Reading data

Why data matters

"Companies are vacuuming up data **to make better decisions** about everything from product development and advertising to hiring. In their 2012 feature on big data, Andrew McAfee and Erik Brynjolfsson describe the opportunity and report that "companies in the top third of their industry **in the use of data-driven decision making were, on average, 5% more productive and 6% more profitable than their competitors**" even after accounting for several confounding factors." (Walter Frick (2014), HBR)

https://hbr.org/2014/05/an-introduction-to-data-driven-decisions-for-managers-who-dont-like-math

Sidenote: Data comes from different sources and has different shapes and sizes

Data source	Data format examples	suffix	R Package to read data
Flat files	Comma separated values	.csv	data.table
Declarative Languages (similar to a data format)	JSON	.json	jsonlight
	XML	.xml	XML
Foreign data formats	Stata data files	.dta	foreign
	SPSS data files	.spss	
	SAS data files	.xport	
Relational databases	SQLite		RSQLite
	MySQL		

... and many more!

Sidenote: Data comes from different sources and has different shapes and sizes

Data source	Data format examples	suffix	R Package to read data
Flat files	Comma separated values	.csv	data.table
Declarative Languages (similar to a data format)	JSON	.json	jsonlight
	XML	.xml	XML
Foreign data formats	Stata data files	.dta	foreign
	SPSS data files	.spss	
	SAS data files	.xport	
Relational databases	SQLite		RSQLite
	MySQL		

... and many more!

Sidenote: Data comes from different sources and has different shapes and sizes

Data source	Data format examples	suffix	R Package to read data
Flat files	Comma separated values	.csv	data.table
Declarative Languages (similar to a data format)	JSON	.json	jsonlight
	XML	.xml	XML
Foreign data formats	Stata data files	.dta	foreign
	SPSS data files	.spss	
	SAS data files	.xport	
Relational databases	SQLite		RSQLite
	MySQL		

... and many more!

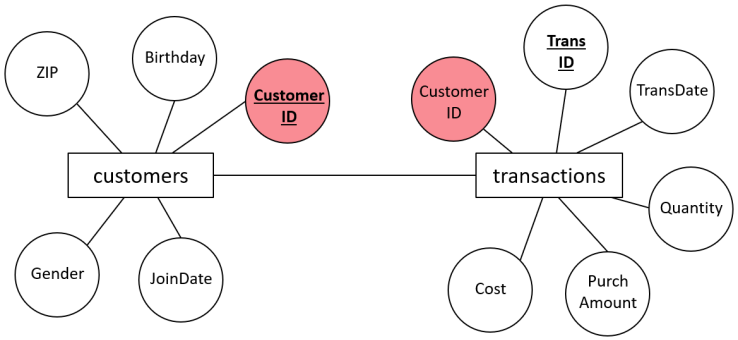
Comma separated values (CSV) and relational databases are the most common forms of data

