

XL1C: V0D Graph by Time Ratio Display Excel2013 1

Graph Time-Series Using Ratio Display in Excel 2013

by
Milo Schield

*Elected Member: International Statistical Institute (ISI)
US Rep: International Statistical Literacy Project (ISLP)
Vice President: National Numeracy Network (NNN)
Director, W. M. Keck Statistical Literacy Project*

**Materials at: www.StatLit.org/pdf/Excel2013-Graph-Ratio-Display-Demo-Output.pdf
[/Excel2013-Graph-Ratio-Display-Slides.pdf](http://www.StatLit.org/pdf/Excel2013-Graph-Ratio-Display-Slides.pdf)**

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Goal: Graph Data By Time Using a Ratio Display

Assignment: Generate FIVE charts as shown.

- These five graphs are shown on slides 5, 6, 8, 9 and 10.
- Professional graph (slide 12) is not required.

Data is the spot price for crude oil:
West Texas Intermediate (WTI), FOB Cushing OK.

Data at:
www.StatLit.org/XLS/Excel2013-Graph-Ratio-Display-Data.xls

Original data source:
<https://research.stlouisfed.org/fred2/series/DCOILWTICO/downloaddata>

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Data at A18:B373

1	Title:	Crude Oil Prices: West Texas Intermediate (WTI) - Cushing, Oklahoma
2	Series ID:	DCOILWTICO
3	Source:	US Energy Information Administration
4	Release:	Spot Prices (Not a Press Release)
5	Seasonal Adjustment:	Not Seasonally Adjusted
6	Frequency:	Monthly
7	Aggregation Method:	Average
8	Units:	Dollars per Barrel
9	Date Range:	1986-01-02 to 2015-08-17
10	Last Updated:	2015-08-19 1:41 PM CDT
11	Notes:	Definitions, Sources and Explanatory Notes: http://www.eia.doe.gov/dnav/pet/tblDefs/pet_spt_tbldef2.asp
12	Source:	https://research.stlouisfed.org/fred2/series/DCOILWTICO/downloaddata
13	Filename:	201508-DCOILWTICO-Monthly.xls

DATE	PRICE
1986-01-01	22.93
1986-02-01	15.45
1986-03-01	12.61

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Select Line Graph: 2-D. No markers

The screenshot shows the 'Chart Wizard' dialog box in Excel. The 'Chart type' is set to 'Line'. The 'Subtype' is '2-D Line'. The 'Options' tab is selected, and the 'Markers' checkbox is unchecked. A preview of the resulting line graph is shown on the right.

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Graph 1: Y is Linear X: Major 24 M; Date

The screenshot shows the 'Format Axis' task pane. Under 'AXIS OPTIONS', the 'Date axis' is selected. The 'Bounds' section shows 'Minimum' as 1/1/1986 and 'Maximum' as 7/1/2015. The 'Units' section shows 'Major' as 24 and 'Months'. The 'NUMBER' section shows 'Category' as 'Date' and 'Type' as '*3/14/2001'. A preview of the graph shows a line chart with a date axis.

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Graph 2: Format Year yyyy

The screenshot shows the 'Format Axis' task pane. The 'NUMBER' section is expanded, and the 'Format Code' is set to 'yyyy'. The 'Add' button is highlighted with a red circle. A preview of the graph shows a line chart with a year axis.

Problem with Linear

Compare two doublings:

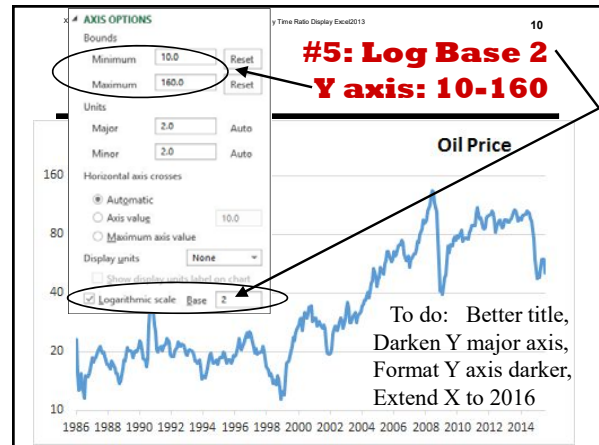
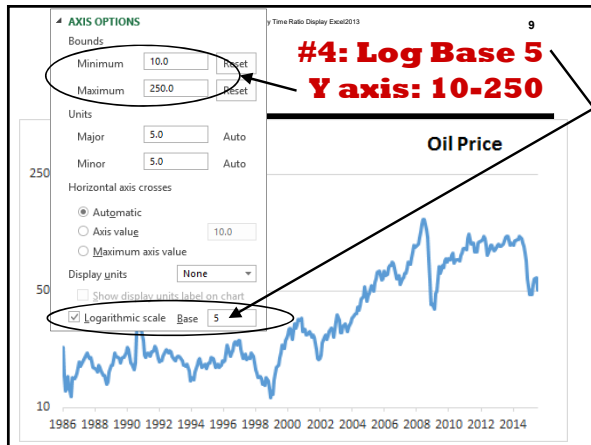
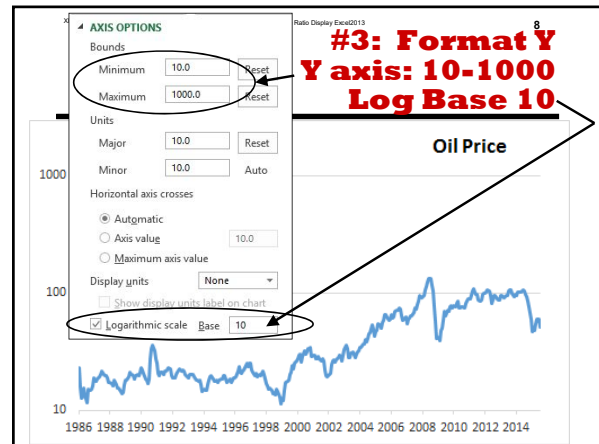
- Doubling from 20 to 40 (20 points).
- Doubling from 80 to 160 (80 points)

Second looks bigger than the first on a linear interval scale.

Goal: Scale the y-axis so each doubling has the same size.

Solution: Format the y-axis using a 'ratio scale'.
 Ratio scale: Identical ratios (doublings) have same size.

Technically, a 'ratio scale' is called a "logarithmic scale."



Results

US Oil since 1986. Min =10; Max = 140. Factor of 14.

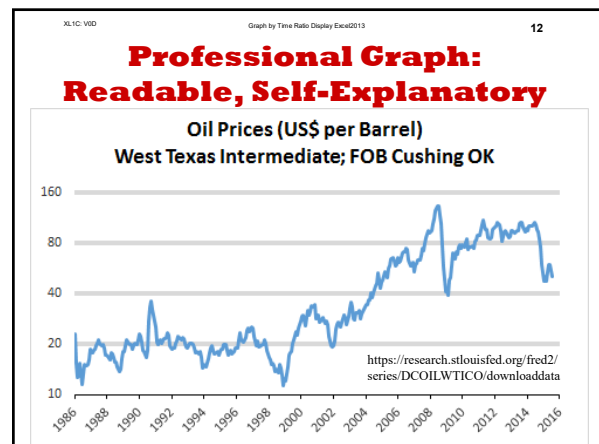
Use Log scale when Y data values more than double.

Set base so there are 2-4 powers between min & max

- Base 10: 10 to 1000. One power between min & max
- Base 5: 5 to 125: One power between min & max.
- Base 2: 10 to 160: Three powers between min & max.

Conclusion: Log scale with base 2 is preferred.

Note: A professional graph (slide 12) should be easily readable from a distance and be self-explanatory.



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[/Excel2013-Graph-Ratio-Display-Demo-Output.pdf](#)

[/Excel2013-Graph-Ratio-Display-Slides.pdf](#)

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West Texas Intermediate (WTI), FOB Cushing OK.

