()+gggttitle("This is my plot")
```

We title the y-axis *Y* and the x-axis *X*. We also suppress the legend.

```
ylab("Pov. rates")+xlab("Time")+guides(fill=FALSE) +
```

We control the y-axis and create ticks on the numbers 10, 12 and 14 of the variable *Value*.

```
scale_y_continuous(breaks=c(10,12,14)) +
```

We control the tick labels on the x-axis. We angle the tick labels 45 degrees

```
theme(axis.text.x=element_text(angle=45)) +
```

We create several of these plots, each using a different factor level from the variable *Geography*. Essentially, each plot is using different data according to a unique value of *Geography*

```
facet_grid(~Geography)
```

Result

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The graphic is now ready to be placed into a LaTeX environment. No additional wrapper is necessary to bring this graphic from R into LaTeX and eventually to exportable .pdf. We will reuse this code later.

Other resources

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For more information see the following links

- <http://www.cookbook-r.com/Graphs/>
- <http://sharpstatistics.co.uk/r/ggplot2-guide/>
- http://www.ceb-institute.org/bbs/wp-content/uploads/2011/09/handout_ggplot2.pdf

Section 2

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Exporting Tables to LaTeX environments

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Now what about tables?

We've seen how to create graphics and plots using ggplot within R. Now lets see how to create tables ready to be exported into LaTeX. There are two packages in R designed for this. To use either, input the following two lines of code

1 Xtable

```
install.packages("xtable")  
library(xtable)
```

2 Hmisc

```
install.packages("Hmisc")  
library(Hmisc)
```

Exporting R tables as LaTeX tables

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- Tables are only slightly more tricky than plots, in that there are several base R functions to summarize data and create tables in the console. But that output is not immediately exportable to LaTeX
- We look to Xtable and Hmisc, which allows us to wrap R tables within a function that translates it into LaTeX code.
- Exportable objects can range from contingency tables to matrices, regression summaries, ANOVA tables and even raw data

Exporting using Xtable

I generally prefer Xtable to Hmisc because

- 1 xtable can wrap tables from almost all objects and classes
- 2 You can modify the LaTeX output a great deal in xtable
- 3 Most importantly, xtable can export tables without a float

More on the float environment later.

List of base tables

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R function

- `table()`
- `xtabs()`
- `prop.table()`
- `aggregate()`
- `anova()`

Description

- 2-way contingency table
- 3-way contingency table
- 2-way frequency table
- Custom aggregate data
- Analysis of variance wrapper around a regression object

Xtable input

Take nearly any R object of class dataframe, matrix, array, aov, lm...

and then enter `xtable(x)` to provide LaTeX output. You are given a series of options for the output.

- Digits
- Captions
- Line divisions
- Alignment of columns
- Floating environment
- and more

Wrapping xtable in print

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Wrapping xtable in the print function is essential because it allows us to specify the LaTeX object to not float the table. A floated table is within a table environment and is sandwiched between `\begin{table}` and `\end{table}`

Once a table is floated there is very little we can do with it. The biggest problem is always **Overfull Hbox**. Tables are often too long to fit to the page width. Since Beamer is in a presentation format, its a bad idea to play around too much with the page size.

Sometimes we have Overfull Vbox where the table is too long, but this is easily corrected by specifying xtable to deliver output in "longtable" format and splitting the table across multiple frames. This cannot be done with wide tables.

Wrapping xtable in print Cont...

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We can shrink this "un-floated" table by first loading the **graphicx** package into LaTeX and then use the **resize** argument. It should look something like this.

```
\documentclass{beamer}
\usepackage{graphicx}
\begin{document}
\resizebox{\linewidth}{!}{%
<<echo=FALSE,warning=FALSE>> =
print(xtable(x),floating=FALSE)
@
}
```


Xtable example part 1

First lets create the table in R. It doesn't look too nice.

