CPSC203 WEEK-2 LAB-2 SPREADSHEET DESIGN RULES

-Prepared By Nashad Ahmed Safa Graduate Student Department of Computer Science

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.

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

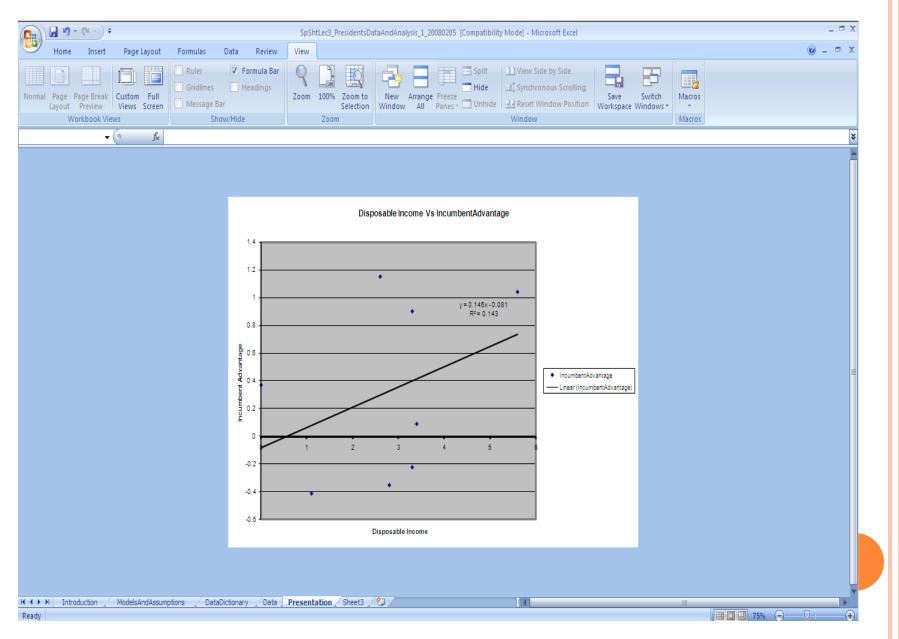
Part 1

In this first iteration, two separate sheets are used:

