

# Data Analysis with Microsoft Excel and Access



FRE 501 2013  
Lecture 1

# Outline

1. Introduction to Excel and Access capabilities
2. Key features for Economic Analysts, MFRE
3. Excel : Forms (input) and Graphics (output)
4. Excel : VBA and Simulations
5. Access : Demo of Queries
6. Summary

# **1. Introduction and Background**

**Share Background**

**Excel and Access are tools – learn through practice,  
like riding a bike**

# Capabilities - Excel

- Spreadsheet software for performing calculations and analyzing data
- Heavily used everywhere: corporates, govts, non-profits, schools
- > 1 million rows and > 16,000 columns, can handle large data sets
- Specialized programs such as MatLab, STATA, SAS, SPSS, etc. exist for more complex analysis

Most people only use a fraction of excel's full suite of functions  
Not unlike using a swiss army knife as a paper-weight

# Capabilities - Access

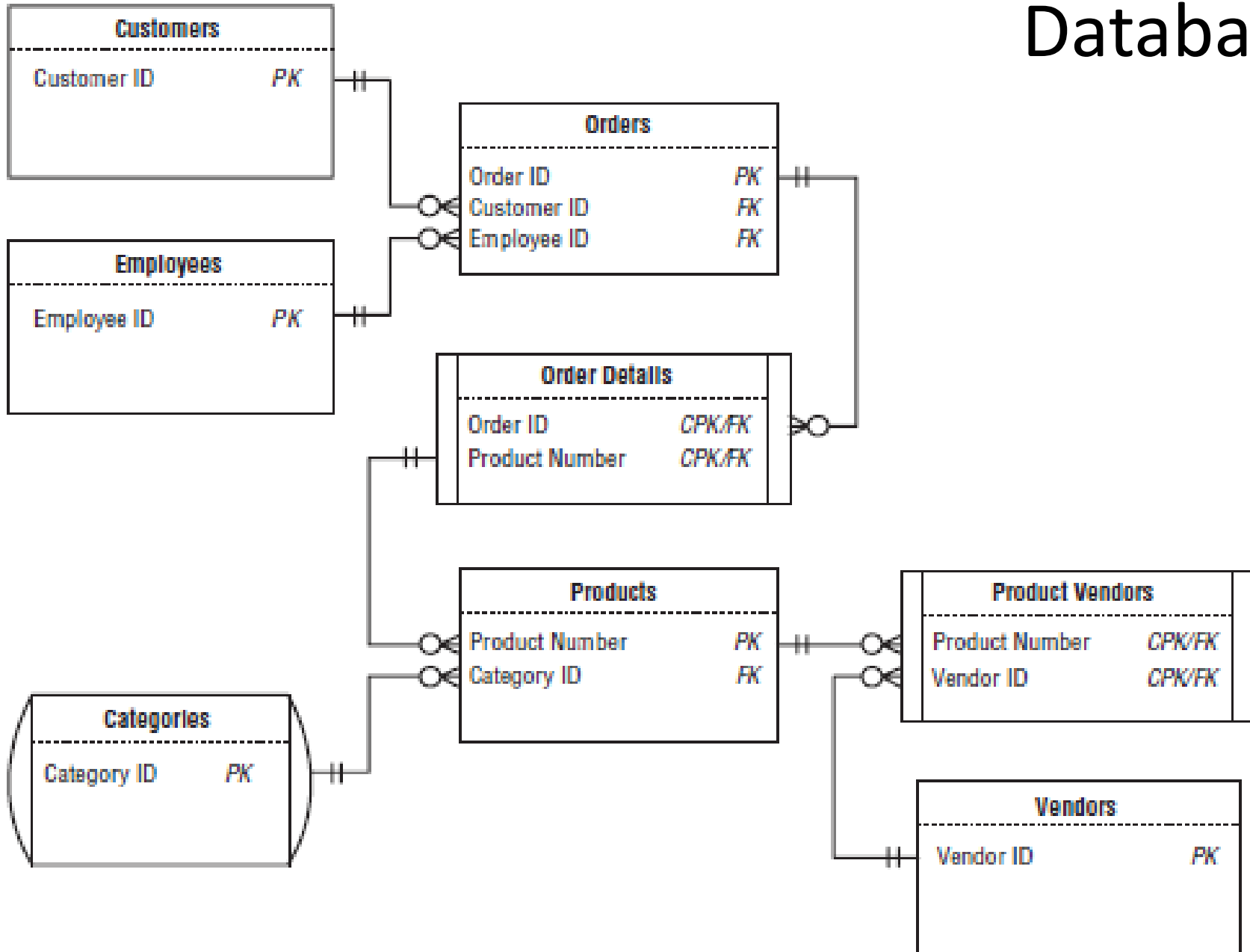
- Relational database software w graphical interface
- Most useful for storing huge amounts of data
- Data can be 'accessed' in a variety of ways

We interact with databases everyday:

- Amazon (one of the largest databases in the world)
- Google (probably the largest)
- Blogs
- UBC Connect
- FAOStat (you will play with this soon)

# Sales Order Database

# Sample Database



# Excel vs. Access

	EXCEL	ACCESS
<b>Advantages</b>	Easy to learn and use	Scalability
	Calculations and Analysis	Maintaining Data integrity
	Variety of Graphical Outputs	Versatility of data outputs (reports)
<b>Disadvantages</b>	Difficult to scale w volume	Takes more training
	Maintenance quickly becomes difficult	Overkill if the task is simple or one-time
	Ranges, Formulas need updating	

**Meant to process and analyze information**

**Meant to store and access information**

## 2. MFRE-Economic Analysts

You are likely to interact heavily with Excel and to a lesser extent, Access in your professional career



### **MS Word, Excel and Powerpoint :**

**“Tools of the trade”** in the professional world

More complex analysis might be done in other programs, but finishing touches usually done in office Suite

### **MS Access:**

- Basic understanding is important as you will download lots of economic data
- Useful when you need to manipulate large datasets
- Crucial if you are an entrepreneur – regardless of whether a brick n mortar establishment or a blogshop



# 3. Excel – Inputs

Apart from monkeys typing, Excel can import data (and even auto-refresh) from a variety of sources:

- Databases like MS Access
- Web sources
- Text files (eg .csv)
- Live prices/data from financial databases –  
Bloomberg, Reuters, Capital IQ

# Excel – Inputs (Forms)

Helps monkeys input data when there are many columns / fields  
Excel's in-built forms are fairly intelligent

- High degree of customization
- Formula cells are automatically greyed out (formulas copied down)
- Easy to cycle through records

Trade Entry:		Others	
ID	1	Change in Invested Capital	-10620
Trade Type	Buy	Bought capital	10,620.00
Name	Suntec Reit	Value Traded	10,620.00
Symbol	T82U	Change in Cash	-\$10,657.63
TRADE DATE	6/29/2006	Commissions	\$37.63
SETTLE DATE		Dividends	
ACCOUNT	Singapore	Remarks	
Broker	DBS		
Quantity	9000		
Change in Shares Held	9000		
Executed Price	\$1.180		

