CPSC203 WEEK-2 LAB-2
SPREADSHEET DESIGN RULES

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SOME BASIC RULES ABOUT DESIGN

- Design the spreadsheet on paper first. Graph paper often works well.
- Test and edit your calculations. Where appropriate use intermediate calculations and check-sums to ensure calculations are correct.
- Keep the components of a calculation visible. No "magic numbers". Place fixed numbers used in a calculation in their own cell with a descriptive title.
- Be aware of the "space" or "geography" of the spreadsheet. Arrange your information so that it is well spaced and easy to take in at a glance.

PARTS OF A WELL DESIGNED SPREADSHEET

Adapted from: **The Elements of Spreadsheet Style. 1986. By J.M. Nevison**

These parts can be considered components of a disciplined approach to building spreadsheet so they are self-documenting. The parts could each be in their own sheet, or they could be in a single sheet.

- **Introduction** -- What is this spreadsheet or workbook about. Note the title, purpose, author, creation and revision dates etc.
- **Model and Assumptions** -- Justify any models, summary statistics, or calculated variables you are using.

PARTS OF A WELL DESIGNED SPREADSHEET

- **Data Dictionary** -- For every variable in the spreadsheet note: its
  - **Location** (cell range),
  - **Name**,
  - The **Data Class** it is (Raw Data, Statistical Summary, Calculated Variable, Score etc.),
  - **Data Type** (e.g. Integer, Text, Currency, Date, etc.) and
  - **Description** (a description of the data or what it's 'purpose' is).
- **Raw Data** -- Present your raw data in tabular form -- with **columns representing variables** and **rows representing cases**.

PARTS OF A WELL DESIGNED SPREADSHEET

- **Calculated Data**
  - Summary Statistics -- Usually Summary statistics result from calculations across rows for a single column.
  - Derived variables are often based on calculations across columns for a row.
- **Presentation** (Reporting)
  - Emphasize the final information you wish to show without excessive background details.
  - Use charts wherever appropriate to summarize large volumes of data.

EXAMPLE

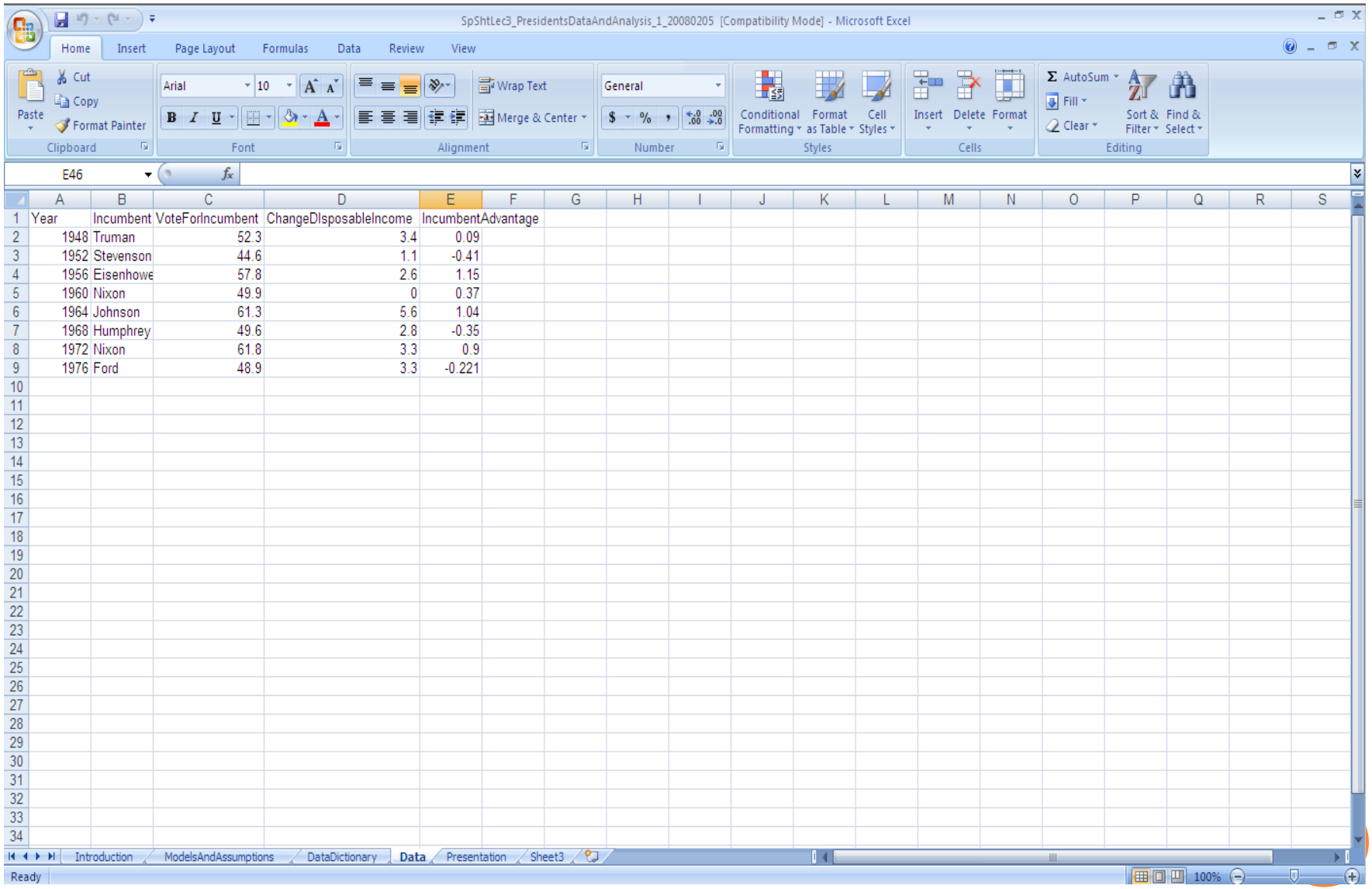
- The following example shows incremental improvements, working towards good spreadsheet design

Part 1

In this first iteration, two separate sheets are used:

- data
- presentation

EXAMPLE



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Year	Incumbent	VoteForIncumbent	ChangeDIsposableIncome	IncumbentAdvantage														
2	1948	Truman	52.3	3.4	0.09														
3	1952	Stevenson	44.6	1.1	-0.41														
4	1956	Eisenhowe	57.8	2.6	1.15														
5	1960	Nixon	49.9	0	0.37														
6	1964	Johnson	61.3	5.6	1.04														
7	1968	Humphrey	49.6	2.8	-0.35														
8	1972	Nixon	61.8	3.3	0.9														
9	1976	Ford	48.9	3.3	-0.221														
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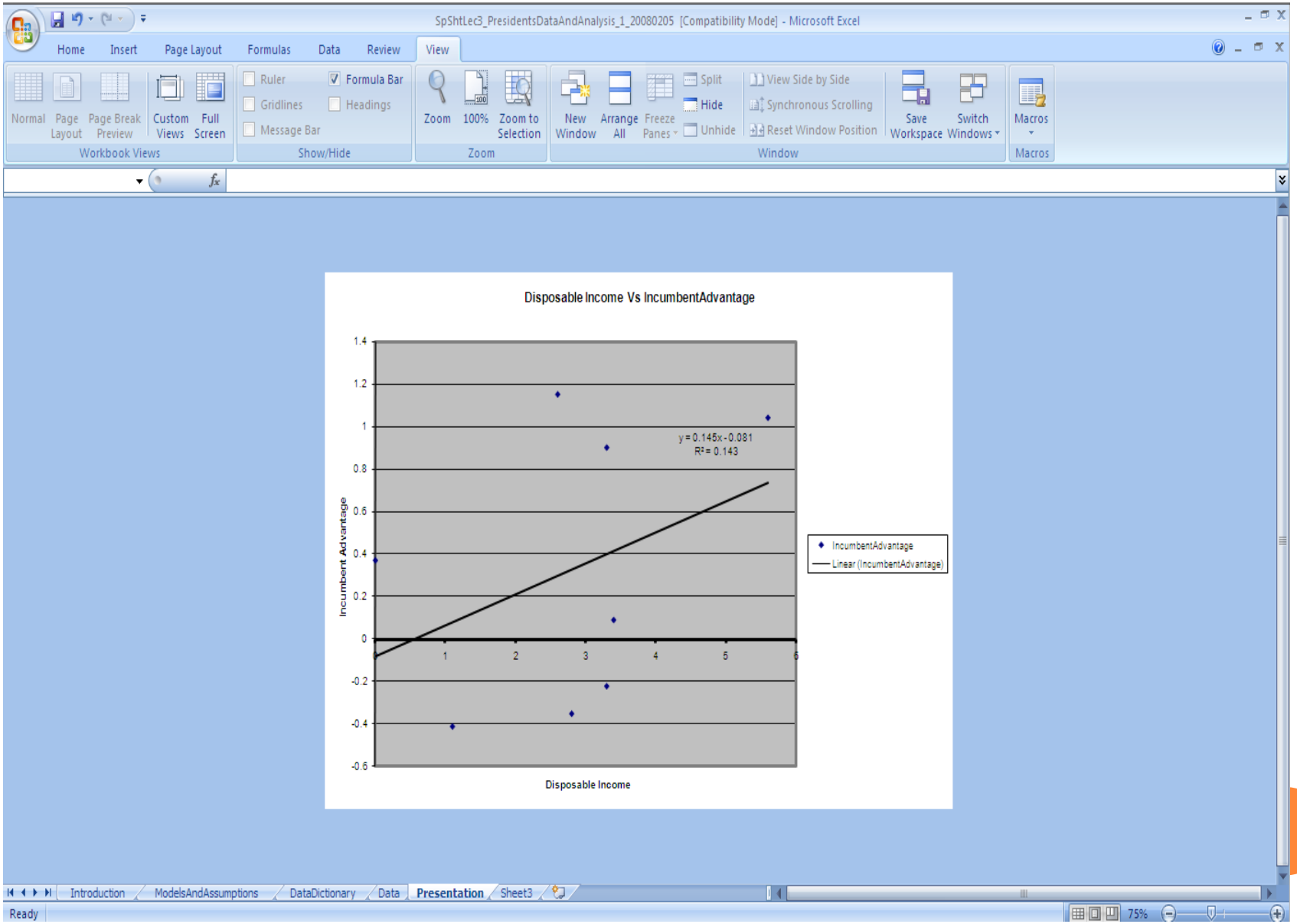
EXAMPLE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Reset Window Position
Save Workspace
Switch Windows
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Macros
Disposable Income Vs IncumbentAdvantage
y = 0.145x - 0.081
R² = 0.143
Incumbent Advantage
Disposable Income
IncumbentAdvantage
Linear (IncumbentAdvantage)
Introduction
ModelsAndAssumptions
DataDictionary
Data
Presentation
Sheet3
Ready
75%

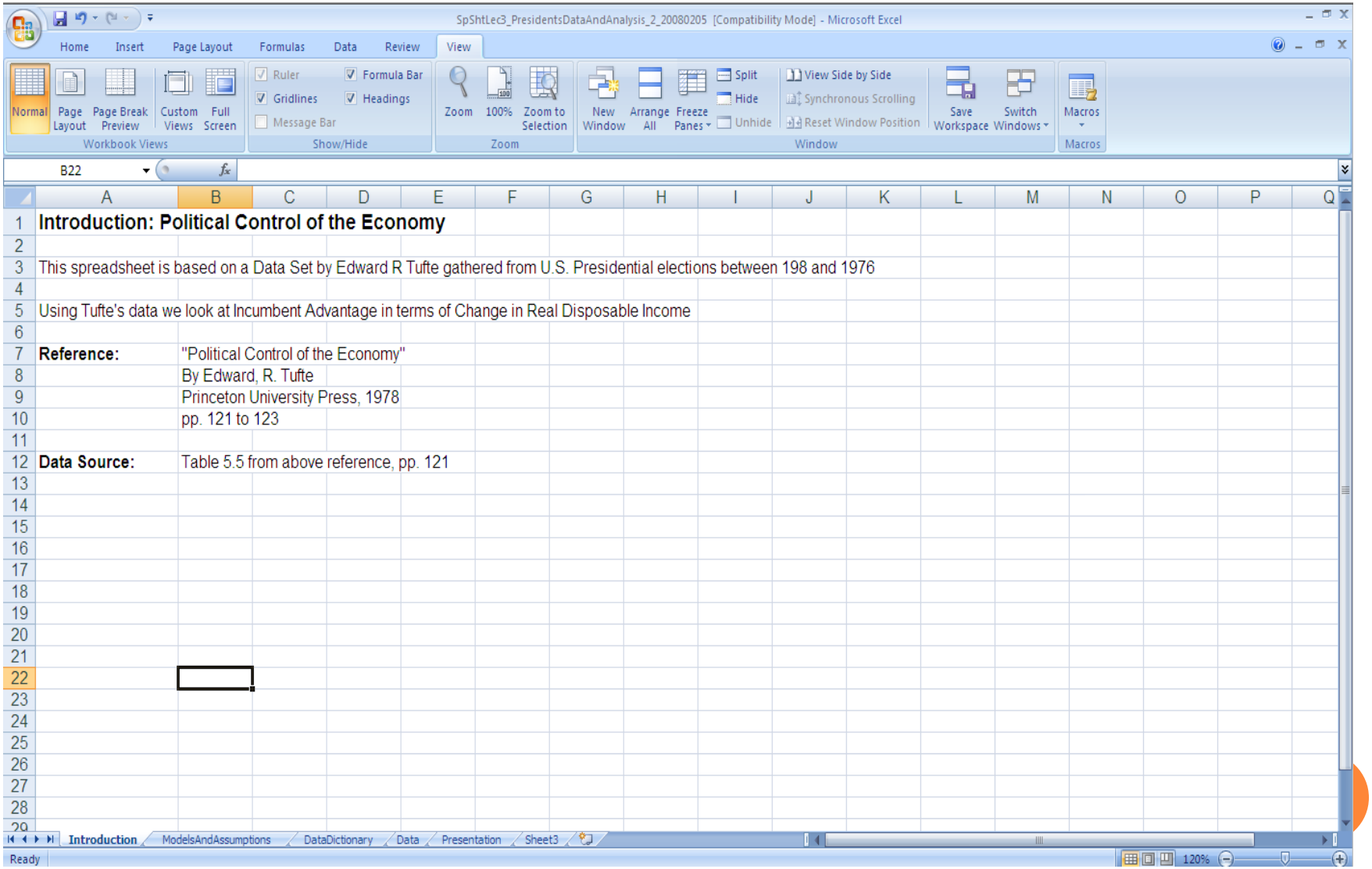
EXAMPLE

Part 2

In this second iteration, five separate sheets are used:

- introduction
- model and assumptions
- data dictionary
- data
- presentation

EXAMPLE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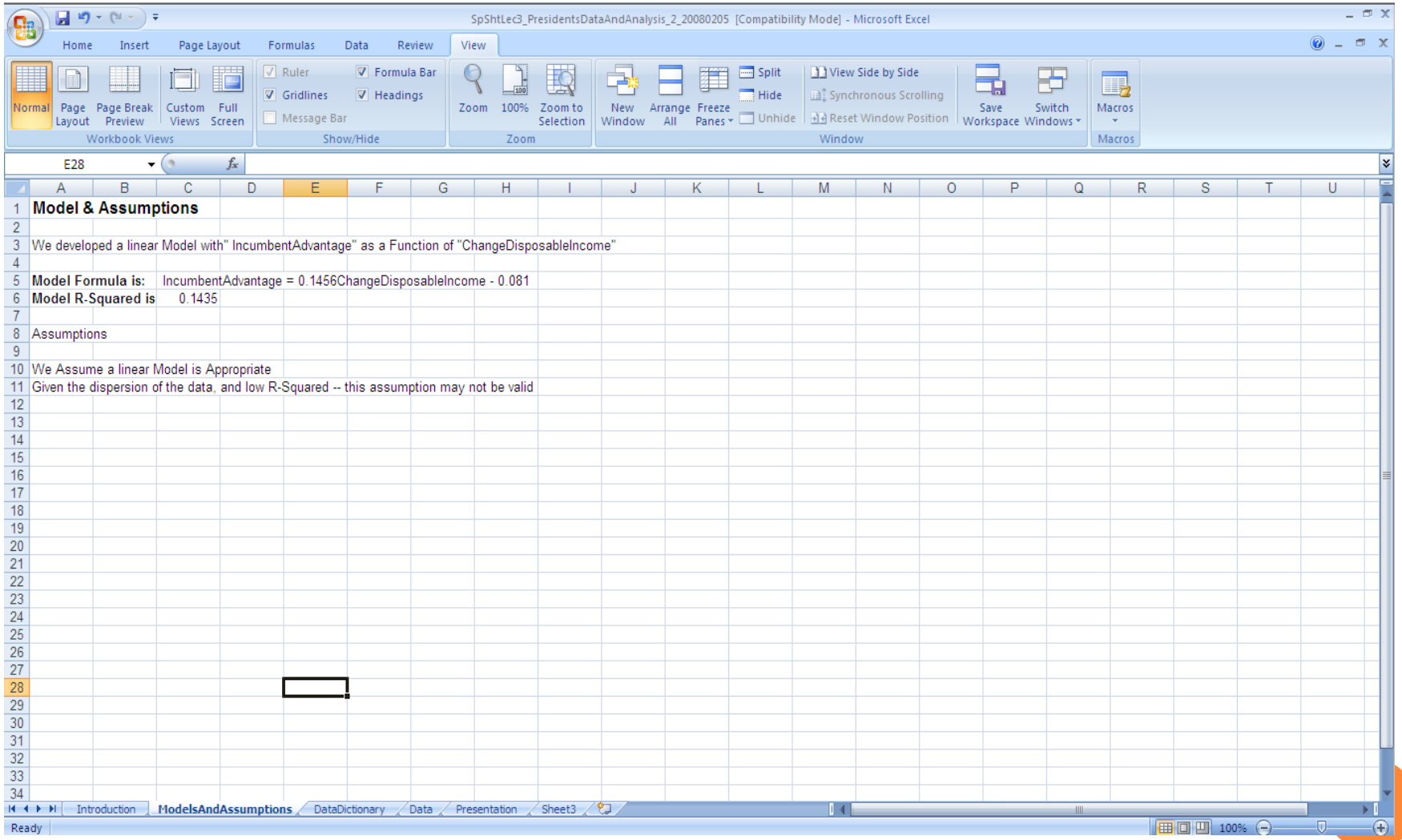
Macros
Macros
B22
Introduction: Political Control of the Economy
This spreadsheet is based on a Data Set by Edward R Tufte gathered from U.S. Presidential elections between 198 and 1976
Using Tufte's data we look at Incumbent Advantage in terms of Change in Real Disposable Income
Reference:
"Political Control of the Economy"
By Edward, R. Tufte
Princeton University Press, 1978
pp. 121 to 123
Data Source:
Table 5.5 from above reference, pp. 121
Introduction
ModelsAndAssumptions
DataDictionary
Data
Presentation
Sheet3
Ready
120%

EXAMPLE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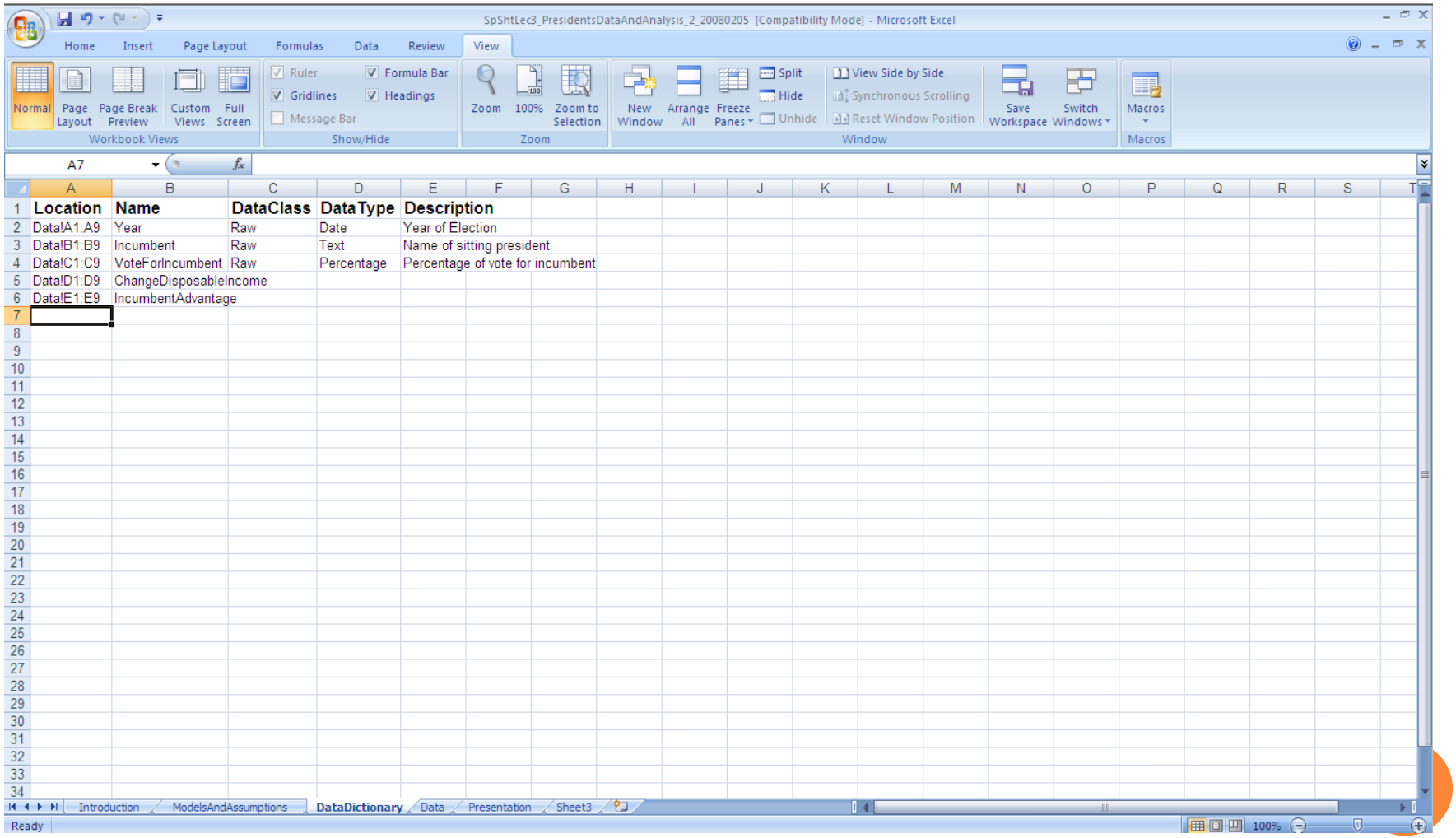
Macros
Macros
E28
Model & Assumptions
We developed a linear Model with" IncumbentAdvantage" as a Function of "ChangeDisposableIncome"
Model Formula is: IncumbentAdvantage = 0.1456ChangeDisposableIncome - 0.081
Model R-Squared is 0.1435
Assumptions
We Assume a linear Model is Appropriate
Given the dispersion of the data, and low R-Squared -- this assumption may not be valid
Introduction
ModelsAndAssumptions
DataDictionary
Data
Presentation
Sheet3
Ready
100%