• data

• presentation

A B C D E F G H I J K L M N O P Q R S 1 1947 Incumbent/VoteForticument ChangeDisposabilicome IncumbentAdvantage 34 0.09 1 1 L M N O P Q R S 1 1945 Totals 2.6 1.1 -0.41 Incumbent/VoteForticuments IncumbentAdvantage IncumbentAd	C)	9	· (° ·);	;			SpS	ihtLec3_Presi	identsDataA	ndAnalysis_1	_20080205 [C	ompatibility	Mode] - Mic	rosoft Exce	I						_ = >
Parte Fort Control Parte Control Contro Control Control	9	Home	Insert	Page Layout	Formulas Data	Review	View													() _ = ×
Parts Format Primet P	Ê	Ba Con		Arial - 1		= = =	≫⁄~~	Wrap Te	xt	General	-				-		Σ AutoSui Fill ▼				
E46 A B C D E F G H J K L M N O P Q R S 1 Year Incumbent VideForticumbert ChangeOlgosabiliticume IncumbentAdvantage 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 3.4 0.09 0.037 3.5 1.16.041 3.5 6 1.04 1.99 0.037 3.4 0.221 1.16.941 1.964 1.964 1.97 1.964 1.97 1.964 1.99 3.3 0.221 1.17 1.16.14 1.16.14 1.964								📑 Merge 8	Center 🝷	\$ - %	• •.0 .00 .00 →.0	Condition Formatting		Cell Styles *			🧷 Clear 🔻	Sort & Filter ▼	Find & Select ₹		
A B C D E F G H I J K L M N O P Q R S 1 Year Incumbent VoteForincumbent ChangeDisposableIncome. Incumbent Advantage 3 409 1 Incumbent VoteForincumbent ChangeDisposableIncome. Incumbent VoteForincumbent		- C			6		Alignme	ent	G.	Numb	er 🕞		Styles		Cells			Editing			
1 Year Incumbent VorteGrinnumbent ChangeDisposabilitoneme 0.09 0.037 3 19952 Steenson 44.6 1.1 0.41 19952 Steenson 43.9 0 0.37 19954 Mumphrey 49.6 2.8 -0.35 19952 Notion 61.8 3.3 0.9 1970 Ford 48.9 3.3 -0.221 1971 48.9 3.3 -0.221 1971 48.9 3.3 -0.221 1971 48.9 -0.221 -0.211 1971 48.9 -0.221 -0.211 1972 Noon 61.8 -0.221 -0.211 1971 -0.211 -0.211 -0.211 1972 Noon 61.8 -0.211 -0.211 1973 -0.211 -0.211 -0.211 1974 -0.211 -0.211 -0.2	_				_				-								-				2
2 1948 Turnan 52.3 3.4 0.09 1952 Exersion 44.6 1.1 0.41 4 1955 Exersion 47.8 2.6 1.16 5 1950 Noon 49.9 0 0.37 6 1954 Johnson 61.3 5.6 1.04 7 1958 Exervice 61.8 3.3 0.9 9 1972 Nixon 61.8 3.3 0.9 9 1975 Pord 48.9 3.3 -0.221 10 1976 Pord 48.9 3.3 -0.221 11 1976 Pord 48.9 3.3 -0.221 11 1976 Pord 48.9 3.3 -0.221 11 197 1976 Pord 48.9 197 12 197 198 197 198 13 197 198 199 197 14 198 198 198 198 15 199 199 199 199 199 16 199 199 199 199 19						leincome li				Н		J	K	L	M	N	0	Р	Q	R	S
4 1956 Esenhove 57.8 2.6 115 5 1960 Monon 49.9 0 0.37 6 1954 Johnson 61.3 5.6 10.4 7 1958 Esenhove 5.8 0.35 1.15 1970 Monon 61.3 5.6 10.4 1.15 7 1958 Humphrey 43.6 2.8 0.35 1970 Monon 61.8 3.3 0.9 1.17 1976 Ford 48.9 3.3 0.221 1.16 11 1.11 1.11 1.11 1.11 1.11 12 1.11 1.11 1.11 1.11 1.11 13 1.11 1.11 1.11 1.11 1.11 1.11 13 1.11 1.11 1.11 1.11 1.11 1.11 1.11 14 1.11 1.11 1.11 1.11 1.11 1.11 1.11 13 1.11 1.11 1.11 1.11 1.11 1.11 1.11 14 1.11 1.11 1.11	2	1948	Truman																		
6 1964 Johnson 61.3 5.6 1.04 1968 Johnson 61.8 3.3 0.9 9 1972 Nixon 61.8 3.3 0.9 1976 Ford 48.9 3.3 0.921 10 11 12 13 14 14 15 16 17 16 17 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10	3	1952	Stevenson																		
6 1964 Johnson 61.3 5.6 1.04 1968 Johnson 61.8 3.3 0.9 9 1972 Nixon 61.8 3.3 0.9 1976 Ford 48.9 3.3 0.921 10 11 12 13 14 14 15 16 17 16 17 18 19 19 19 19 10 10 10 10 10 10 10 10 10 10	4																				
7 1968 Humphrey 49.6 2.8 -0.35 9 1972 Non 61.8 3.3 0.9 9 1976 Ford 48.9 3.3 -0.21 10 1 1 1 1 11 1 1 1 1 1 12 1 1 1 1 1 1 13 1 1 1 1 1 1 1 14 1	5																				
8 1972 Nixon 61.8 3.3 0.9 9 1976 Ford 48.9 3.3 -0.221 10 11	7																				
10	8																				
	9	1976	Ford	48.9		3.3	-0.221														
	10																				
17 <	11																				
17 <	13																				
17 <	14																				
17 <	15																				
18 <	16																				
19 19 <	17																				
20	19																				
28	20																				
28	21																				
28	22																				
28	23																				
28	25																				
28	26																				
29 29 30 30 31 32 33 33 33 34 4 5 M Introduction / ModelsAndAssumptions / DataDictionary] Data / Presentation / Sheet3 / 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	27																				
31 32 32 33 33 34 4 ↓ ▶ I Introduction / ModelsAndAssumptions / DataDictionary] Data / Presentation / Sheet3 / 22	28																				
31 32 32 33 33 34 4 ↓ ▶ I Introduction / ModelsAndAssumptions / DataDictionary] Data / Presentation / Sheet3 / 22	30																				
32 33 33 34 34 55 5 5 5 5 5 5 5 5 5 5 5 5	31																				
34 ModelsAndAssumptions / DataDictionary Data / Presentation / Sheet3 / €] / → I	32																				
(() ModelsAndAssumptions / DataDictionary] Data / Presentation / Sheet3 / 💭	33																				
		N	aduation	MadalaAndAasura	Data Disk	Det-		tation / cl													
	Ready	r (intr	oduction /	ModelsAndAssumption		ary j Data	Presen	itation Z St	ieeto 🖉 📞									m	100%		