My first excel form in  
2006 to track portfolio  
trades/performance

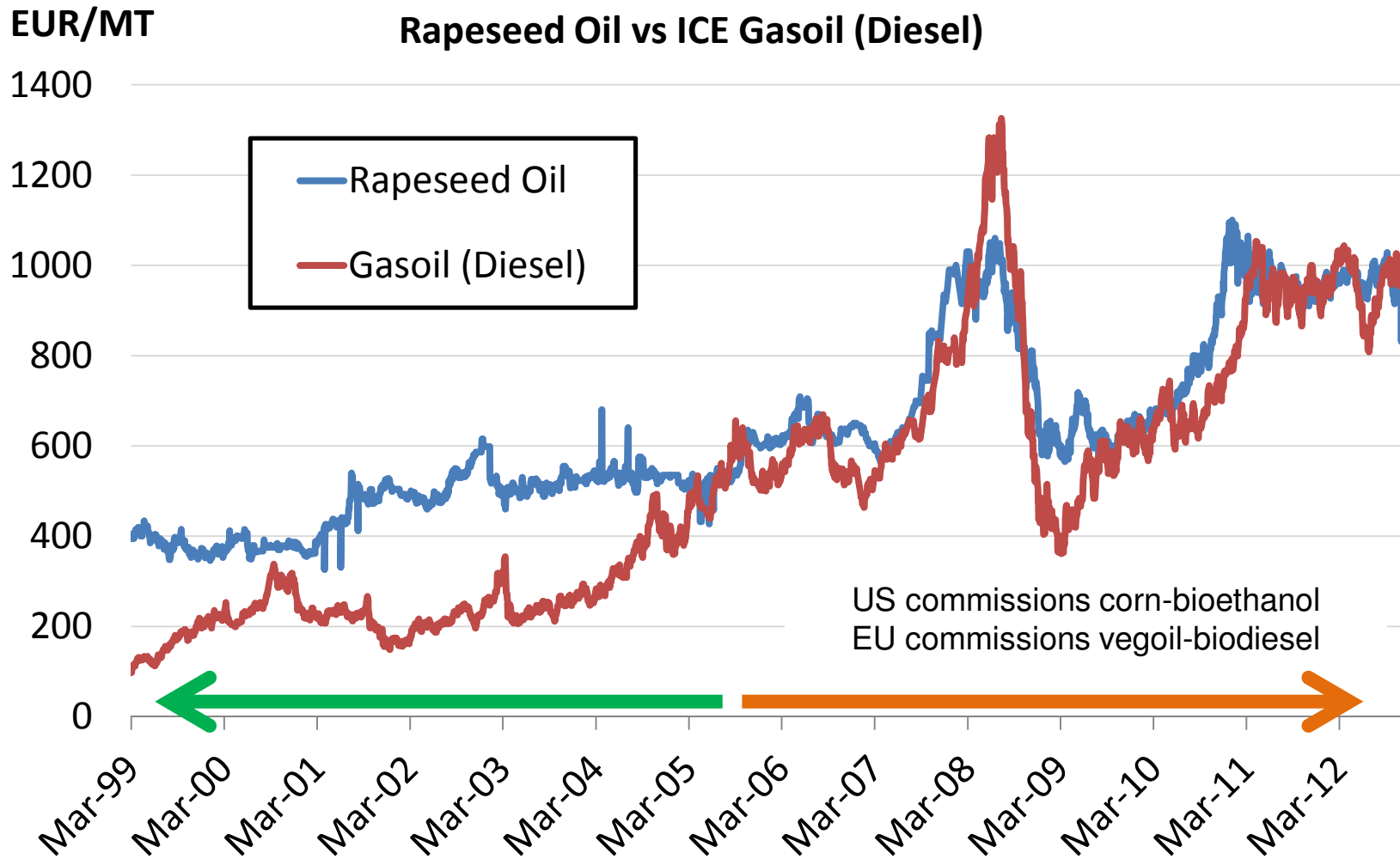
# Excel – Outputs (Graphics)

Presentation matters – helps to get the message across

## **Some Tips:**

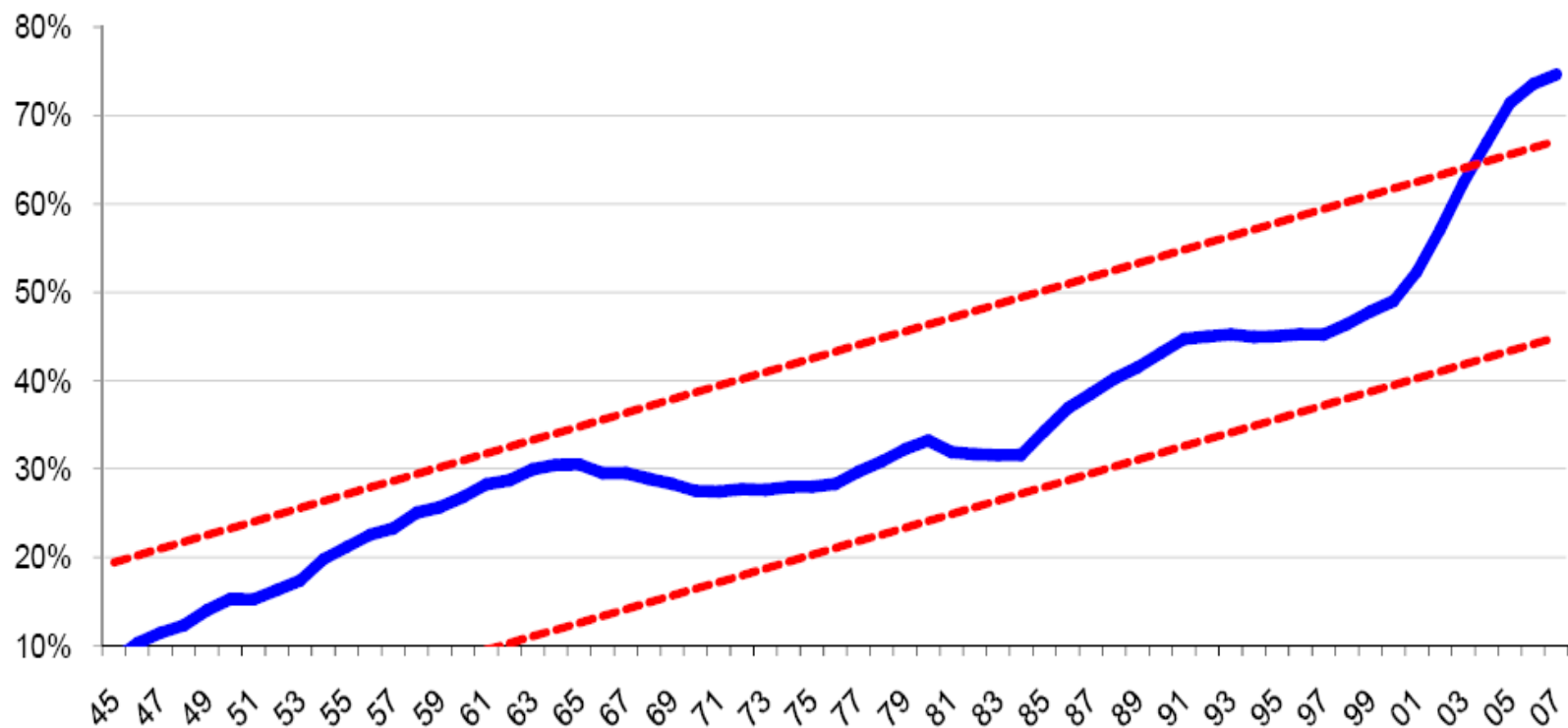
- Avoid MS Excel default templates – they look amateurish
- Make sure data / lines are in the right sequence
- Remove outlines from graphs/charts
- Always label axes (plural of axis) and data
- Avoid decimal places in axes unless necessary