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www.StatLit.org/XLS/Excel2013-Graph-Ratio-Display-Data.xls

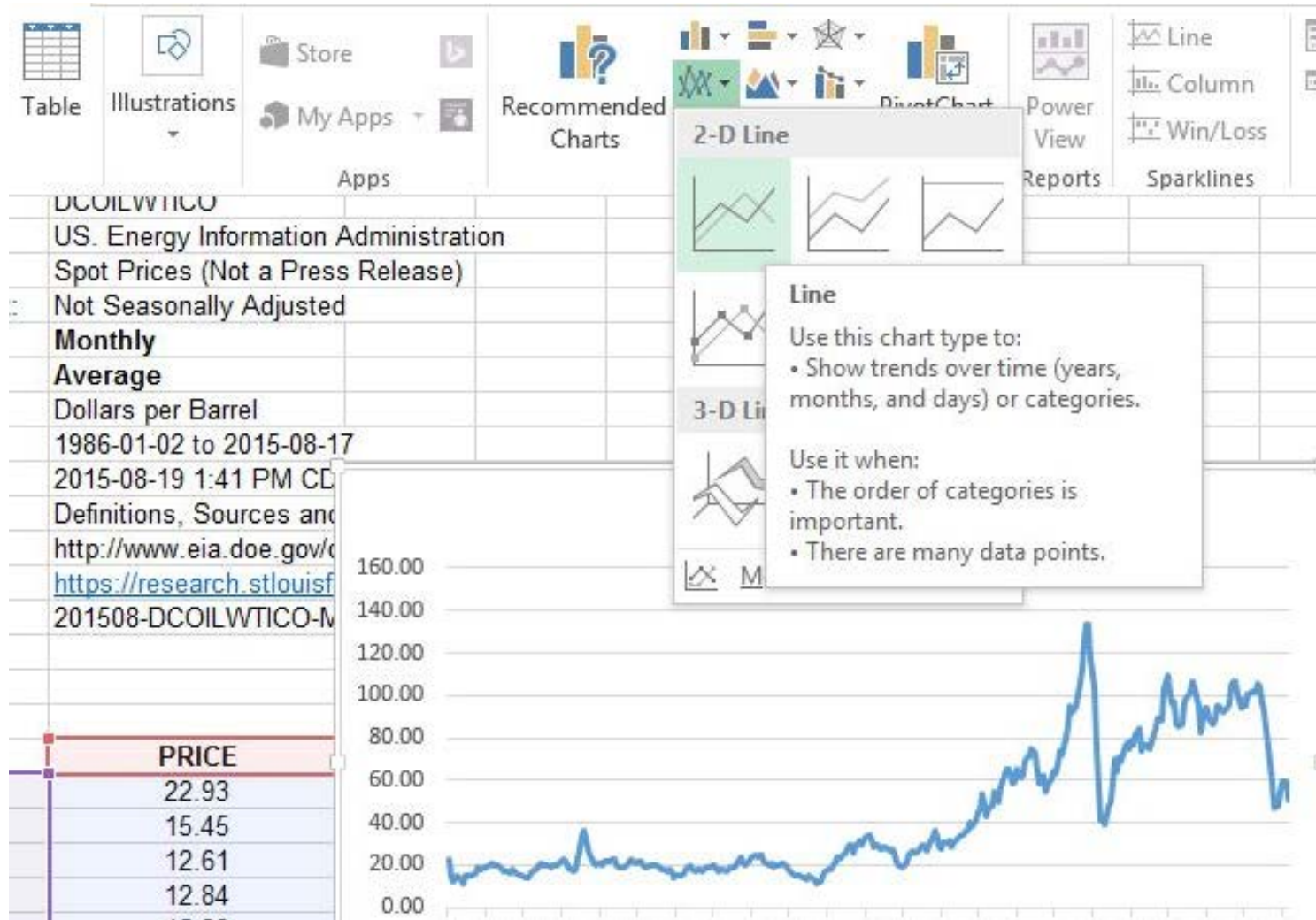
Original data source:

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Data at A18:B373

	A	B	C	D	E	F
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16	DATE	PRICE				
17	1986-01-01	22.93				
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19	1986-03-01	12.61				
20	1986-04-01	12.54				