Part 2

In this second iteration, five separate sheets are used:

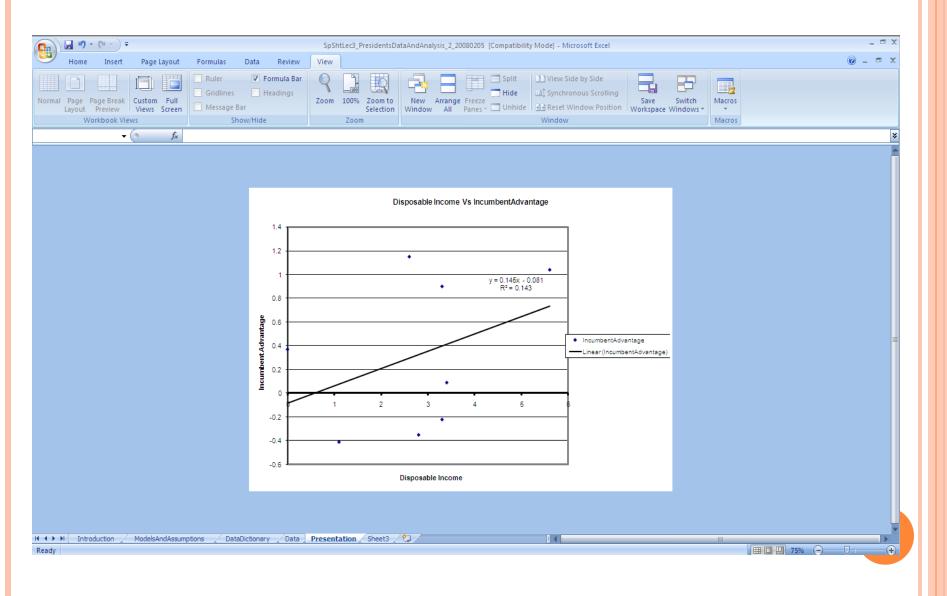
- introduction
- model and assumptions
- data dictionary
- data
- presentation

	- 19 - (*	-				SpS	ShtLec3_Preside	ntsDataAndAn	alysis_2_200802	05 [Compatibil	ity Mode] - Mi	crosoft Excel						- ¤ X
	Home I	Insert	Page Layout	Formulas	Data Rev	view View											0	– 🖻 X
Normal	Layout Prev		ustom Full /iews Screen	Ruler Gridlines Message S		X	100% Zoor Selec Zoom	nto New	Arrange Fre v All Pan	eze es - Onhide		de by Side onous Scrolling Vindow Positior	Save	Switch Windows ¥	Macros Macros			
	B22	+ (6	f _x															×
	А		В	С	D	E	F	G	Н		J	K	L	М	N	0	Р	Q 🗖
1 Ir	ntroduct	tion: P	olitical C	control o	f the Ecor	nomv												
2																		
	his spread	sheet is	based on a	a Data Set I	by Edward R	Tufte gath	ered from L	J.S. Preside	ential electi	ons betwee	n 198 and	1976						
4																		
	sing Tufte'	s data w	ve look at In	icumbent A	dvantage in t	erms of Ch	ange in Re	al Disposal	ble Income									
6	_																	
	eference:				he Economy													
8 9				rd, R. Tufte	Press, 1978													
10			pp. 121 to		Fless, 1970													
11			pp. 121 tt	0123														
	ata Sourc	e:	Table 5.5	from above	e reference,	op. 121												
13																		_
14																		_
15																		
16																		
17																		
18																		
19 20																		
20																		
22																		
23				-9														
24																		
25																		
26																		
27																		
28																		
20	Introduct	tion M	1odelsAndAssum	ptions / Dat	taDictionary / D)ata / Presen	ntation / Shee	:t3 / 🞾										
Ready																120%		(+)