# Line Charts: Great for displaying trends



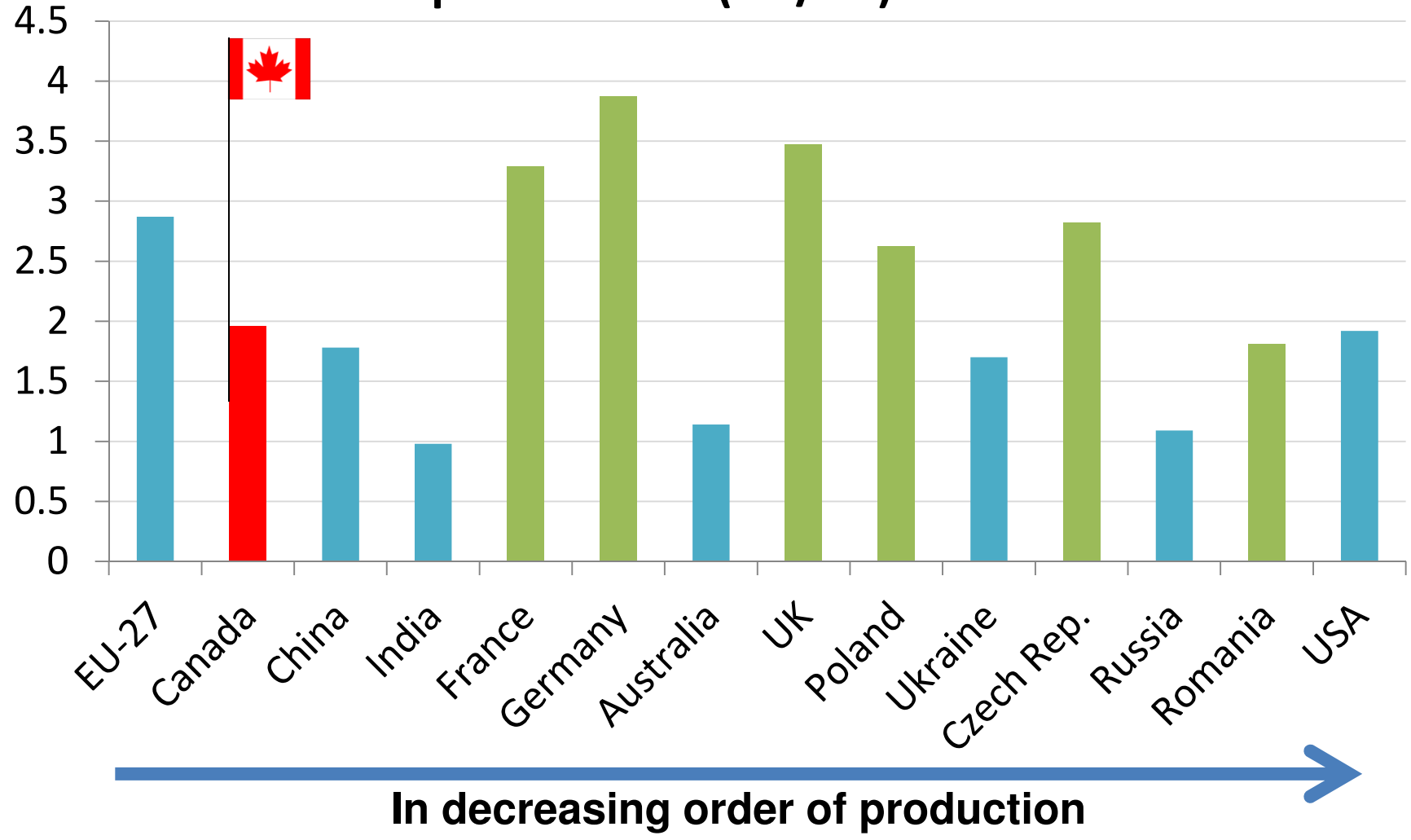
# Linear Graph with Bands

Household Mortgage Debt as % of GDP  
(with linear regression), 2 standard deviations