EXAMPLE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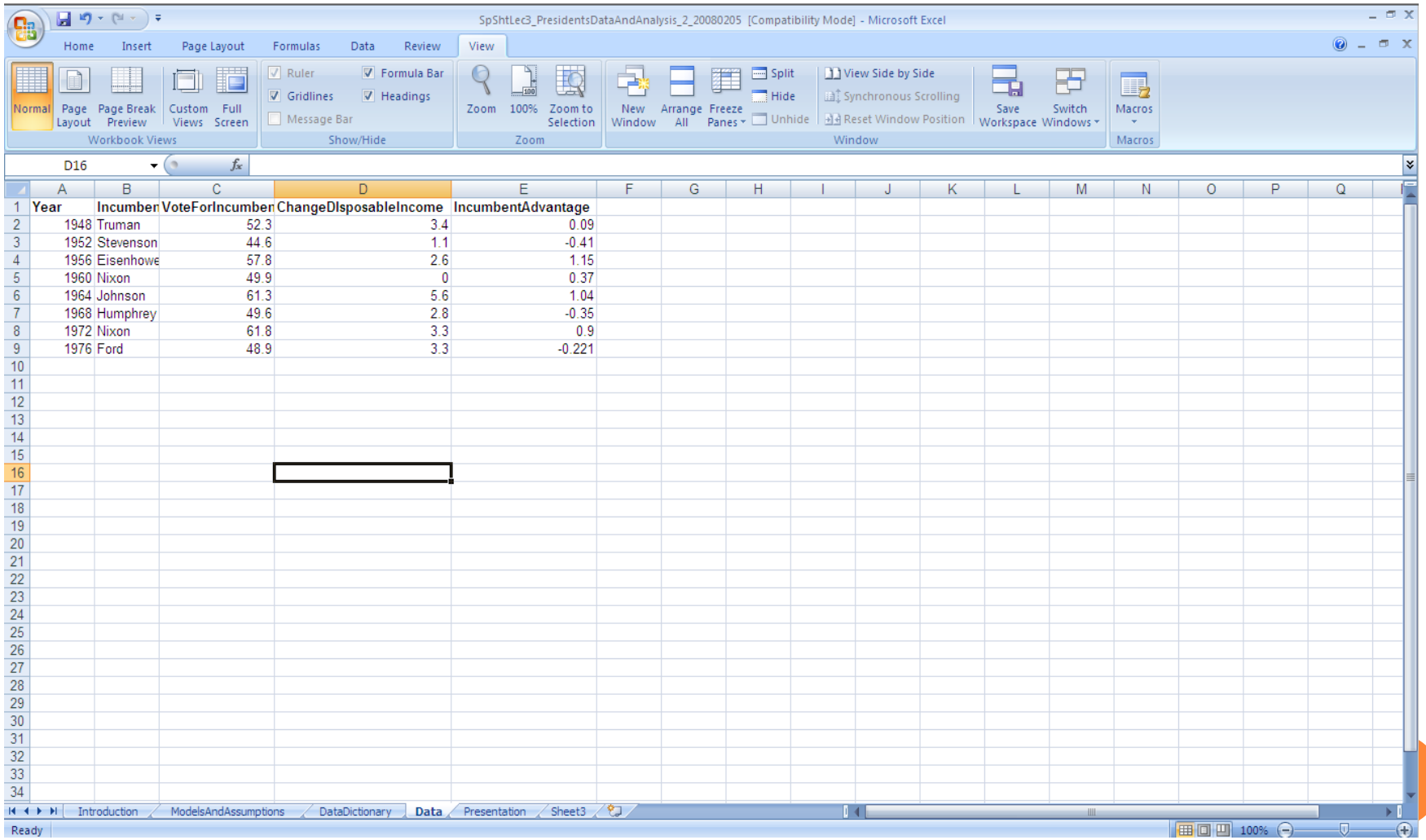
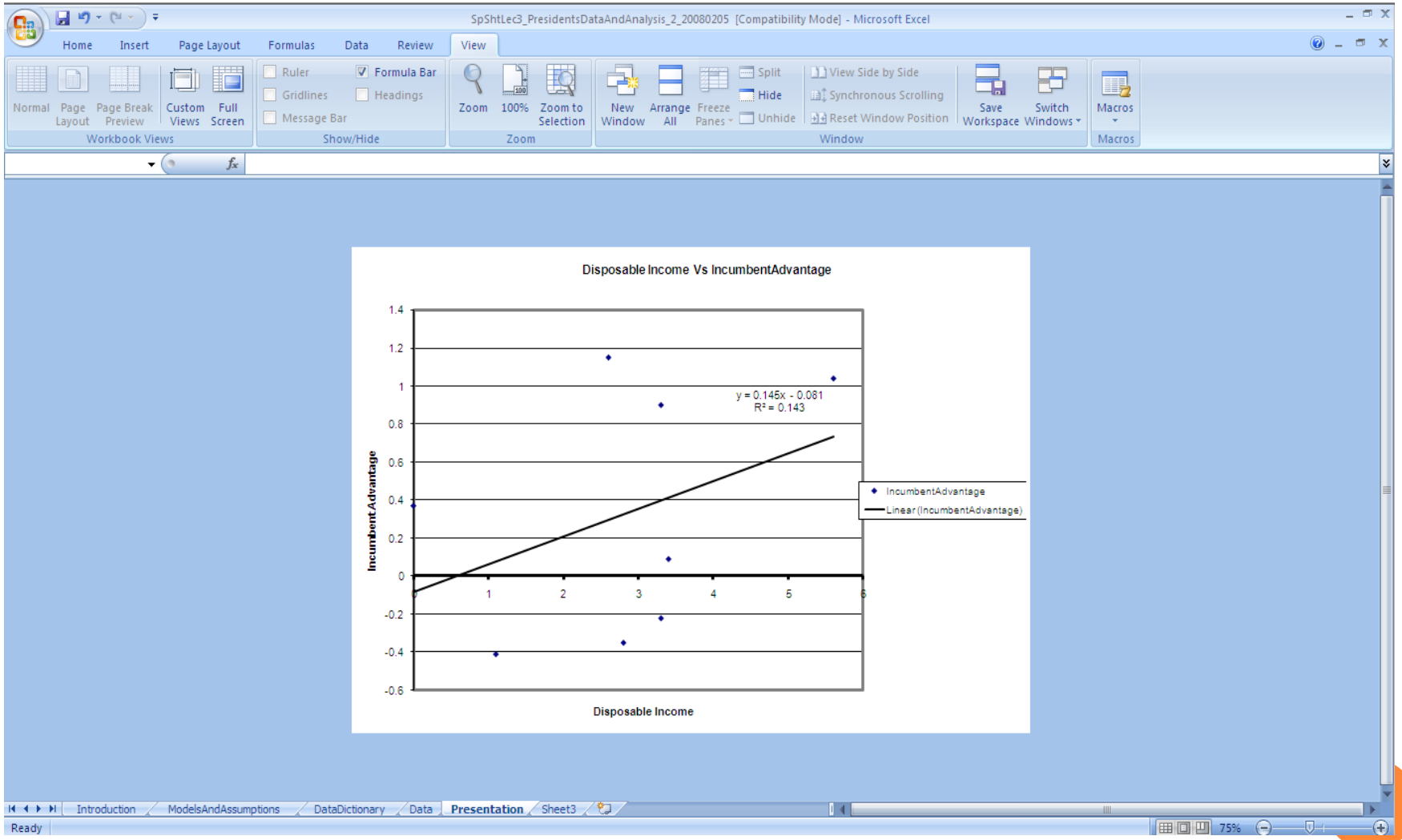
Macros
Macros
A7
Location
Name
DataClass
DataType
Description
Data!A1:A9
Year
Raw
Date
Year of Election
Data!B1:B9
Incumbent
Raw
Text
Name of sitting president
Data!C1:C9
VoteForIncumbent
Raw
Percentage
Percentage of vote for incumbent
Data!D1:D9
ChangeDisposableIncome
Data!E1:E9
IncumbentAdvantage
Introduction
ModelsAndAssumptions
DataDictionary
Data
Presentation
Sheet3
Ready
100%