6		v) - (° -)	Ŧ					SpShtLeG_	PresidentsDa	taAndAnal	/sis_2_2008020	5 [Compatibili	ity Mode] -	Microsoft Exc	el							УX
C	но	me Insert	Page Layo	ut For	rmulas	Data R	eview V	iew													0 - 🗖	х
No		ut Preview	Custom Fu Views Scre		Ruler Gridlines Message Bar		ngs	oom 100%	Selection	New Window	Arrange Freez All Panes	🗧 🗖 Hide	요를 Syncl 관람 Rese		lling	ava Su	vitch Ma dows *	acros				
		Workbook V	~		Shov	w/Hide		Zoo	m				Windo	W			J	acros				
	E2			6x	-	F	0				17			N	0	0	0	0	0	-		*
1	A Mode	B & Assum		D	E	F	G	H		J	K	L	М	N	0	Р	Q	R	S		U	
2																						
	We dev	eloped a linea	ar Model with"	Incumber	ntAdvantag	e" as a Fu	nction of "C	hangeDis	osableInco	me"												
4	Model	ormula is:	IncumbentA	dvantage	= 0 1456C	hangeDisn	osableinco	me - 0.081														
6		R-Squared is		aranago	0.11000	langebiep		0.00														
7	Assump	tiona																				_
9	Assump	tions																				
			Model is Appr																			
11	Given th	e dispersion	of the data, ar	nd low R-	Squared 1	this assum	nption may	not be vali	d													-11
13																						
14																						
15 16																						-
17																						
18 19																						-11
20																						
21																						
22 23																						-
24 25 26																						
25																						-11
20																						
28]																
29 30																						-
31																						
32																						
33 34																						-
	► H	Introduction	ModelsAndAs	sumption	ns DataDi	ictionary 🏒	Data 🖉 Pr	esentation	Sheet3 🖌	2	1		14				Ш	1			•	U
Rea	dy																	Œ	1009	. 🕞 —	-0	\oplus

) 🖬 🤊 -	(" -) ∓				SpShtL	ec3_PresidentsD	ataAndAna	lysis_2_2008	0205 [Compa	tibility Mod	le] - Microso	ft Excel							- 9
Home	Insert Page Lay	out Forn	nulas Data	Review	View													🥑 –	-
Layout	age Break Preview	Full	i ridlines 🔽 He 1essage Bar	rmula Bar adings		00% Zoom to Selection	New Window	Arrange Fr	reeze ines - Un	de 🗎 🗎		s Scrolling	Save Workspace	Switch Windows *	Macros				
Wo	orkbook Views		Show/Hide			Zoom				W	indow				Macros				
Α7	• ()	f _x																	
А	В	С	D	E	F	G	Н		J	K	L	М	N	0	Р	Q	R	S	
Location			ss DataType																
Data!A1:A9		Raw	Date	Year of E															
Data!B1:B9		Raw	Text		sitting pres														
	VoteForIncumbent		Percentage	Percenta	ge of vote f	or incumbent													
	ChangeDisposable																		
Data!E1:E9	IncumbentAdvantag	e																	
	-																		
Introc	duction 🔬 ModelsAnd	Assumptions	DataDictionar	y 🖉 Data 📈	Presentati	on 🖌 Sheet3 🦼	/ 🔁 / 👘												

	9 - (2 -) =				SpShtLec3	PresidentsD	ataAndAna	lysis_2_20080	205 [Compat	ibility Mode] - Microsof	t Excel							- 5
Hom	ne Insert	Page Layout	Formulas Da	ta Review	View													0 -	. 🖻
nal Page	Page Break ut Preview	Custom Full Views Screen		 Formula Bar Headings 	Zoom 1009	6 Zoom to Selection	New Window	Arrange Fre	Eeze hes - Ont	e 🗈 🗋 S	i <mark>ew Side by</mark> S ynchronous eset Windov	Scrolling	Save Workspace	Switch Windows *	Macros				
	Workbook Vie	ews	Show/H	lide	Zoo	m				Wir	ndow				Macros				
D16	5 🔻	f _x																	
А			D				F	G	Н	- I	J	K	L	M	N	0	Р	Q	
'ear		VoteForIncumbe																	
	8 Truman	52.		3.4		0.09													
	2 Stevenson			1.1		-0.41													
	6 Eisenhowe			2.6		1.15													
	0 Nixon	49.		0		0.37													
	4 Johnson	61.		5.6		1.04													
	8 Humphrey	49.		2.8		-0.35													
	2 Nixon	61.		3.3		0.9													_
197	'6 Ford	48.	9	3.3		-0.221													_
																			_
																			_
																			_
			-																_
																			_
																			_
																			_
																			_
																			-
																			-
																			-
► ► I	ntroduction /	ModelsAndAssumpt	tions / DataDictio	narv Data	Presentation	/ Sheet3	1			1	4								ľ



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.