```
table<-with(subset (data2,data2$Year>=2000&data2$Geography=="Canada"&
data2$Statistic=="Percentage of persons in low income"&
as.character(data2$Line)=="Low income cut-offs after tax, 1992 base"),
xtabs(Value~Population+Year))
```

##	Year								
## Population	2000	2001	2002	2003	2004	2005	2006	2007	
## Females	13.6	12.1	12.4	12.2	11.9	11.1	10.7	9.3	
## Males	11.4	10.3	10.7	11.0	10.8	10.5	10.0	9.0	
## Persons under 18 years	13.9	12.2	12.4	12.7	13.0	11.7	11.1	9.5	
## Persons 18 to 64 years	12.9	11.7	12.0	12.2	11.9	11.4	11.1	9.9	
## Persons 65 years and over	7.6	6.7	7.6	6.8	5.6	6.2	5.3	4.8	
## Persons in economic families	9.3	8.1	8.6	8.7	8.2	7.5	7.1	6.0	
## Child in single mother families	40.1	37.4	43.0	41.4	40.4	32.9	31.2	26.7	
## Child in two-parent families	9.5	8.3	7.4	7.9	8.4	7.8	7.5	6.5	
## Unattached individuals	32.9	30.8	29.5	29.7	30.1	30.5	29.4	27.6	
## All persons	12.5	11.2	11.6	11.6	11.4	10.8	10.3	9.1	
##	Year								
## Population	2008	2009	2010	2011					
## Females	9.8	9.5	9.3	8.9					
## Males	8.9	9.5	8.7	8.7					
## Persons under 18 years	9.0	9.4	8.2	8.5					
## Persons 18 to 64 years	10.1	10.4	10.1	9.7					
## Persons 65 years and over	5.8	5.1	5.3	5.2					
## Persons in economic families	6.2	6.5	5.9	5.5					
## Child in single mother families	23.3	21.5	21.8	23.0					
## Child in two-parent families	6.4	7.3	5.7	5.9					
## Unattached individuals	27.3	26.9	26.9	27.7					
## All persons	9.3	9.5	9.0	8.8					

Xtable example part 2

Now lets wrap our xtab() table within xtable.

```
table2<-  
xtable(table,digits=1,align="l|rrrrrrrrrrrrrrr")
```

```
## % latex table generated in R 3.0.1 by xtable  
## % Wed Jan 8 10:22:00 2014  
## \begin{table}[ht]  
## \centering  
## \begin{tabular}{l|rrrrrrrrrrrrrrr}  
## \hline  
## & 2000 & 2001 & 2002 & 2003 & 2004 & 2005 & 2006 & 2007 & 2008 & 2009 & 2010 & 2011 & 2012  
## \hline  
## Females & 13.6 & 12.1 & 12.4 & 12.2 & 11.9 & 11.7 & 11.5 & 11.3 & 11.1 & 10.9 & 10.7 & 10.5 & 10.3  
## Males & 11.4 & 10.3 & 10.7 & 11.0 & 10.8 & 10.6 & 10.4 & 10.2 & 10.0 & 9.8 & 9.6 & 9.4 & 9.2  
## Persons under 18 years & 13.9 & 12.2 & 12.5 & 12.3 & 12.1 & 11.9 & 11.7 & 11.5 & 11.3 & 11.1 & 10.9 & 10.7 & 10.5  
## Persons 18 to 64 years & 12.9 & 11.7 & 11.9 & 11.7 & 11.5 & 11.3 & 11.1 & 10.9 & 10.7 & 10.5 & 10.3 & 10.1 & 9.9  
## Persons 65 years and over & 10.5 & 9.4 & 9.7 & 9.9 & 9.7 & 9.5 & 9.3 & 9.1 & 8.9 & 8.7 & 8.5 & 8.3 & 8.1  
## \end{tabular}  
## \end{table}
```

Example part 3

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We have to modify our R chunk code for LaTeX to properly read xtable

```
<<echo=FALSE,warning=FALSE, results='asis'>> =  
table2<-  
xtable(table,digits=1,align="l|rrrrrrrrrrrrrr")  
@
```

	2000	2001	2002	2003
Females	13.6	12.1	12.4	12.2
Males	11.4	10.3	10.7	11.0
Persons under 18 years	13.9	12.2	12.4	12.7
Persons 18 to 64 years	12.9	11.7	12.0	12.2
Persons 65 years and over	7.6	6.7	7.6	6.8
Persons in economic families	9.3	8.1	8.6	8.7
Child in single mother families	40.1	37.4	43.0	41.4
Child in two parent families	9.5	8.3	7.4	7.0

Example part 4

Now you see our Overfull Hbox problem. First we wrap the xtable within print, specify floating=FALSE and resize the table