# Column Charts good for comparing 'magnitudes'

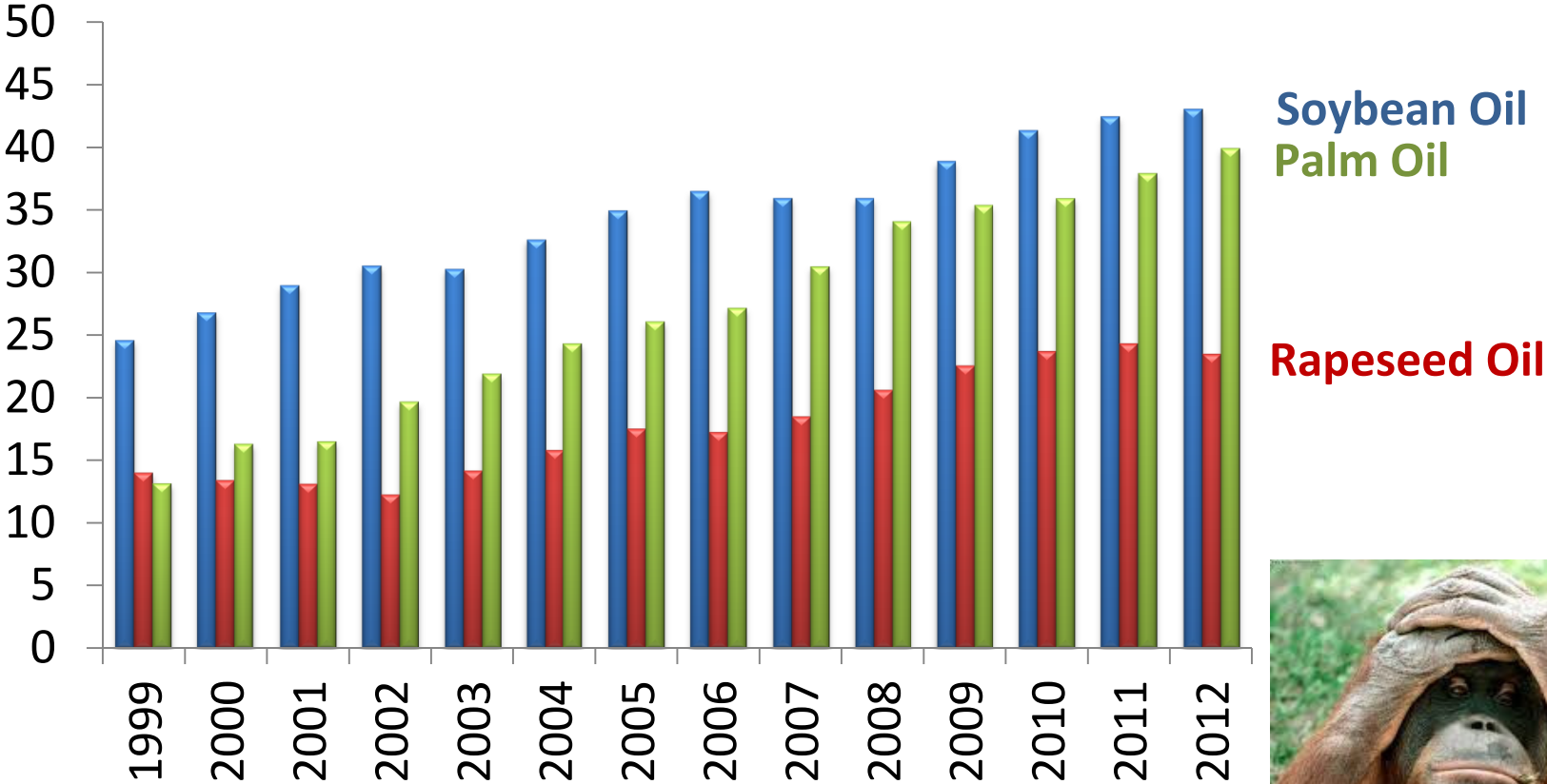
## Rapeseed Yield (Mt/Ha) 2011



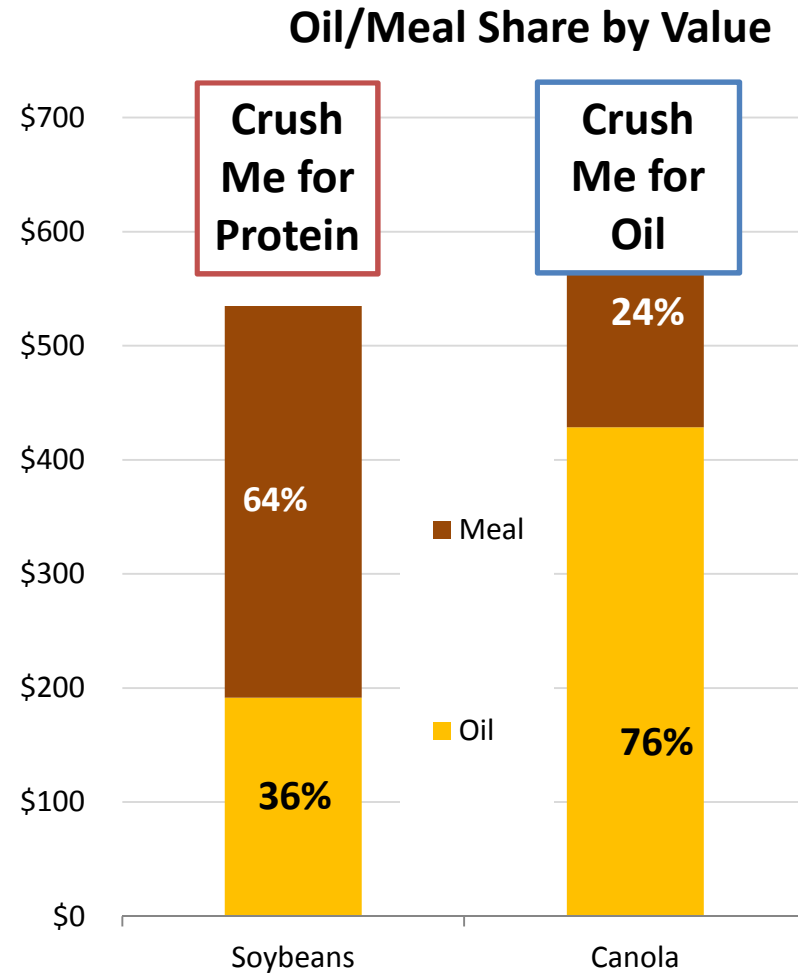
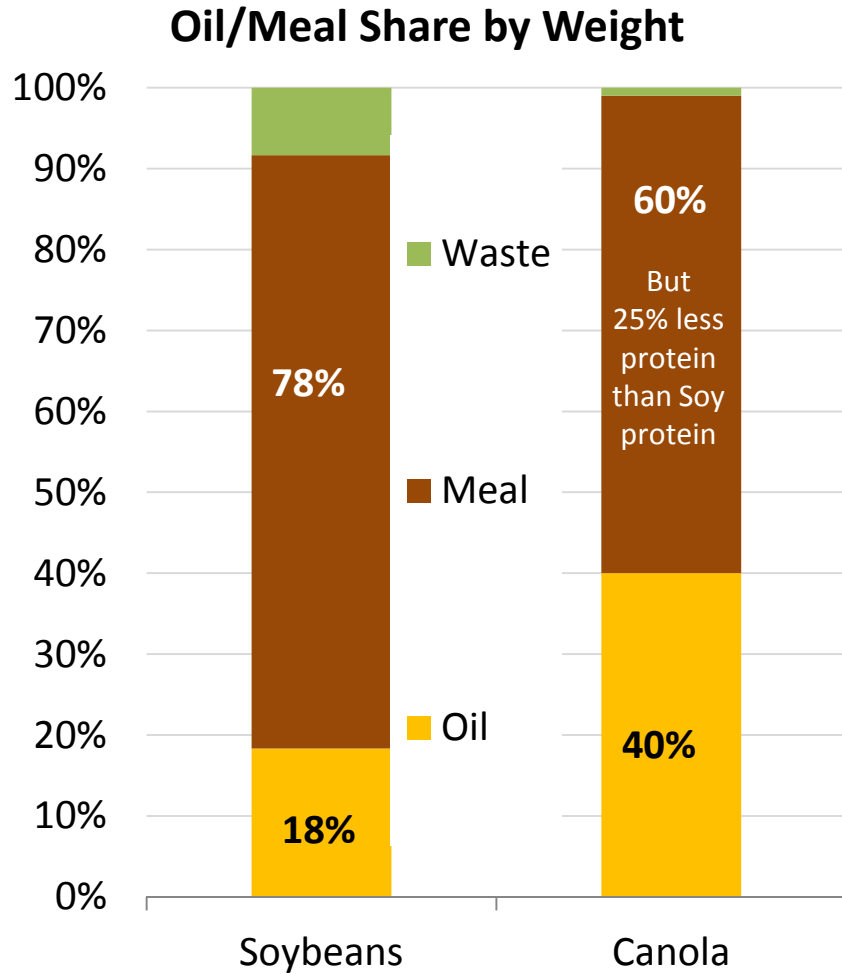
# Columns: comparing magnitudes across time