EXAMPLE



	A	B	C	D	E
1	Year	Incumben	VoteForIncumber	ChangeDIsposableIncome	IncumbentAdvantage
2	1948	Truman	52.3	3.4	0.09
3	1952	Stevenson	44.6	1.1	-0.41
4	1956	Eisenhowe	57.8	2.6	1.15
5	1960	Nixon	49.9	0	0.37
6	1964	Johnson	61.3	5.6	1.04
7	1968	Humphrey	49.6	2.8	-0.35
8	1972	Nixon	61.8	3.3	0.9
9	1976	Ford	48.9	3.3	-0.221

EXAMPLE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Macros
Disposable Income Vs IncumbentAdvantage
y = 0.145x - 0.081
R² = 0.143
IncumbentAdvantage
Linear (IncumbentAdvantage)
Disposable Income
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
0
1
2
3
4
5
6
Introduction
ModelsAndAssumptions
DataDictionary
Data
Presentation
Sheet3
Ready
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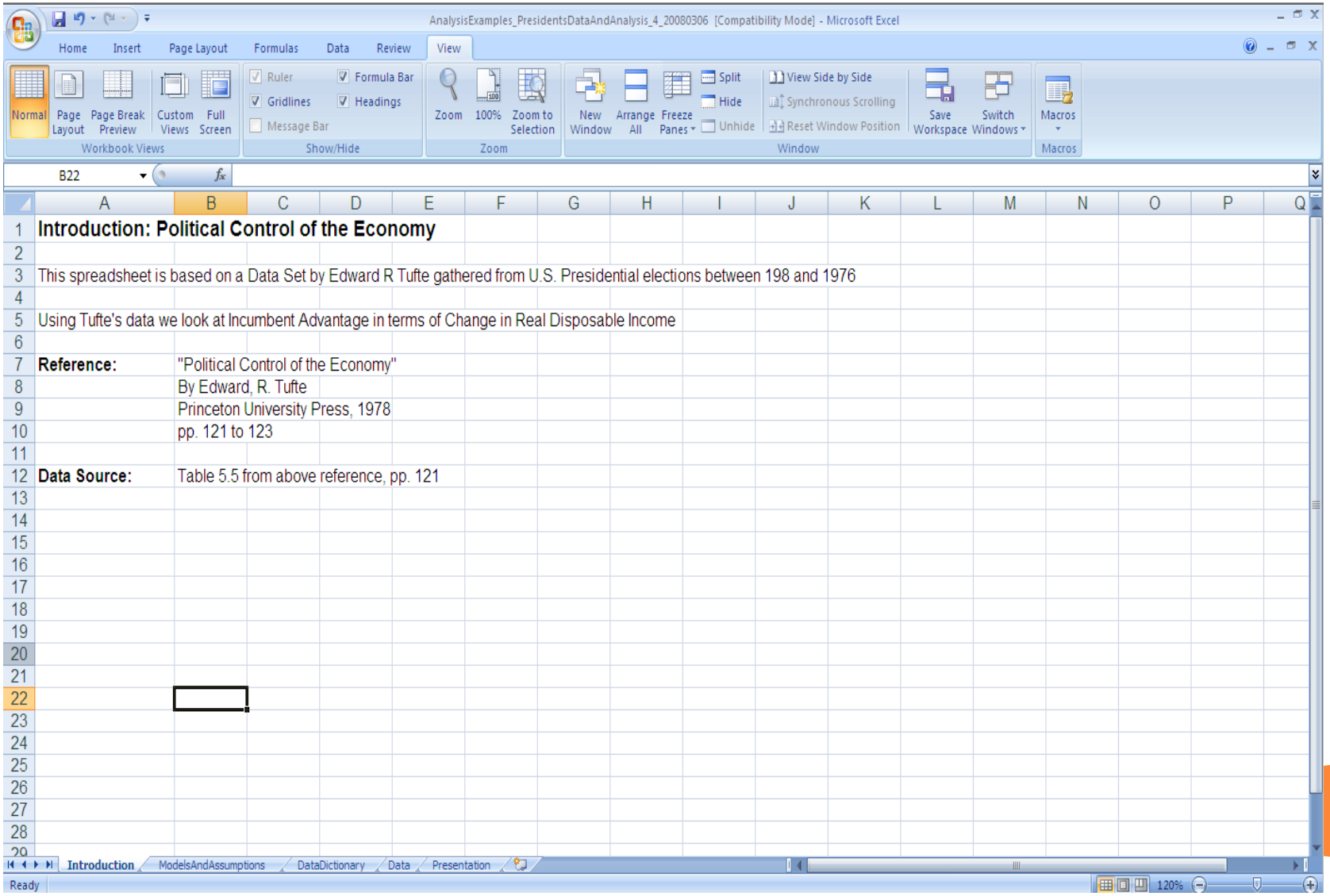
EXAMPLE

Part 3

- In this third iteration, the same five sheets are used (as in Part 2), with further refinements, descriptions, and presentation of the two models used.