```
\resizebox{\linewidth}{!}{%  
<<echo=FALSE,warning=FALSE,results='asis'>> =  
print(table2,floating=FALSE)  
@  
}
```

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Females	13.6	12.1	12.4	12.2	11.9	11.1	10.7	9.3	9.8	9.5	9.3	8.9
Males	11.4	10.3	10.7	11.0	10.8	10.5	10.0	9.0	8.9	9.5	8.7	8.7
Persons under 18 years	13.9	12.2	12.4	12.7	13.0	11.7	11.1	9.5	9.0	9.4	8.2	8.5
Persons 18 to 64 years	12.9	11.7	12.0	12.2	11.9	11.4	11.1	9.9	10.1	10.4	10.1	9.7
Persons 65 years and over	7.6	6.7	7.6	6.8	5.6	6.2	5.3	4.8	5.8	5.1	5.3	5.2
Persons in economic families	9.3	8.1	8.6	8.7	8.2	7.5	7.1	6.0	6.2	6.5	5.9	5.5
Child in single mother families	40.1	37.4	43.0	41.4	40.4	32.9	31.2	26.7	23.3	21.5	21.8	23.0
Child in two-parent families	9.5	8.3	7.4	7.9	8.4	7.8	7.5	6.5	6.4	7.3	5.7	5.9
Unattached individuals	32.9	30.8	29.5	29.7	30.1	30.5	29.4	27.6	27.3	26.9	26.9	27.7
All persons	12.5	11.2	11.6	11.6	11.4	10.8	10.3	9.1	9.3	9.5	9.0	8.8

Remember, the **resize** command will only work on a "non-floating" object. Therefore if you have an Overfull hbox, you must first wrap your table in `print()` and specify `floating=FALSE`.

I'll go over the R chunk code and Sweave code in the next section.

A simpler solution: Xtable font size

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Sometimes the `resize` command is unnecessary and a simpler solution is available. Xtable allows for us to change the font size from normal size to very small to **very large**

```
xtable(...,size=" ")
```

By changing the font size of the table, we can easily remedy minor Overfull Hbox and Vbox. There are 10 sizes.

- tiny
- normal
- LARGE
- scriptsize
- large
- huge
- footnotesize
- Large
- Huge
- small

Dressing up a table

Lets say we have a properly sized vanilla table

	LICO	LIM	MBM
1995	14.50	12.10	
1996	15.20	12.70	
1997	15.00	12.70	
1998	13.70	12.90	
1999	13.00	12.40	
2000	12.50	12.80	
2001	11.20	12.50	
2002	11.60	12.90	13.00
2003	11.60	13.20	12.70
2004	11.40	13.40	12.70
2005	10.80	13.00	12.30
2011	8.80	12.60	12.00

We will try to add a few features to the table:

- Percentage signs
- Captions
- Line divisions
- A little colour

To use the following code add `\usepackage{colortbl}` to the preamble and `library(stringr)` to the chunk code

Dressing up a table: Result

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	LICO	LIM	MBM
1995	14.5%	12.1%	
1996	15.2%	12.7%	
1997	15.0%	12.7%	
1998	13.7%	12.9%	
1999	13.0%	12.4%	
2000	12.5%	12.8%	
2001	11.2%	12.5%	
2002	11.6%	12.9%	13.0%
2003	11.6%	13.2%	12.7%
2004	11.4%	13.4%	12.7%
2005	10.8%	13.0%	12.3%
2011	8.8%	12.6%	12.0%

Table : Poverty Lines

```
tab3<-apply(tab2, 2, func)
func<-function(u){
  ifelse(!is.na(u),
    sprintf("%.1f%%",u),u)}
pos<-as.list(seq(1,
  nrow(tab3),by=2))
com<-rep(
  "\\rowcolor[gray]{.9}",
  length(pos))
print(xtable(tab3,
  caption="Poverty Lines",
  align="l|c|c|c",
  size="small"),
hline.after=
  c(-1,0,11,nrow(tab2)),
add.to.row=list(
  pos=c(list(-1,8),pos),
  command=c(
    "\\rowcolor[rgb]{1,.8,.8}"
    "\\rowcolor[rgb]{.8,1,0}",
    com)))
```


Dressing up a table: Explanation

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First we define a function that will paste a % on every non-NA element