Million Metric Tons

## Top 3 Vegetable Oils World Supply



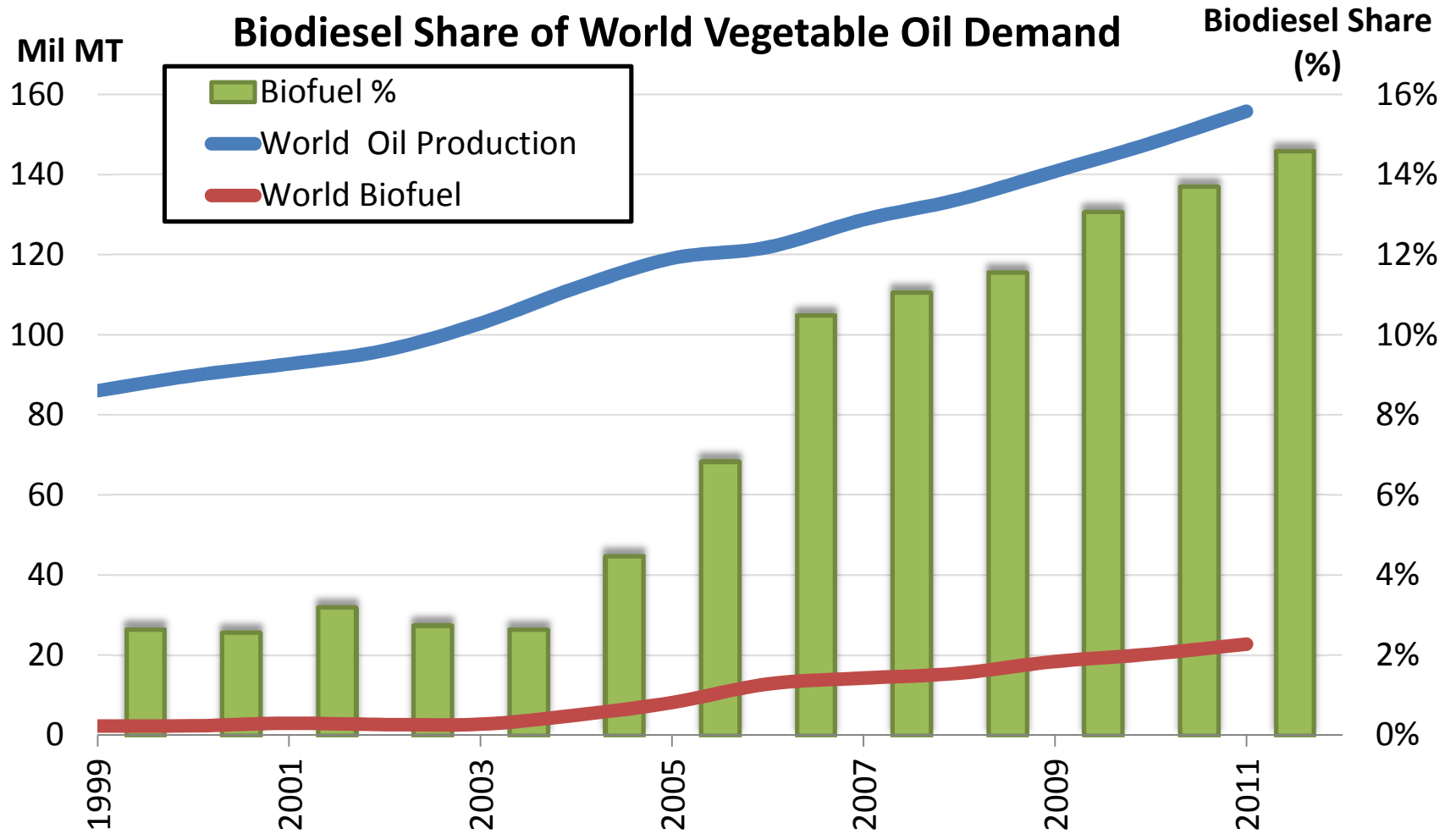
# Stacked Columns



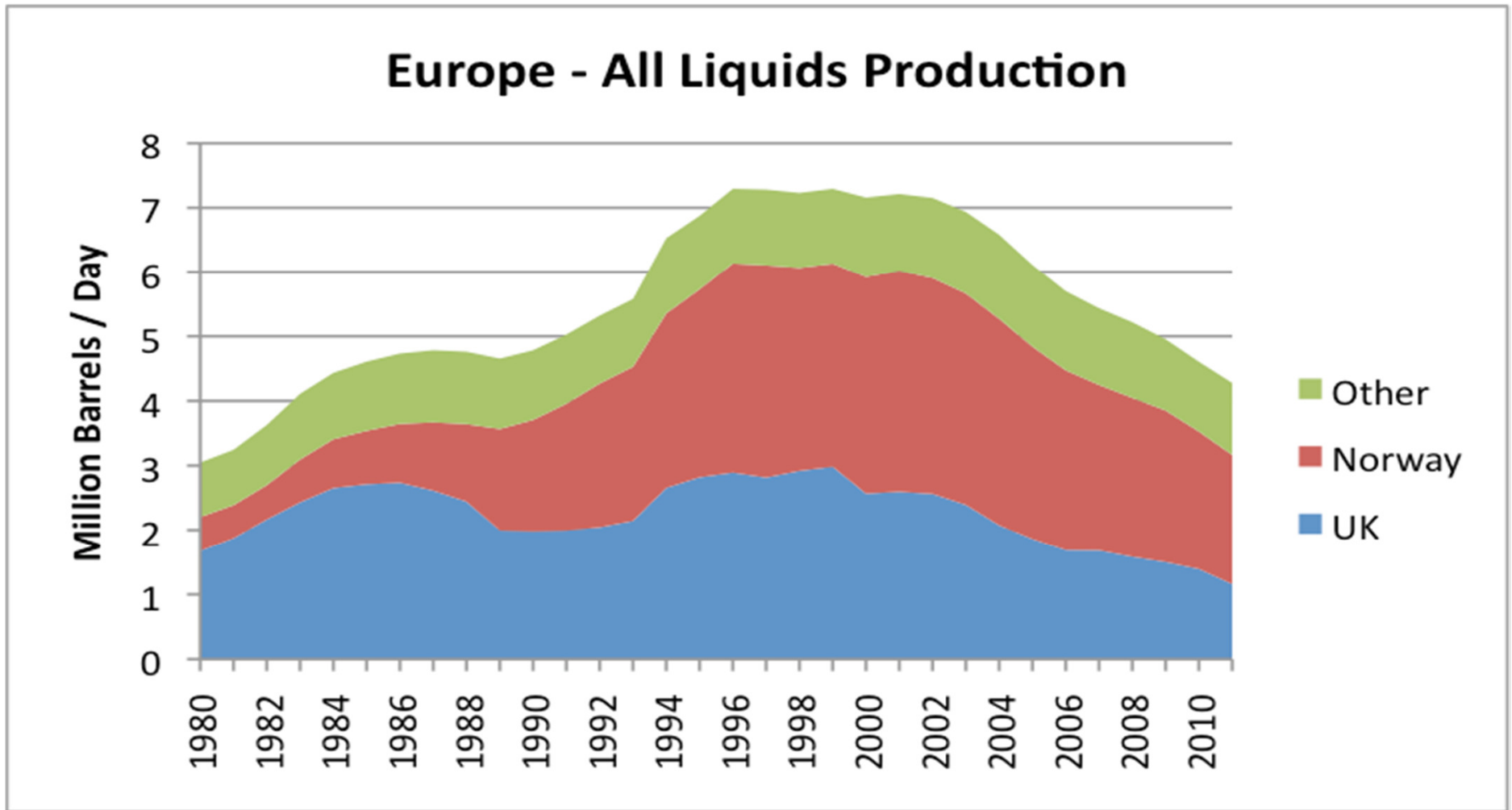
Based on Chicago prices for soybeans and Vancouver FOB prices for Canola



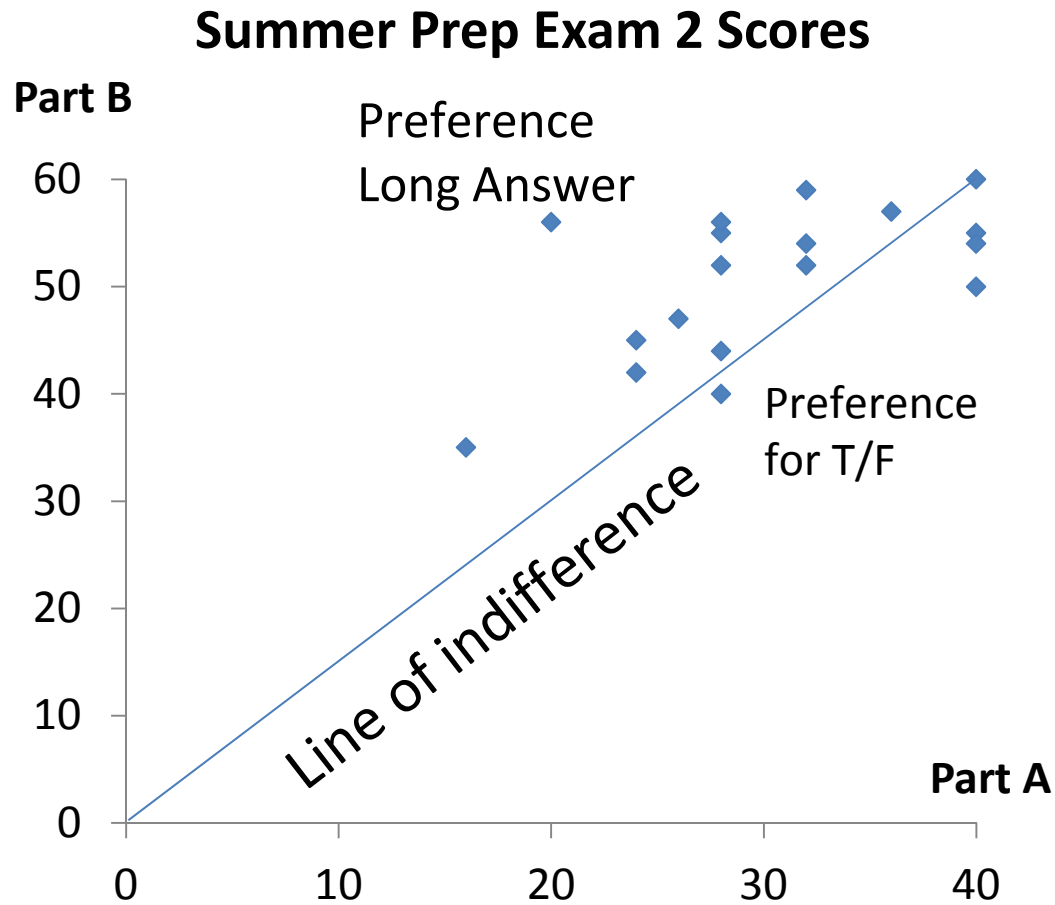
# Lines and Columns combined (two axes)