CSV files are loaded directly into R ❶

Data is read from an existing database ❷

transactionData.csv

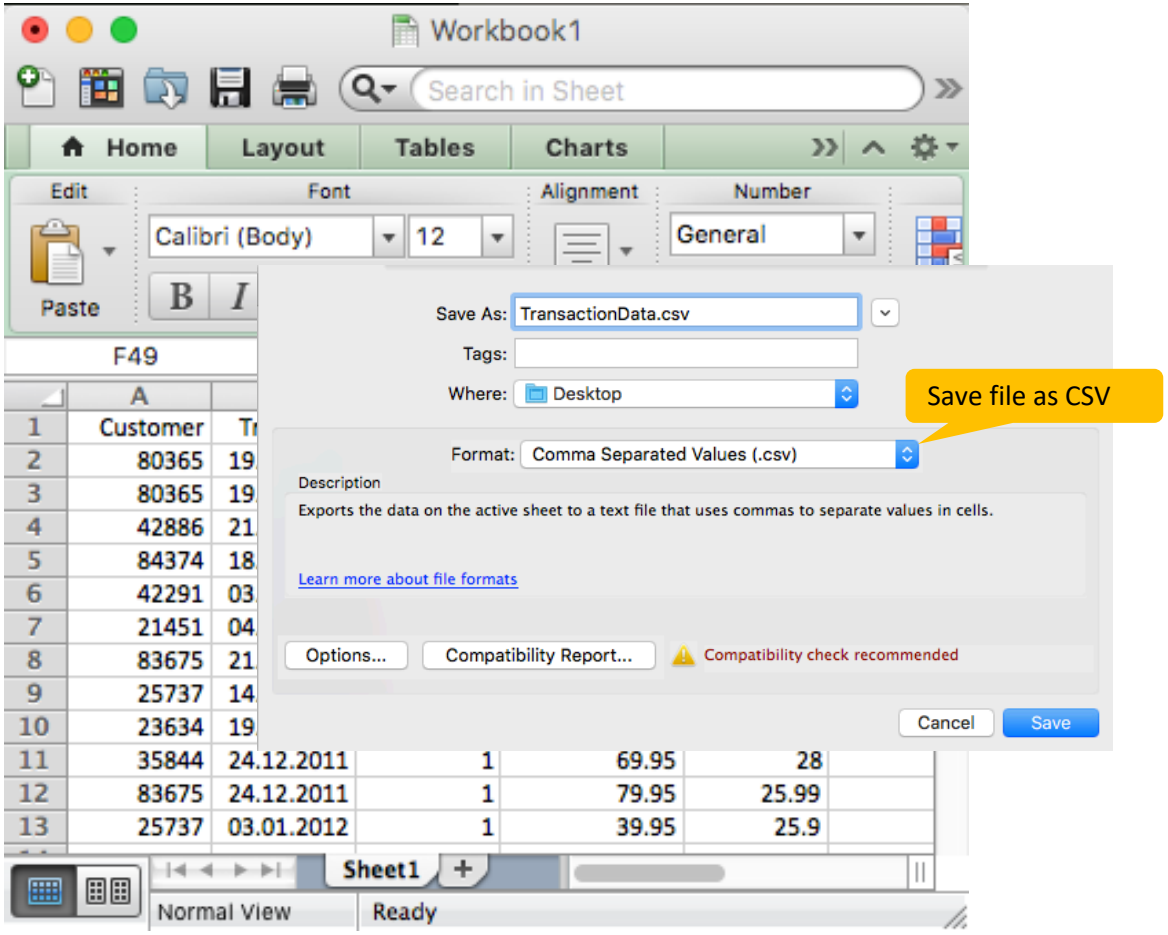
```
Customer,TransDate,Quantity,PurchAmount,Cost,TransID
149332,15/11/05,1,1.9995E2,107,127998739
172951,29/08/08,1,1.9995E2,108,128888288
120621,19/10/07,1,9.995E1,49,125375247
149236,14/11/05,1,3.995E1,1.895E1,127996226
149236,12/06/07,1,7.995E1,35,128670302
140729,19/11/09,1,1.2995E2,59,127637750
140729,19/11/09,1,7.995E1,3.918E1,127637750
140729,19/11/09,1,2.495E1,1.15E1,127637750
140729,19/11/09,1,7.95,2.96,127637750
140729,28/04/12,1,8.995E1,35,129377737
140729,28/04/12,1,6.995E1,2.64E1,129377737
180970,19/06/09,1,1.1995E2,5.846E1,129195647
180970,19/06/09,1,2.795E1,1.251E1,129195647
149332,13/12/05,1,4.995E1,2.487E1,129878743
149332,05/10/06,1,2.495E1,1.25E1,129883508
182927,11/02/09,2,5.99E1,1.592E1,129290963
182927,11/02/09,1,3.495E1,1.575E1,129290963
182927,11/02/09,1,1.2995E2,6.308E1,129290963
182927,11/02/09,1,2.495E1,8,129290963
```