Select Line Graph: 2-D. No markers



Graph 1: Y is Linear X: Major 24 M; Date

Format Axis

AXIS OPTIONS

TEXT OF



Date axis

Bounds

Minimum 1/1/1986

Maximum 7/1/2015

Units

Major 24 Months

NUMBER

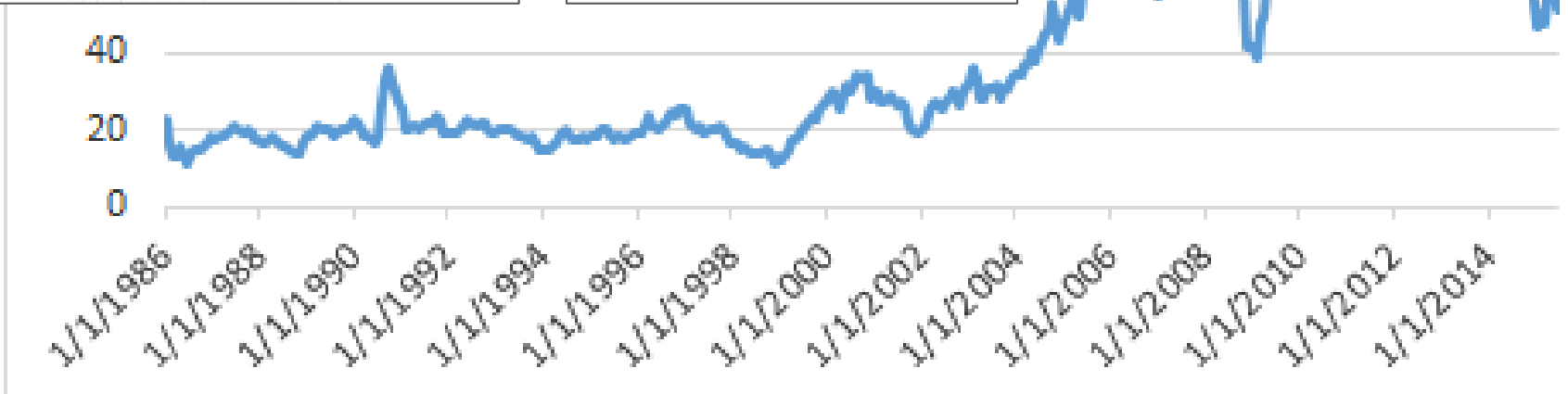
Category

Date

Type

*3/14/2001

Oil Price



Graph 2: Format Year

yyyy

Oil Price

NUMBER

Category

Custom

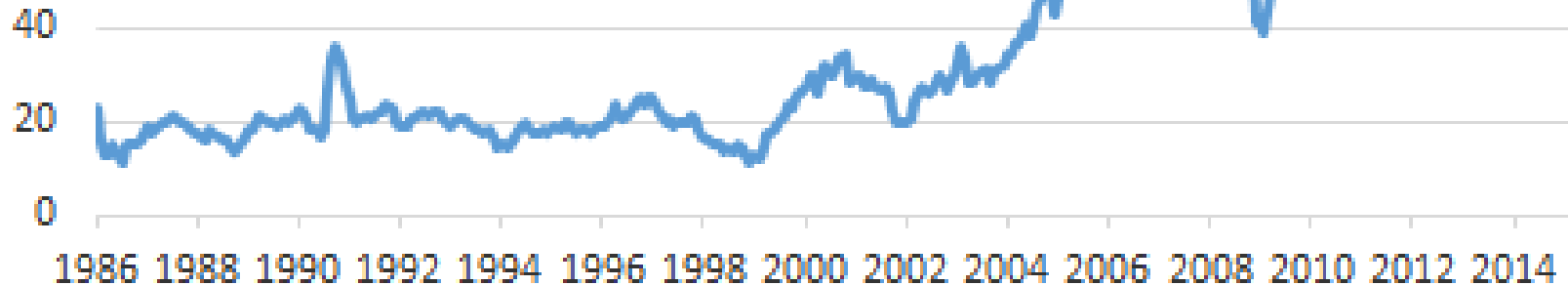
Type

yyyy

Format Code

yyyy

Add



Problem with Linear

Compare two doublings:

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Technically, a 'ratio scale' is called a "logarithmic scale."