```
tab3<-apply(tab2, 2, function(u)
  ifelse(!is.na(u), sprintf( "%.1f%%", u), u))
```

Then we need to specify the rows in the table which are alternating

```
pos<-as.list(seq(1,nrow(tab3),by=2))
```

Then we pick the color for the alternating rows defined by `pos`

```
com<-rep("\rowcolor[gray]{.9}",length(pos))
```

Now call `xtable` and use the `caption` option to define your caption

```
print(xtable(tab3,caption="Poverty Lines",
```

Create vertical lines between certain columns

```
align="l||c|c|c",
```

Also specify a different font size for the table and close `xtable` options

```
size="small"),
```

Dressing up a table: Explanation cont.

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Now in the print options, create horizontal lines to divide key rows

```
hline.after=c(-1,0,11,nrow(tab2)),
```

Select the header, another row and our alternating rows

```
add.to.row=list(pos=c(list(-1,8),pos),
```

Now lets select colors for these select rows

```
command=c("\\rowcolor[rgb]{1,.8,.8}",  
  "\\rowcolor[rgb]{.8,1,0}",  
  com))
```

Now we are finished.

A few things on Hmisc

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The Hmisc equivalent of the `xtable()` wrapper is the `latex()` function. To my knowledge, `latex()` will always float the output. So in cases of Overfull Hbox, the table cannot be resized to fit the page.

If you do not run into a Overfull Hbox, there are cool features in Hmisc not available in xtable, mainly its `summarize.formula` functions which will only work with Hmisc's `latex` wrapper

Section 3

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Using Sweave and Knitr

Sweave and Knitr

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Now knowing how to create plots and tables in a LaTeX format, how exactly do we get our R code into LaTeX in the first place? The generic R script file will not work. To get started

- Open R
- Instead of a script file, open up an R Sweave file with extension `.Rnw`
- Go to Tools \Rightarrow Options \Rightarrow Sweave
- Select "Weave Rnw files using" \Rightarrow knitr

You must have LaTeX in order to run this type of file. We will use **knitr** to move R code into LaTeX code, rather than the default **Sweave** which has a few annoying problems

Sweave layout

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In a .Rnw file, you must use LaTeX code. To use R code instead, you must create a "Chunk".

- To begin the chunk, type:

```
<<>>=
```

- To end the chunk, type:

```
@
```

On your screen it should look like this:

```
\documentclass{article}  
\begin{document}
```

LATEX CODE GOES HERE

```
<<>>=
```

```
R CODE GOES HERE|
```

```
@
```

```
\end{document}
```

R to Sweave

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- Within the chunk, the R code is exactly the same as if you were writing R code in a script file.
- It is better to create a chunk for every table or plot, rather than putting all your R code and figures/tables in the same chunk.
- Plots are almost never sized correctly to the page. You will have to tweak with the chunk code in order to display plots with your desired dimensions.

Chunk Code

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You can control the output of the R code within your chunk.

```
<< options go here >>=
```

A couple options:

- | | |
|--------------|---------------------------------------|
| ● echo | ● Prints the R code in the output |
| ● warnings | ● Prints the warnings in the output |
| ● results | ● Whether to display the chunk output |
| ● include | ● How to display the chunk output |
| ● size | ● Font size of chunk output |
| ● message | ● Prints messages in the output |
| ● fig.height | ● Change height of figure |
| ● fig.width | ● Change width of figure |

Chunk code example

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```
<<echo=FALSE, warning=FALSE, message=FALSE,  
fig.height=4, size='tiny'>>=
```

- The actual R chunk code is not displayed
- Warnings from the R chunk code are not displayed
- Messages from the R chunk code are not displayed
- The figure in the chunk has a height of 4 inches
- The font size for the chunk output is `tiny`

Finally, compiling the .pdf

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- After you have set up your R chunk with LaTeX friendly plots and tables, the very last step is to click **Compile PDF**
- This will create several files, a .log file, a .tex file, several auxiliary files and the .pdf file.
- Any plot output from your R chunks will also be saved in a folder (if unspecified) called **figure** in whichever directory you are working from.