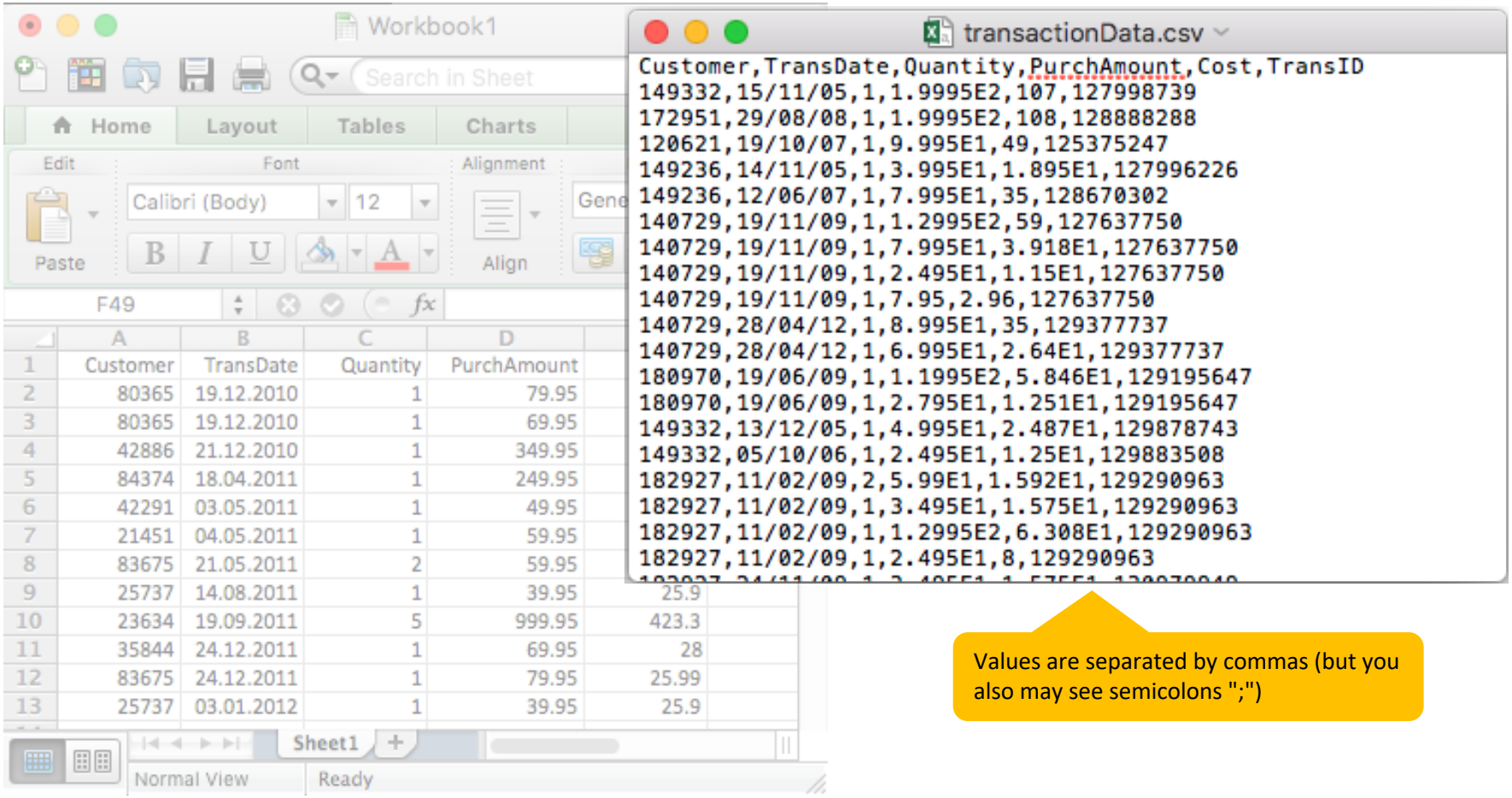
Reading CSV data in 3 simple steps

1. Ensure your data is in CSV format or create a CSV file out of data.
2. Load data into R.
3. Make data available for processing.

Step 1:
Create CSV out of spreadsheet

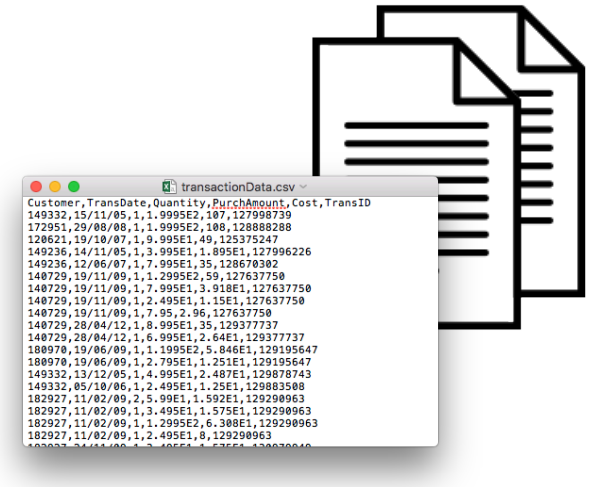


Step 1:
Create CSV out of spreadsheet



Values are separated by commas (but you also may see semicolons ";")

Step 2:
How to load data into Python from a CSV file



Customer	TransDate	Quantity	PurchAmount	Cost
149332	15/11/05	1	199.95	107.00
172951	29/08/08	1	199.95	108.00
120621	19/10/07	1	99.95	49.00
149236	14/11/05	1	39.95	18.95
149236	12/06/07	1	79.95	35.00
...	...	...	...	...