#3: Format Y Y axis: 10-1000 Log Base 10

AXIS OPTIONS

Bounds

Minimum

Maximum

Units

Major

Minor

Horizontal axis crosses

Automatic

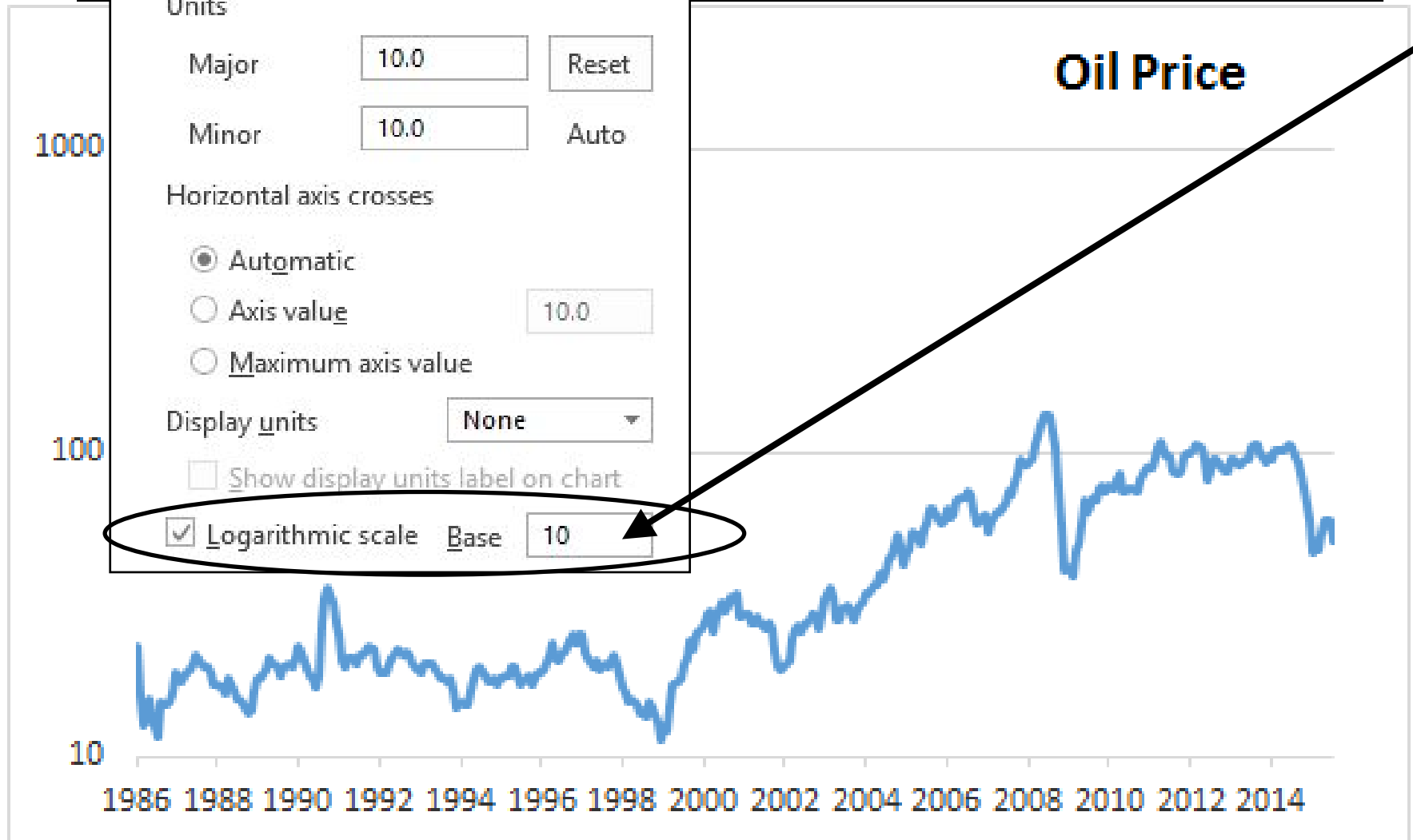
Axis value

Maximum axis value

Display units

Show display units label on chart

Logarithmic scale Base



#4: Log Base 5 Y axis: 10-250

AXIS OPTIONS

Bounds

Minimum

Maximum

Units

Major Auto

Minor Auto

Horizontal axis crosses

Automatic