EXAMPLE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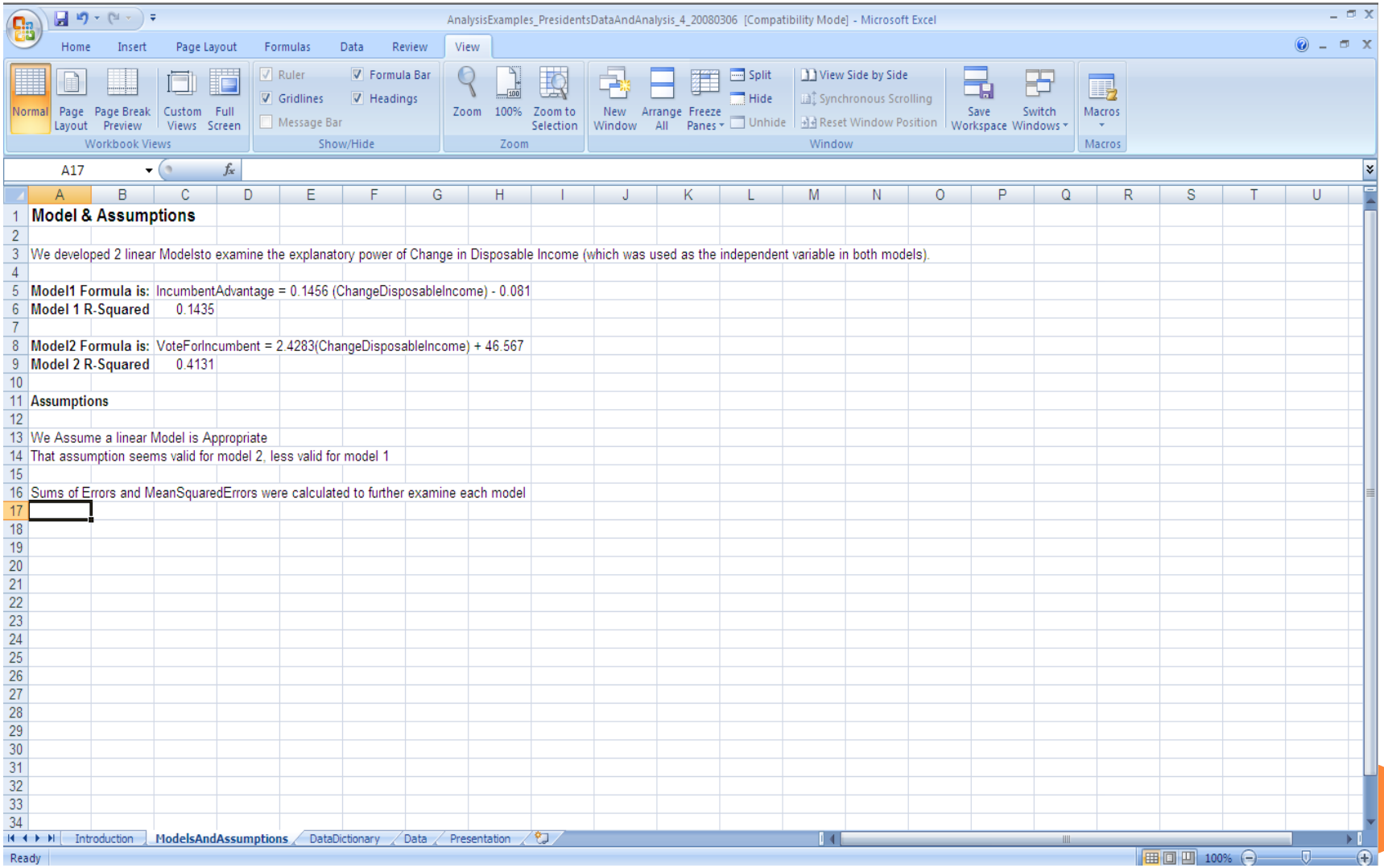
pp. 121 to 123
Data Source:
Table 5.5 from above reference, pp. 121
Introduction
ModelsAndAssumptions
DataDictionary
Data
Presentation
Ready
120%