# Stacked Area Charts emphasize change in magnitude over time



# Scatter Plots great for examining relationships between variables (X and Y)



# 4. Excel-Analytics and Simulations

Most crucial functions for the Economic Analyst:

- **Mathematical** functions
- **Logical** functions
- **Lookup/Reference** functions
- **Statistical** functions
- **Pivottables**
- Everything in “**Data**” Tab, especially the **Analysis Toolpak**

# Excel Upgrades

- **Data Analysis Toolpak** [File-> Options -> Add-ins]
- **ASAP Utilities** (good to have) [<http://www.asap-utilities.com/>]
- **FRED** (Fed Reserve Bank St Louis) [<http://research.stlouisfed.org/fred-addin/>]  
140,000 + free data series from various sources (e.g. BEA, BLS, Census, OECD)
- **Developer Tab** (VBA, advanced) [File->Options->Customize Ribbon]
- **Powerpivot** (advanced) [Download from Microsoft]



# Excel: Analysis Toolpak

## **DESCRIPTIVE STATISTICS**

Histogram

Descriptive Statistics

Rank and Percentile

## **Regression and Correlation**

Covariance

Correlation

Regressions:

single and multi- variable

## **HYPOTHESIS TESTING**

T-tests

F-test

Z-test: 2 samples for means

Anovas (analysis of variance)

## **Time Series Forecasting**

Moving Average

Exponential Smoothing

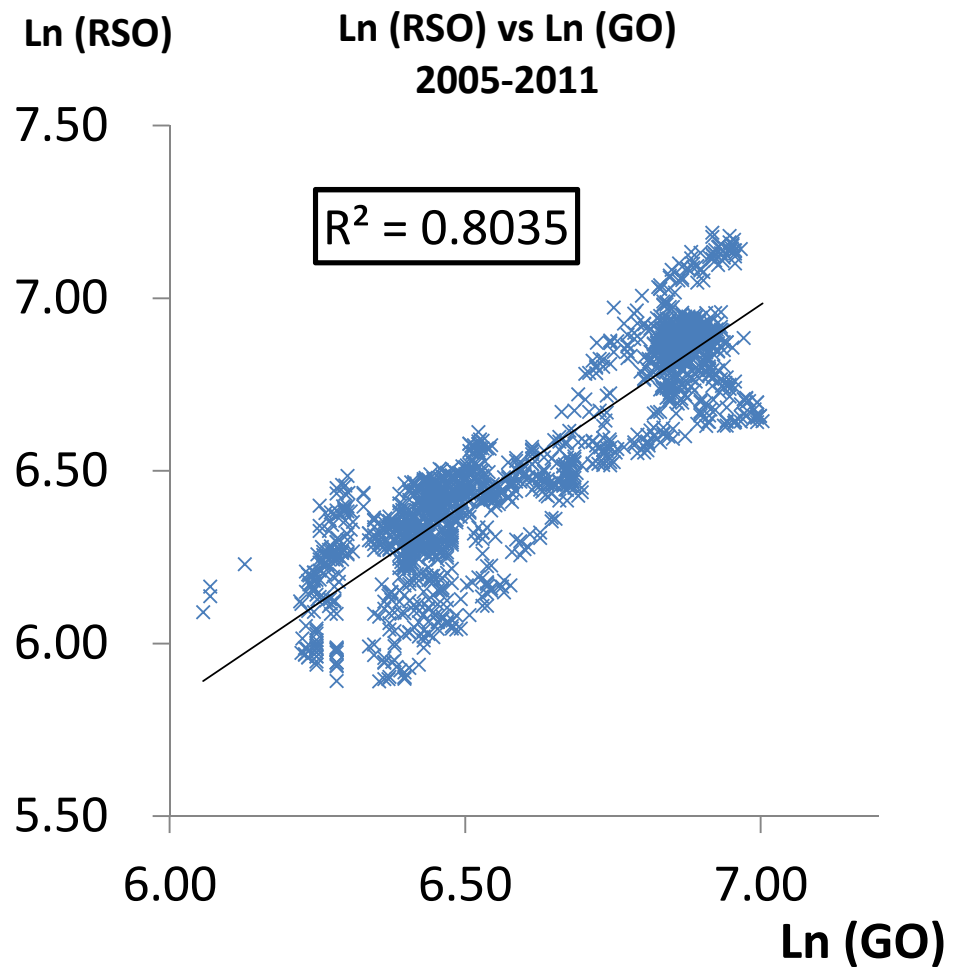
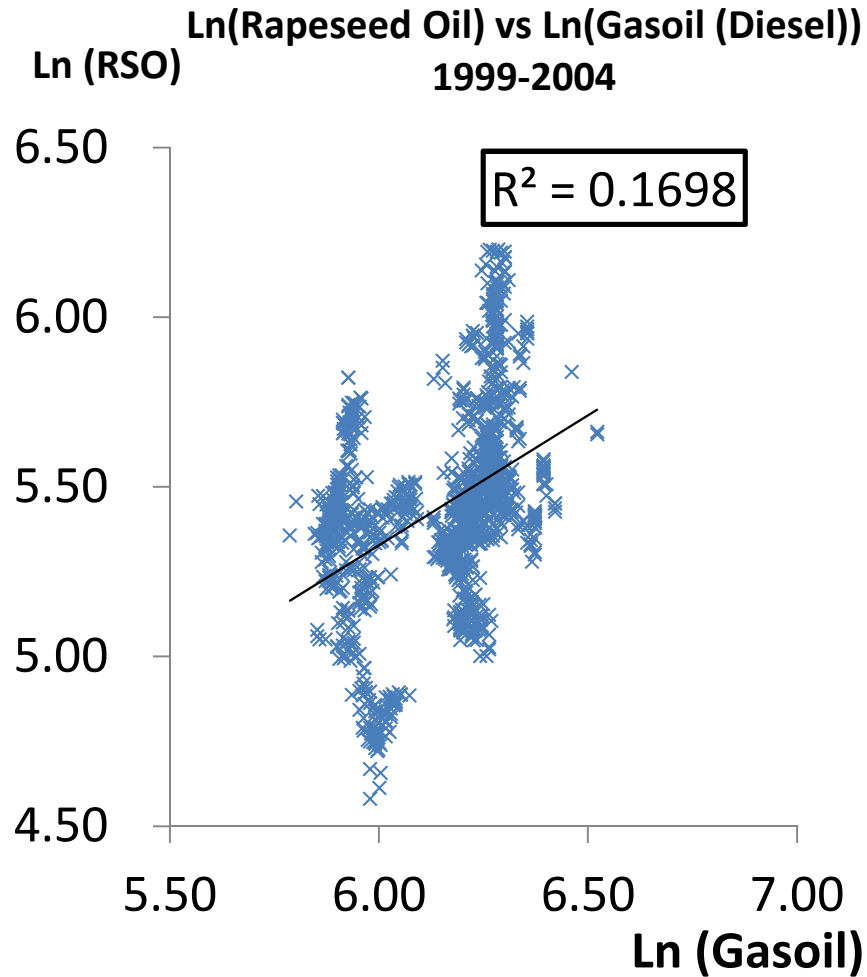
Microsoft Page on [Analysis Toolpak](#)