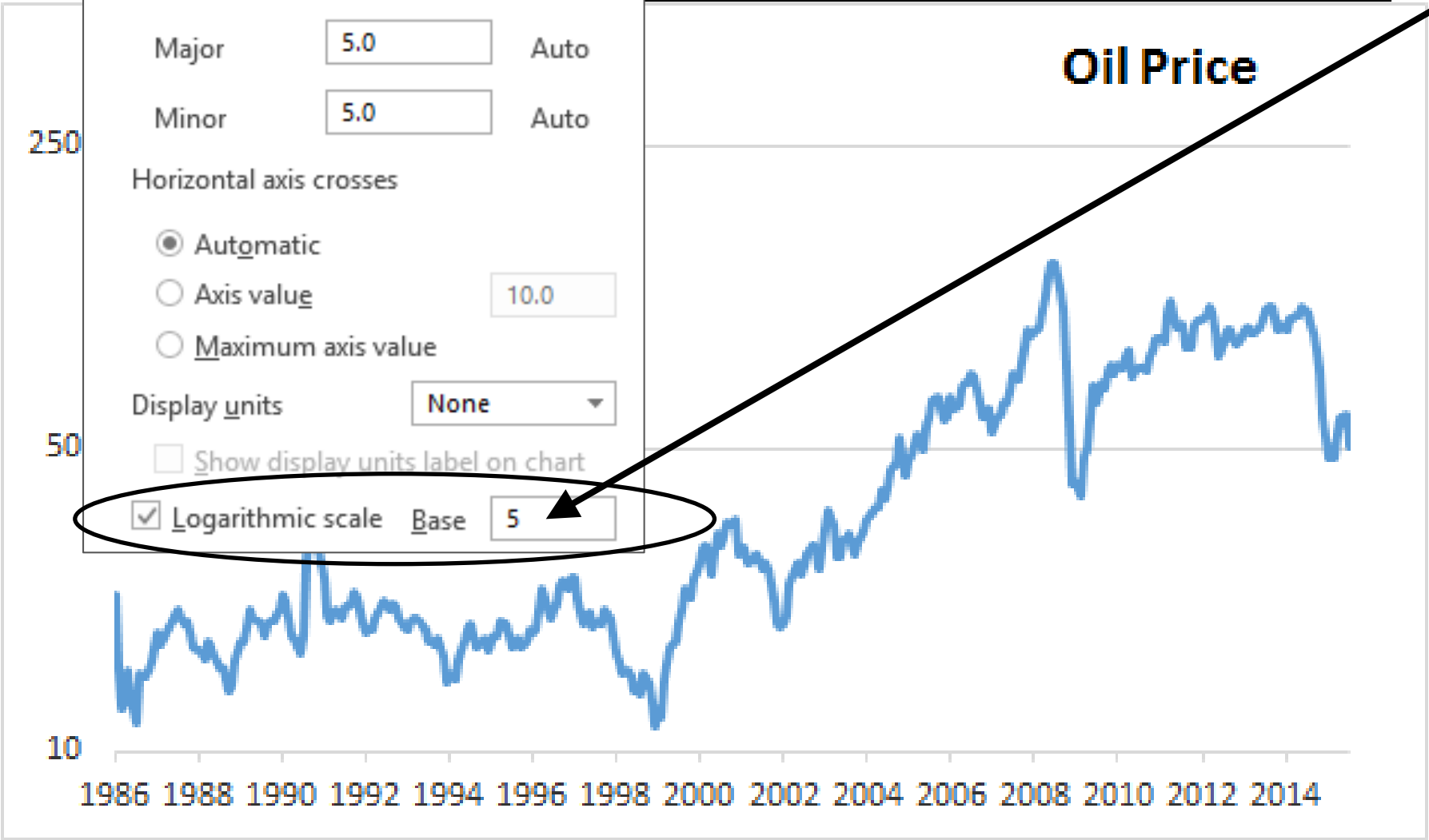
Axis value

Maximum axis value

Display units ▼

Show display units label on chart

Logarithmic scale Base



#5: Log Base 2 Y axis: 10-160

AXIS OPTIONS

Bounds

Minimum

Maximum

Units

Major

Minor

Horizontal axis crosses

Automatic

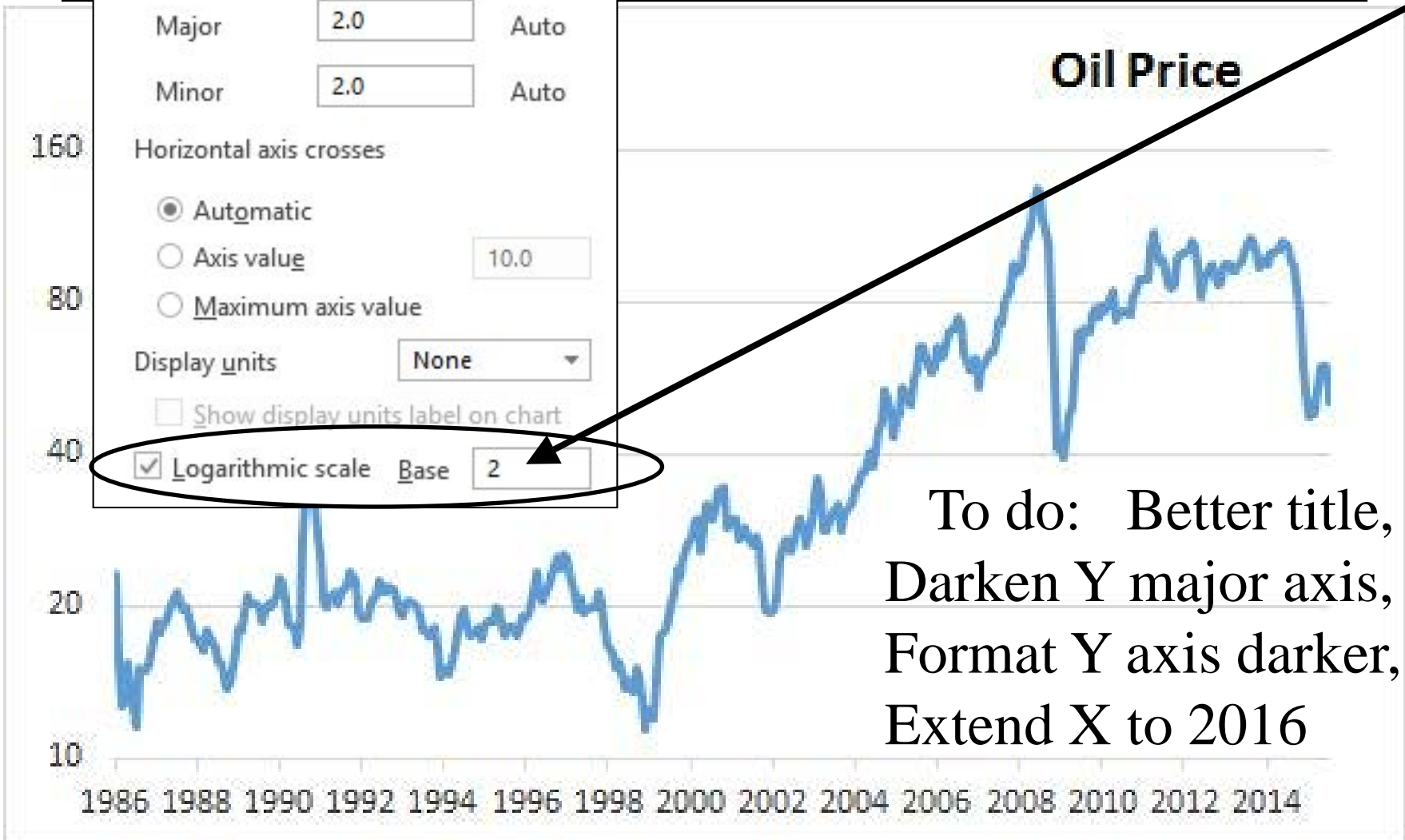
Axis value

Maximum axis value

Display units

Show display units label on chart

Logarithmic scale Base



To do: Better title,
Darken Y major axis,
Format Y axis darker,
Extend X to 2016

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Conclusion: Log scale with base 2 is preferred.

Note: A professional graph (slide 12) should be easily readable from a distance and be self-explanatory.

Professional Graph: Readable, Self-Explanatory

Oil Prices (US\$ per Barrel)

West Texas Intermediate; FOB Cushing OK