EXAMPLE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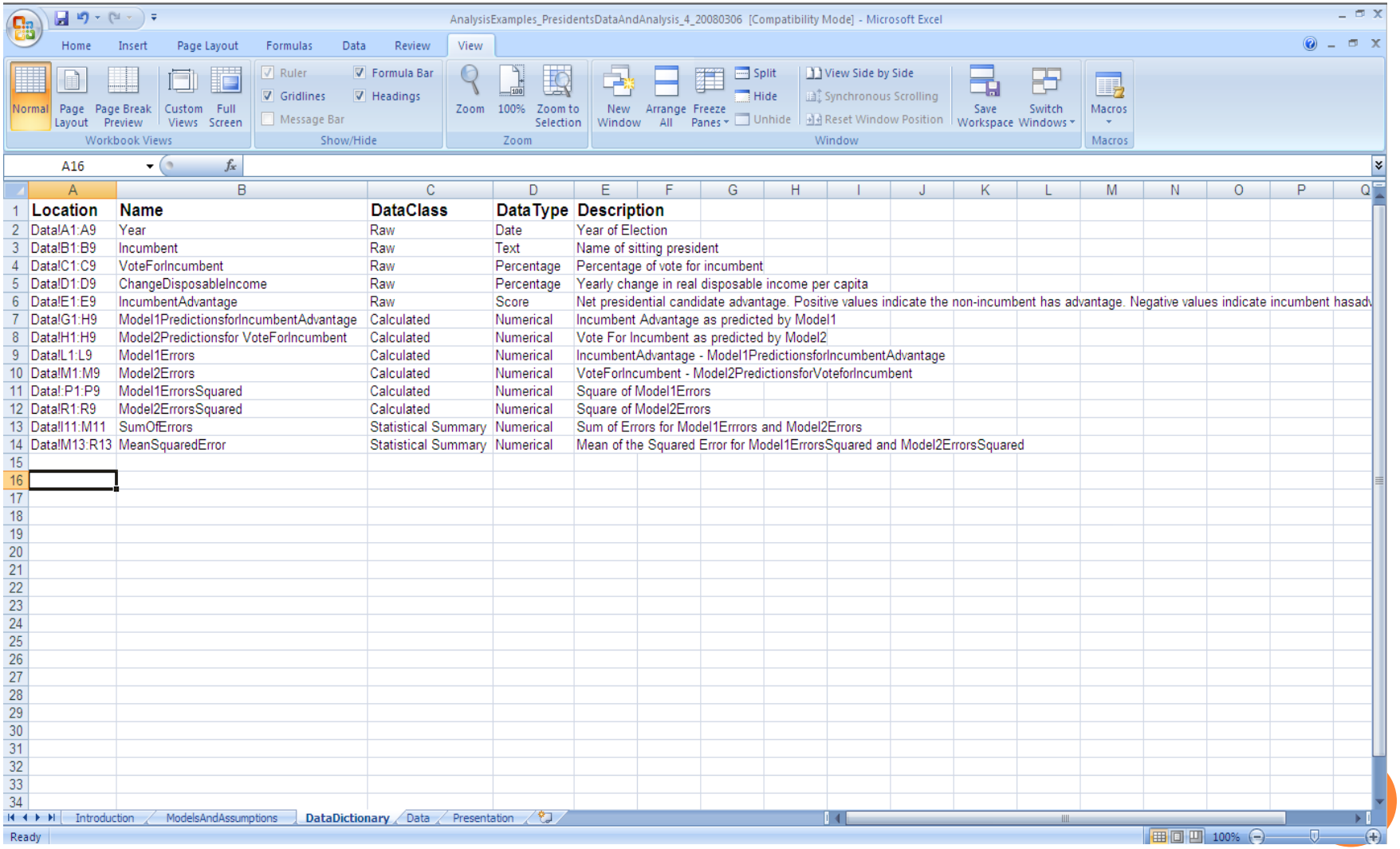
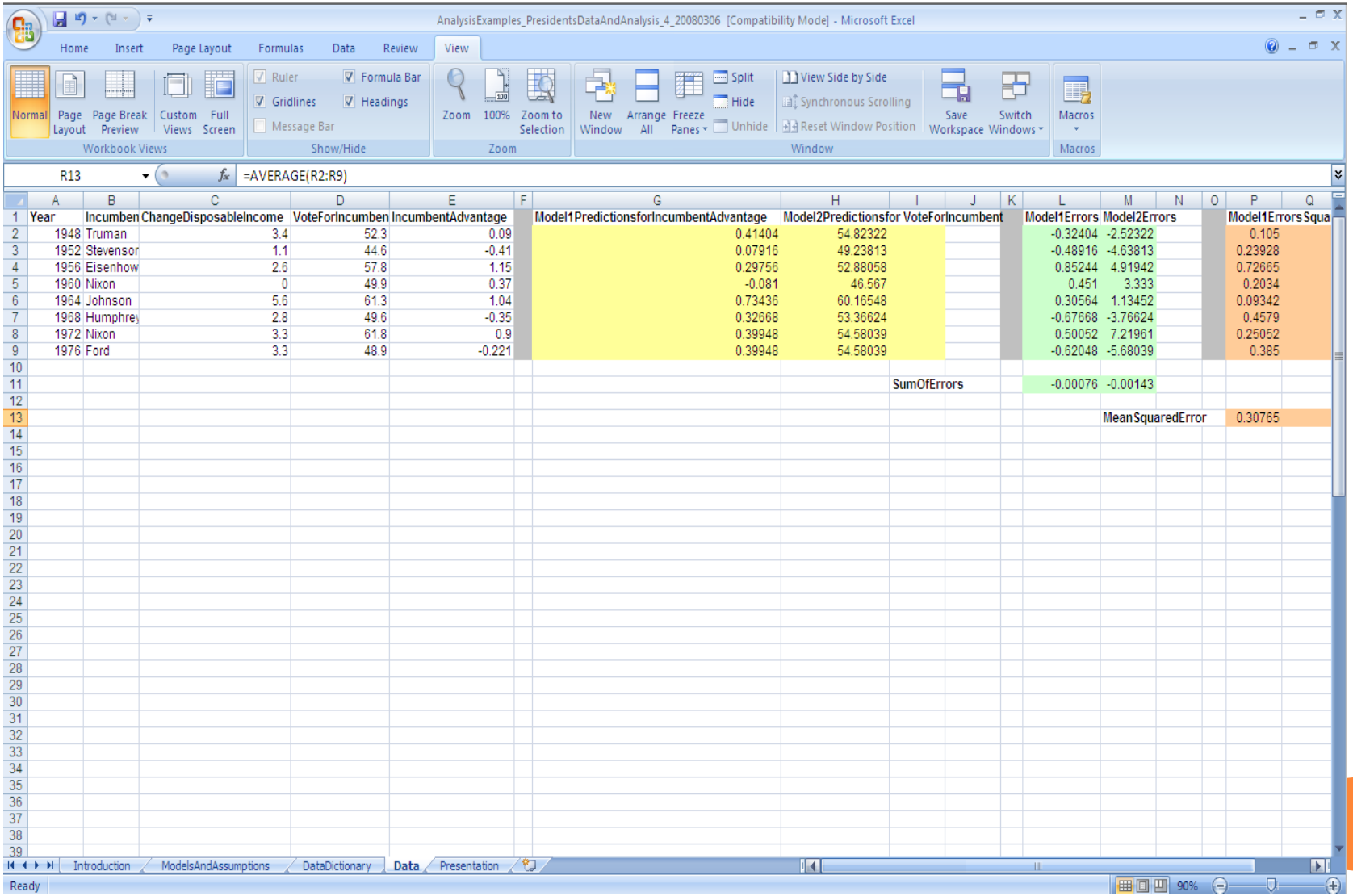
A17
Model & Assumptions
We developed 2 linear Modelsto examine the explanatory power of Change in Disposable Income (which was used as the independent variable in both models).
Model1 Formula is: IncumbentAdvantage = 0.1456 (ChangeDisposableIncome) - 0.081
Model 1 R-Squared 0.1435
Model2 Formula is: VoteForIncumbent = 2.4283(ChangeDisposableIncome) + 46.567
Model 2 R-Squared 0.4131
Assumptions
We Assume a linear Model is Appropriate
That assumption seems valid for model 2, less valid for model 1
Sums of Errors and MeanSquaredErrors were calculated to further examine each model
Introduction
ModelsAndAssumptions
DataDictionary
Data
Presentation
Ready
100%

EXAMPLE



	A	B	C	D	E
1	**Location**	**Name**	**DataClass**	**DataType**	**Description**
2	Data!A1:A9	Year	Raw	Date	Year of Election
3	Data!B1:B9	Incumbent	Raw	Text	Name of sitting president
4	Data!C1:C9	VoteForIncumbent	Raw	Percentage	Percentage of vote for incumbent
5	Data!D1:D9	ChangeDisposableIncome	Raw	Percentage	Yearly change in real disposable income per capita
6	Data!E1:E9	IncumbentAdvantage	Raw	Score	Net presidential candidate advantage. Positive values indicate the non-incumbent has advantage. Negative values indicate incumbent hasadv
7	Data!G1:H9	Model1PredictionsforIncumbentAdvantage	Calculated	Numerical	Incumbent Advantage as predicted by Model1
8	Data!H1:H9	Model2Predictionsfor VoteForIncumbent	Calculated	Numerical	Vote For Incumbent as predicted by Model2
9	Data!L1:L9	Model1Errors	Calculated	Numerical	IncumbentAdvantage - Model1PredictionsforIncumbentAdvantage
10	Data!M1:M9	Model2Errors	Calculated	Numerical	VoteForIncumbent - Model2PredictionsforVoteforIncumbent
11	Data!:P1:P9	Model1ErrorsSquared	Calculated	Numerical	Square of Model1Errors
12	Data!R1:R9	Model2ErrorsSquared	Calculated	Numerical	Square of Model2Errors
13	Data!I11:M11	SumOfErrors	Statistical Summary	Numerical	Sum of Errors for Model1Errrors and Model2Errors
14	Data!M13:R13	MeanSquaredError	Statistical Summary	Numerical	Mean of the Squared Error for Model1ErrorsSquared and Model2ErrorsSquared