# Toolpak: Easy to run regressions

For single variable regressions, shortcut: scatterplot with trendline

## Correlations in price movements

Pre vs Post-biofuel legislation



# Toolpak: Multivariable Regressions too

## Rapeseed Oil vs GO and Wheat

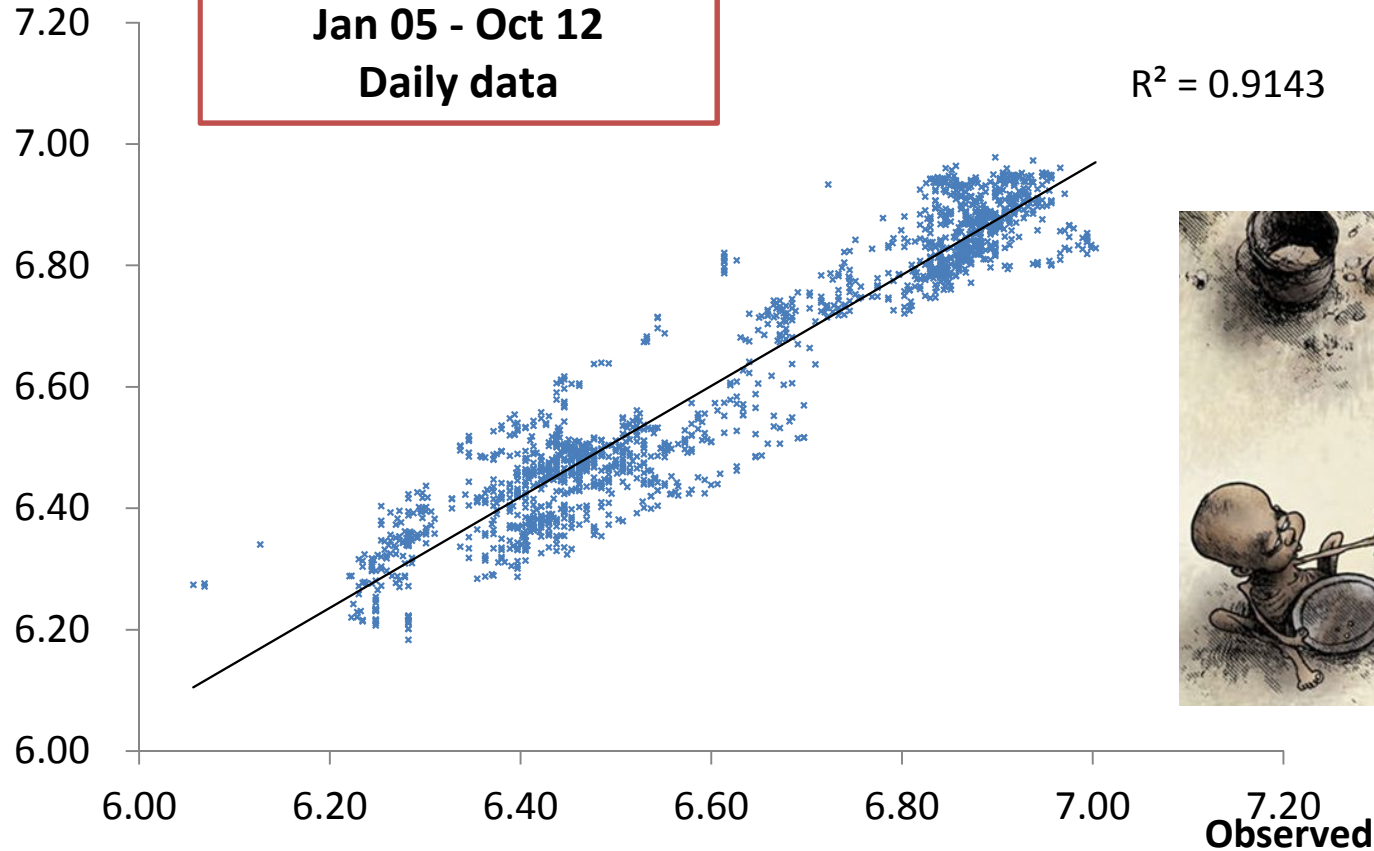
(Fuel) (Food)

Regression  
Predicted

$$\ln(\text{RSO}) = 0.40\ln(\text{GO}) + 0.385\ln(\text{Wheat}) + 2.0$$

Jan 05 - Oct 12  
Daily data

$R^2 = 0.9143$



**Prices:**

RSO: FOB Rotterdam

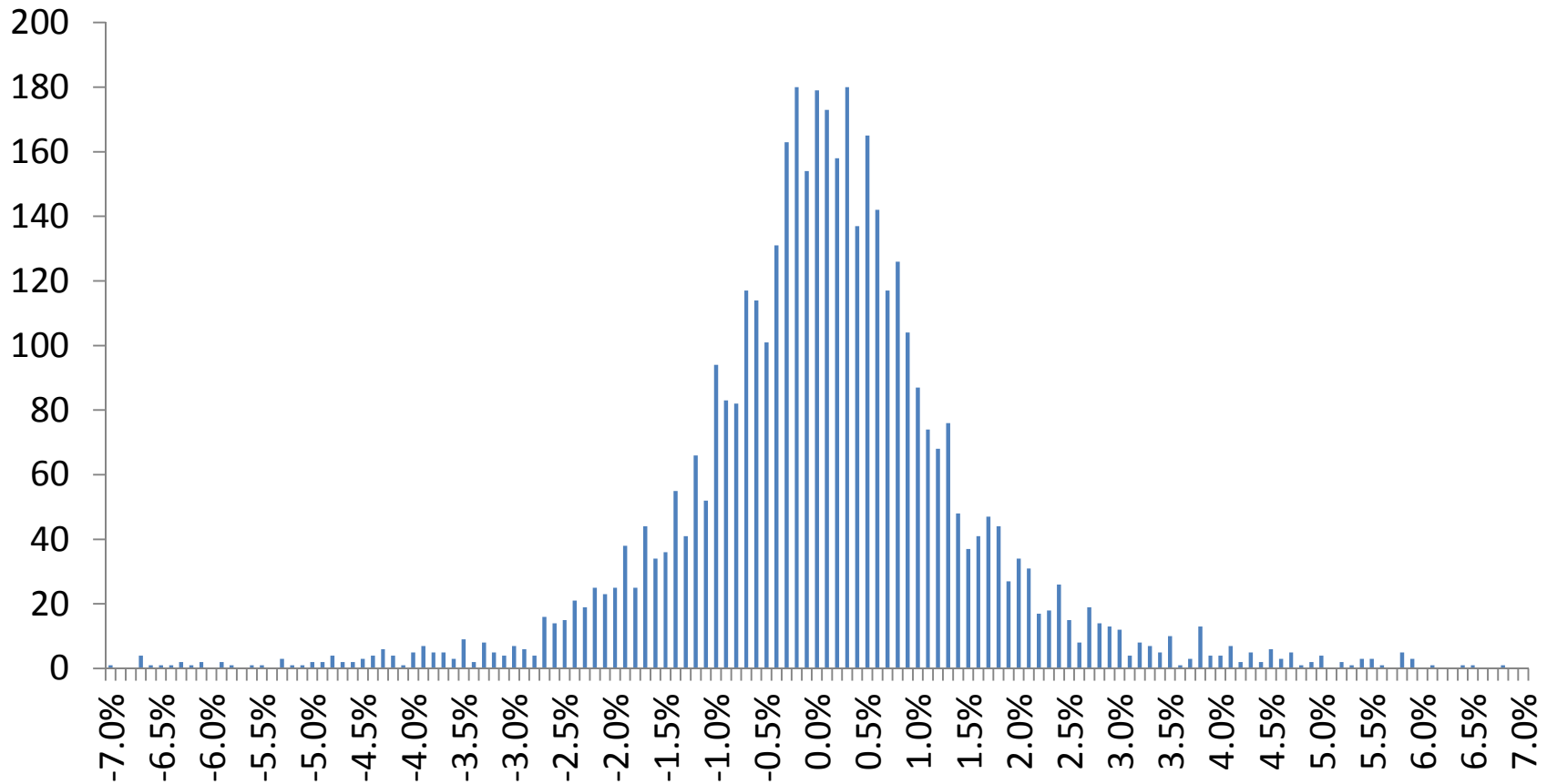
GO : ICE Gasoil

Wheat: Milling Wheat – EU origin



# Toolpak: Histograms

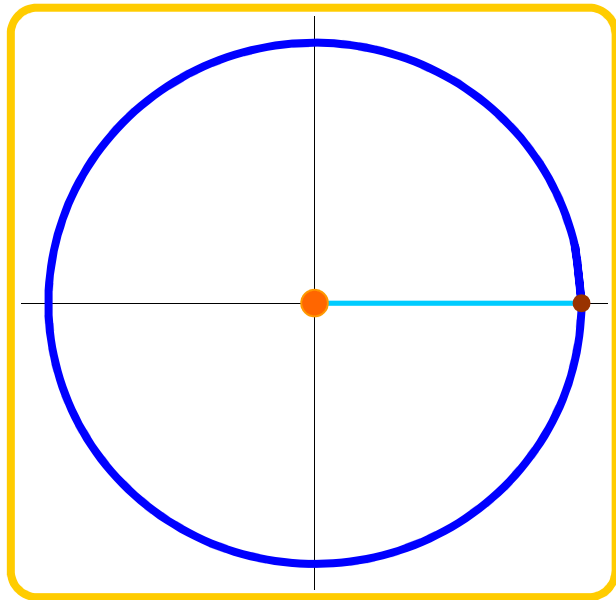
## Histogram of daily price changes CPO (1992-2009)