R base

```
read.csv(input, sep=",", ...)

read.csv2(input, sep=";", ...)
```

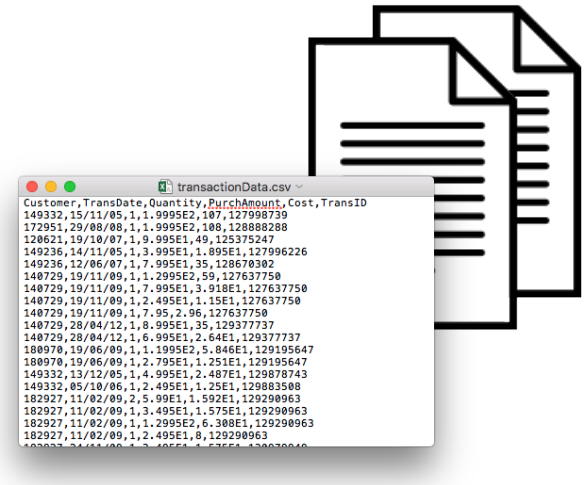
1 The difference is the default separator

data.table

```
fread(input, sep=",", ...)
```

2 Name of CSV file

Step 2:
How to load data into Python from a CSV file



Customer	TransDate	Quantity	PurchAmount	Cost
149332	15/11/05	1	199.95	107.00
172951	29/08/08	1	199.95	108.00
120621	19/10/07	1	99.95	49.00
149236	14/11/05	1	39.95	18.95
149236	12/06/07	1	79.95	35.00
…	…	…	…	…

R base

```
read.csv(input, sep=",", ...)

read.csv2(input, sep=";", ...)
```

1 The difference is the default separator

data.table

```
fread(input, sep=",", ...)
```

2 Name of CSV file

R Basics: A function performs a specific action and is controlled through arguments

Function reads in a CSV file ❶

```
fread(file, sep=",", header=TRUE)
```

`file` does **not** have a default ❷

Differentiate two types of function arguments:

- **No default** if argument is not specified, error is returned
- **Default** if argument is not specified, default is used

R Basics: A function performs a specific action and is controlled through arguments

Function reads in a CSV file ❶

```
fread(file, sep=",", header=TRUE)
```

`file` does **not** have a default ❷

Differentiate two types of function arguments:

- **No default** if argument is not specified, error is returned
- **Default** if argument is not specified, default is used

R Basics: A function performs a specific action and is controlled through arguments

1. **Function** reads in a CSV file
2. `file` does **not** have a default
3. `sep` specifies the character used to separate the values in the CSV
4. sep has a **default**

```
fread(file, sep="auto", header=TRUE)
```

Differentiate two types of function arguments:

- **No default** if argument is not specified, error is returned
- **Default** if argument is not specified, default is used

Why data.table?

- **data.table** provides an enhanced version of **data.frame** to speed up data manipulations:
  - fast file reader
  - add/modify/delete columns by using groups without copying
  - data aggregation
  - ordered joins etc.
- Especially useful for large data (>1 GB in RAM)

R Basics: Specifying your working directory: Point-and-click vs. code

- To find the current working directory use:

```
getwd()
```

- To set a new working directory use:

Version 1 - Mac:

```
setwd("~/path/to/my/
      directory/")
```

Version 2 - Windows:

```
setwd("C:\Users\Desktop\
      MyR-Folder")
```

Plug in your intended path here

R Basics: Specifying your working directory: Point-and-click vs. code

- To find the current working directory use:

```
getwd()
```

- To set a new working directory use:

Version 1 - Mac:

```
setwd("~/path/to/my/
      directory/")
```

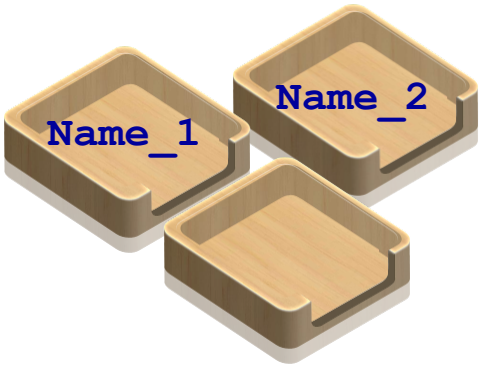
Version 2 - Windows:

```
setwd("C:\Users\Desktop\
      MyR-Folder")
```

Plug in your intended path here

Step 3:
Make data available for use

Customer	TransDate	Quantity	PurchAmount	Cost
149332	15/11/05	1	199.95	107.00
172951	29/08/08	1	199.95	108.00
120621	19/10/07	1	99.95	49.00
149236	14/11/05	1	39.95	18.95
149236	12/06/07	1	79.95	35.00
…	…	…	…	…



Name of new variable ❶

```
variableName <- (...)
```

Use left arrow to store object to `variableName` ❷

Sidenote: Choose variable names wisely

- Do **not** name your variables after existing variables or functions.
- A bad habit is to name your data.tables "data" as `data()` is used to load datasets (from packages).

Reading data