Section 3

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Beamer and LaTeX

LaTeX Preamble

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Here's a very basic intro to LaTeX for the purposes of Beamer.

- 1 Define a document class. We want beamer
- 2 Run any packages you require for LaTeX
- 3 Choose your desired beamer color and theme
- 4 Create a title
- 5 Create an author
- 6 Run any other beamer options

LaTeX Preamble example

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- 1 `\documentclass{beamer}`
- 2 `\usepackage{graphicx}`
- 3 `\usetheme{PaloAlto}`
- 4 `\title{This is my title}`
- 5 `\author{This is my name}`
- 6 `\setbeamertemplate{itemize items}[ball]`

Title and ToC

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Now that the preamble is finished, lets get onto the code:

- 1 `\begin{document}`
- 2 `\frame{\titlepage}`
- 3 `\tableofcontents`

- No. 2 provides us a title page which displays some of the things in our preamble
- No. 3 provides us a table of contents which will list the sections and subsections of the document.

The frame

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In beamer, you will create your presentation frame by frame.

- 1 Start a frame environment with `\begin{frame}`
- 2 Create a frame title with `\frametitle{My frame title}`
- 3 Now you are within the frame. You can then write anything and it will display within the frame.
- 4 Finally, close the frame environment with `\end{frame}`

The frame Cont...

We can dress up our frame a bit.

- 1 Start a block with `begin{block}{My block title}`
- 2 Write anything in the block.
- 3 Maybe you want bulletpoints with `\begin{itemize}`
- 4 Now within the itemize environment, write items
`\item This is my 1st bulletpoint`
`\item This is my 2nd bulletpoint`
- 5 Now close the itemize environment with `\end{itemize}`
- 6 Now close the block environment with `\end{block}`

The following frame is our end result

My frame title

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Now you are within the frame. You can then write anything and it will display within the frame.

My block title

Write anything in the block.

- This is my 1st bulletpoint
- This is my 2nd bulletpoint

More frames

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What if we want to section off the frame into several parts?

- 1 First type `\begin{columns}[T]` to vertically align the sections
- 2 Now specify the first section dimensions with `\begin{column}{width}` ie. `\begin{columns}{.5\textwidth}`
- 3 With this section, you can write, itemize, do anything
- 4 Now close this section with `\end{column}`
- 5 Now specify the second section with `\begin{column}{width}`. ie. `\begin{columns}{.5\textwidth}`
- 6 Try writing here as well
- 7 Now close this section with `\end{column}`
- 8 Then close the environment with `\end{columns}`

More frames example

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With this section, you can
write, itemize, do anything

Try writing here as well

Pausing in Frames

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You can use `\pause` in order to show the contents of your whole frame in several seperate frames.

- 1 Write something
- 2 Now write `\pause`
- 3 Now write something else
- 4 Now write `\pause` again
- 5 Write something here too

Pausing example part 1

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- Write something

Pausing example part 2

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- Write something
- Now write something else

Pausing example part 3

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- Write something
- Now write something else
- Now write something here too

Displaying R output in frame

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Within the frame environment, lets put in a plot that we previously made.

```
\begin{frame}  
\frametitle{R plot example}  
<<echo=FALSE,warning=FALSE>>  
INSERT GGPLOT CODE  
@  
\end{frame}
```