EXAMPLE



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Year	Incumben	ChangeDisposableIncome	VoteForIncumben	IncumbentAdvantage		Model1PredictionsforIncumbentAdvantage	Model2Predictionsfor	VoteForIncumbent			Model1Errors	Model2Errors			Model1ErrorsSqua	
2	1948	Truman	3.4	52.3	0.09		0.41404	54.82322				-0.32404	-2.52322			0.105	
3	1952	Stevensor	1.1	44.6	-0.41		0.07916	49.23813				-0.48916	-4.63813			0.23928	
4	1956	Eisenhow	2.6	57.8	1.15		0.29756	52.88058				0.85244	4.91942			0.72665	
5	1960	Nixon	0	49.9	0.37		-0.081	46.567				0.451	3.333			0.2034	
6	1964	Johnson	5.6	61.3	1.04		0.73436	60.16548				0.30564	1.13452			0.09342	
7	1968	Humphrey	2.8	49.6	-0.35		0.32668	53.36624				-0.67668	-3.76624			0.4579	
8	1972	Nixon	3.3	61.8	0.9		0.39948	54.58039				0.50052	7.21961			0.25052	
9	1976	Ford	3.3	48.9	-0.221		0.39948	54.58039				-0.62048	-5.68039			0.385	
10																	
11									SumOfErrors			-0.00076	-0.00143				
12																	
13													MeanSquaredError			0.30765	
14																	
15																	
16																	
17																	
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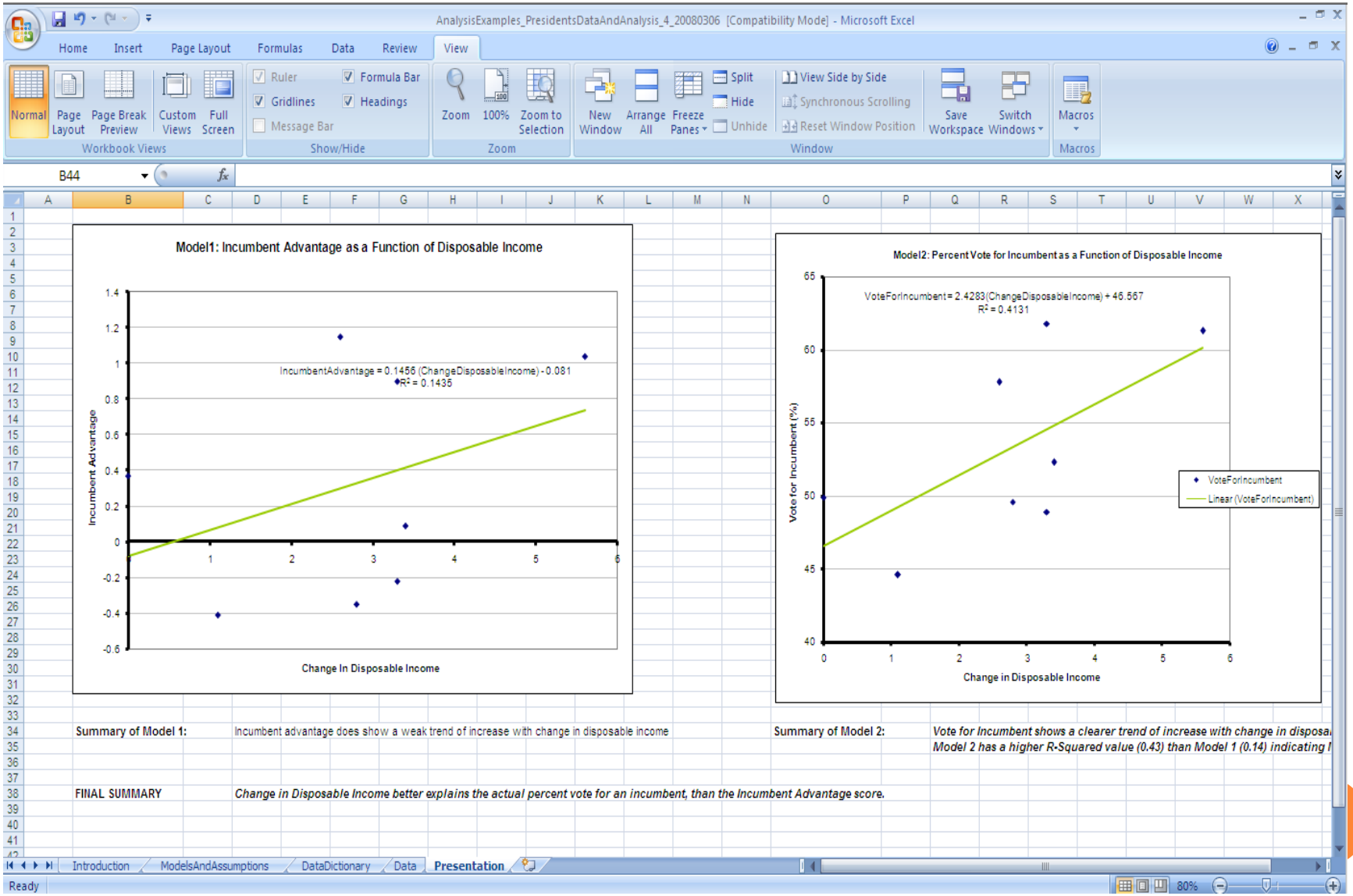
AnalysisExamples_PresidentsDataAndAnalysis_4_20080306 [Compatibility Mode] - Microsoft Excel
Model1: Incumbent Advantage as a Function of Disposable Income
IncumbentAdvantage = 0.1456 (ChangeDisposableIncome) - 0.081
R² = 0.1435
Incumbent Advantage
Change In Disposable Income
Model2: Percent Vote for Incumbent as a Function of Disposable Income
VoteForIncumbent = 2.4283(ChangeDisposableIncome) + 46.567
R² = 0.4131
Vote for Incumbent (%)
Change in Disposable Income
VoteForIncumbent
Linear (VoteForIncumbent)
Summary of Model 1:
Incumbent advantage does show a weak trend of increase with change in disposable income
Summary of Model 2:
Vote for Incumbent shows a clearer trend of increase with change in disposa
Model 2 has a higher R-Squared value (0.43) than Model 1 (0.14) indicating
FINAL SUMMARY
Change in Disposable Income better explains the actual percent vote for an incumbent, than the Incumbent Advantage score.
Introduction
ModelsAndAssumptions
DataDictionary
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Presentation
Ready