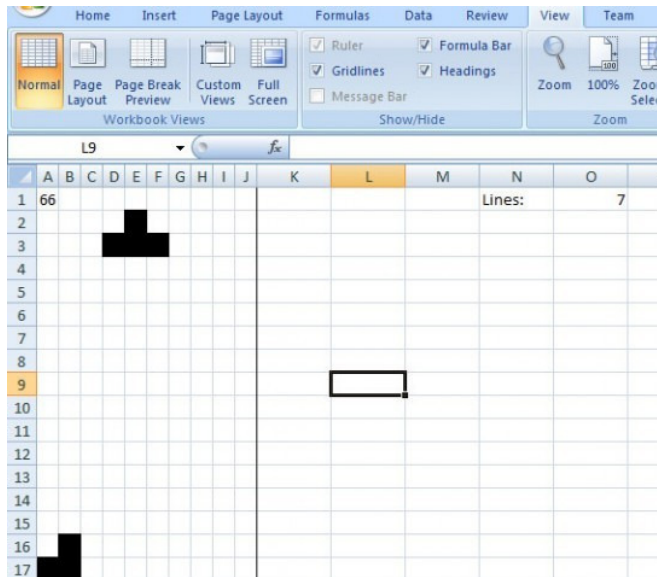
# Developer Tab - VBA

- Excel can interact with Visual Basic programming
- Programs are lines of code written to execute repetitive tasks
- Excel with VBA allow you to fully leverage the power of a computer to perform hundreds of thousands of calculations in the time that you take to write your name
  
- Examples of common repetitive tasks:
  - Reformatting a large dataset that was downloaded somewhere
  - Resetting all the sheets in a workbook to a particular template/style
- Quick and Dirty Way is to “Record Macro” – which records your set of actions so that you can repeat them quickly later.
- Also an excellent way to learn how VBA works

# VBA: Simulations



Orbits



Tetris

**Monte Carlo Simulations** – just a slightly more complex version of the above loops  
Scenarios are run thousands of times to answer questions dealing with complex probabilities

**Excel Solver:** Solves optimization problems through multiple iterations using algorithms

# Powerpivot

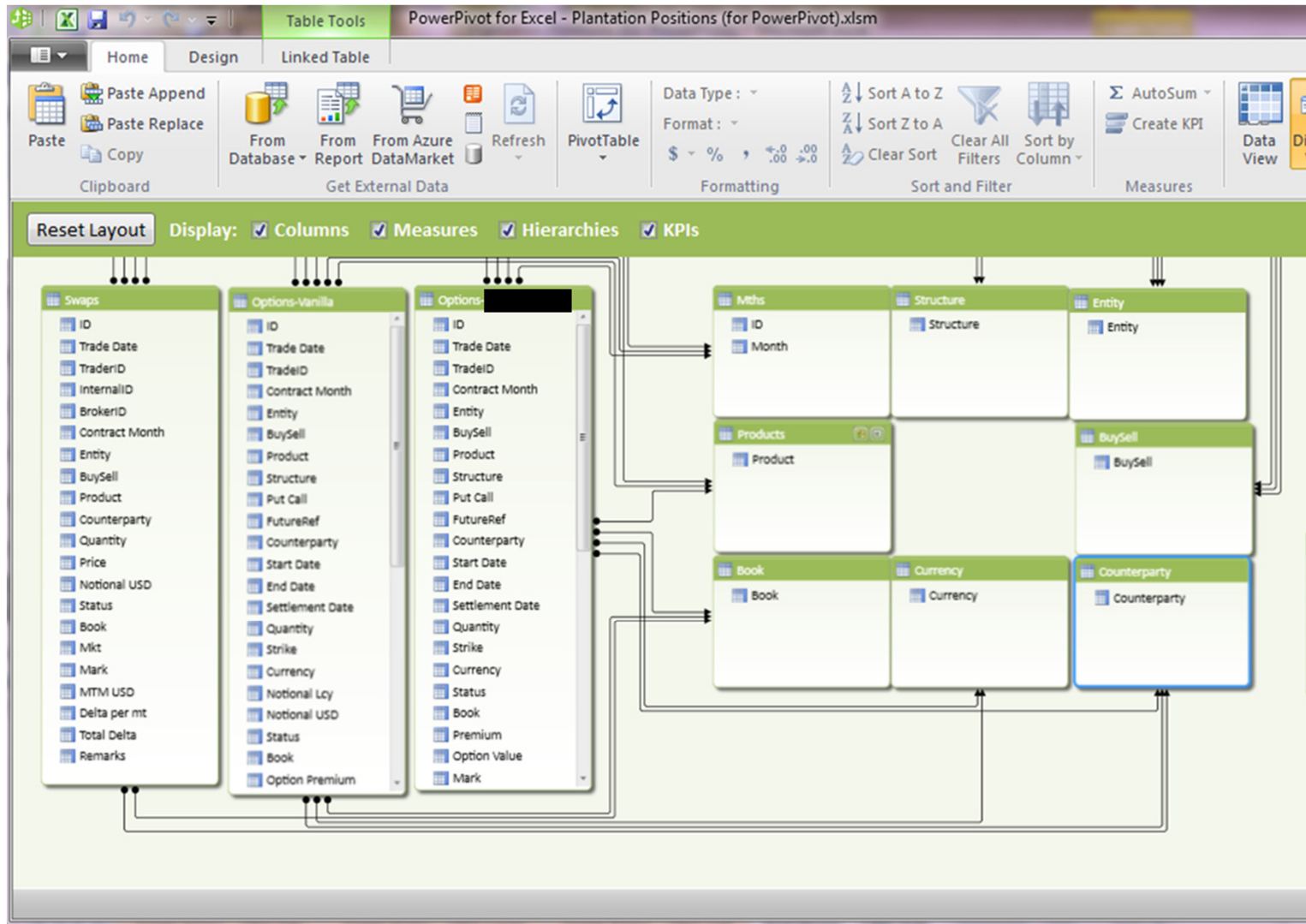
“Don’t Just Crunch Numbers. Crush Them.”

Kinda like a Hybrid between Excel and Access

Computational Power of Excel with Relational Abilities of Access

- Unlimited records vs. 1,048,576 for excel
- Combine data from multiple tables (like access)
- Calculations / Formulas as easy as in excel
- Graphing capabilities as in excel
- Slicers are in-built into Powerpivot

# Powerpivot in action



# 5. Access: demo (at end)

Demonstrations:

1. Import Data into table
2. Use Query design to create new table
3. Export table

## 6. Summary

- Access will help you retrieve and store data from databases, and help you to manipulate datasets when necessary
- Excel will help you to analyze your data and create outputs for presentation

List of excel/access resources are available for you at [blogs.ubc.ca/mliew](http://blogs.ubc.ca/mliew)

# Where Excel and Access are not useful

Where computers are rare