R plot example

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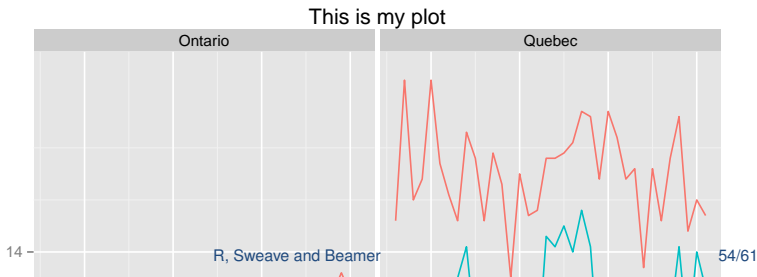
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```
ggplot(subset(data2, (Geography == "Ontario" |  
  "Low income measure after tax" & Statistic  
  (Population == "Males" | Population == "Females")  
  colour = Population)) + geom_line() + ggtitle("This is my plot") +  
  xlab("X") + guides(fill = FALSE) + scale_y_continuous(limits = c(0, 14)) +  
  theme(legend.position = "none", axis.title = "This is my plot") +  
  facet_grid(. ~ Geography)
```



R plot example Cont...

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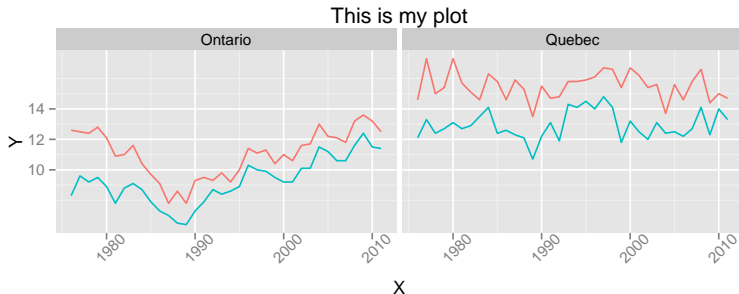
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The last plot is not sized correctly. Playing with the `fig.width` and `fig.height` in the chunk options, we can get...



Inserting images

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- It is very easy to insert images into your frames. To do this, you must load the **graphicx** package in the preamble.
- Within a frame environment, use
`\includegraphics[options here]{file here}`
- I.e. `\includegraphics[width=4in]{Picture.pdf}`
This gives us the file "Picture.pdf" with a width of 4 inches
- Alternatively you can use **scalebox** to shrink a picture to fit the page with
`\scalebox{x}{\includegraphics{Picture.pdf}}`
- I.e. `\scalebox{.5}{\includegraphics{Picture.pdf}}`
This gives us the file "Picture.pdf" but shrunk by half
- The graphic can be in many formats but it is recommended to use .png, .pdf, .eps or .jpg files

Small tips: Font size and verbatim

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```
\tiny, \scriptsize, \footnotesize, \small,  
\normalsize, \large, \Large, \LARGE,  
\huge & \Huge
```

These are used to control the font size of the frame. Alternatively you can wrap these commands in `{ }` if you only want to resize a specific line. I.e. `{\small this is small text}`

Sometimes you want to make sure your text isn't misinterpreted as runnable code. To do this, use the verbatim environment `\begin{verbatim}` and `\end{verbatim}`. **However**, when using verbatim, you must specify the frame as *fragile*:

```
\begin{frame}[fragile]
```

Small tips: suppressed captions

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This pertains specifically for article class and not beamer class...Your table captions will be preceded by **Table 1:** or **Table 2:** or whichever table number you are on. You can suppress this by manually writing your caption in latex.

Following a non-floated table (make sure you don't see a `\begin{table}` or `\end{table}` anywhere!), add `\caption{My caption title}` after the `\end{tabular}` command. To suppress the numbering, write `\usepackage{caption}` in the preamble and instead of `\caption{My caption title}`, write `\caption*{My caption title}`

Why are things going wrong?

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- Sometimes your .Rnw will fail to compile. The Log is sometimes not very helpful or specific. So we should go over a few mistakes
- Sometimes you forget to close an environment. Every line of code: `\begin{ }` **must** be closed by `\end{ }` and in correct order.
- If you have `\begin{document}, \begin{frame}, \begin{block}, \begin{itemize}`, the code must end in the corresponding order” `\end{itemize}, \end{block}, \end{frame}, \end{document}`
- I recommend testing each frame after completion

Anything Else?

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I am not an expert in either LaTeX or Beamer. There are many more features to Ggplot, Sweave and Beamer. Bibtex? Framezoom? Animated graphics? More detail into Hmisc?

Additional resources

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- <http://en.wikibooks.org/wiki/LaTeX/Presentations#Columns>
- http://www.nyu.edu/projects/politicsdatalab/latex/beamer_nyu.pdf