Home Insert	Page Layout	Formulas	Data Re	view View											0	_ = >
nal Page Page Break Layout Preview	Custom Full Views Screen	Ruler Gridlines Message B		X			w Arrange Free	Hide Te		le by Side nous Scrolling indow Position	Save Workspace	Switch Windows *	Macros			
Workbook Viev	VS	Sł	how/Hide		Zoom				Window				Macros			
B22 • (f _x															3
A	В	С	D	E	F	G	Н		J	K	L	М	N	0	Р	Q
Introduction:	Political C	control of	f the Eco	nomy												
This spreadsheet	is based on a	a Data Set b	by Edward F	R Tufte gath	ered from	J.S. Pres	idential election	ons betwee	n 198 and 1	1976						
Using Tufte's data	we look at In	cumbent Ad	lvantage in	terms of Cr	nange in Re	al Dispo	sable Income									
Deference	"Delitical	Control of th	Economi	,u												
Reference:		Control of th rd, R. Tufte	ie Economy													
		University F	Proce 1078													
	pp. 121 to		1035, 1570	·												
	pp. 121 K	5 120														
Data Source:	Table 5.5	from above	reference.	pp. 121												
		-														
Introduction			aDictionary	Data / Preser	ntation 🖉 🖏											

8	9	• (° •) •	÷			Ana	lysisExample	es_President	sDataAndAn	alysis_4_2008	0306 [Compat	ibility Mode	e] - Microsoft	Excel						_	σx
	Home	Insert	Page Layout	Formulas	Data Re	eview Vi	ew													0 - 🗖	×
Norm	Layout	Preview	Custom Full Views Screen	Ruler Gridlines Message E	Bar	ngs		Zoom to Selection	New A Window	rrange Freez All Panes	🗖 Hide	III‡ Syncl		lling		witch M ndows *	acros				
		/orkbook Vi	~ 1	J Sr	how/Hide		Zoom	1				Windo	W				lacros				
	A17					0				17		14	N	0	D	0	D	0	T		*
1 M	A A lodel &	B Assum	-	D E	F	G	H	1	J	ĸ	L	М	N	0	P	Q	R	S	1	U	
2	louera	Assault	500115																		
3 W	/e develop	ped 2 linea	r Modelsto exam	ine the explana	atory power o	f Change in	Disposabl	e Income (which was	used as the	independen	t variable i	n both mod	els).							_
4																					
		Squared	IncumbentAdvar 0.1435	ntage = 0.1456	(ChangeDisp	osableinco	me) - 0.08	1													
7	odelik	-squareu	0.1435																		
			VoteForIncumbe	ent = 2.4283(C	hangeDispos	ableIncome) + 46.567														_
	odel 2 R	-Squared	0.4131																		
10																					- 11
12	ssumptio	ns																			
	le Assum	ne a linear l	Model is Appropr	riate																	
14 TI			ms valid for mode		for model 1																
15																					
16 S	ums of Ei	rrors and IV	leanSquaredErro	irs were calcula	ated to further	r examine e	ach model														
18																					
19																					
20																					_
21 22																					
23																					
24																					
25 26																					
26																					
28																					
29																					
30																					
31																					
32 33																					
34																					-
		oduction	ModelsAndAssu	mptions Data	aDictionary 📈	Data 🖉 Pre	sentation 🦼	2				14							0		
Ready																	E	B 🔲 🛄 1009	% (=)		-+

Home				entsDataAndAnalysis_4_20	00000000 [C0	input ionity in	iourej miner	03010 EXCCI							
	Insert Page Layout Formulas Da	ata Review View												0	- •
Layout Pr			100% Zoom t Selectio		reeze ines + 🗌 Ur	de ⊡‡S	/iew Side by Synchronou: Reset Windo ndow	s Scrolling	Save Workspace	Switch Windows *	Macros Macros				
A16	▼ () f _x	, , , , , , , , , , , , , , , , , , ,									(_
A	B	С	D	E F	G	Н	1	J	K		M	N	0	Р	
Location	Name	DataClass	-	Description	-					_			-		
Data!A1:A9	Year	Raw		Year of Election											
	Incumbent	Raw		Name of sitting preside	ent										+
	VoteForIncumbent	Raw		Percentage of vote for											1
	ChangeDisposableIncome	Raw		Yearly change in real of		income per	capita								1
	IncumbentAdvantage	Raw		Net presidential candio				dicate the	non-incumb	bent has ad	Ivantage. N	egative valu	es indicate	incumbent	t has
	Model1PredictionsforIncumbentAdvantage	e Calculated		Incumbent Advantage							Ŭ	-			
Data!H1:H9	Model2Predictionsfor VoteForIncumbent	Calculated	Numerical	Vote For Incumbent as	s predicted	by Model2									
Data!L1:L9	Model1Errors	Calculated	Numerical	IncumbentAdvantage -	Model1Pre	dictionsforl	ncumbent	Advantage							
Data!M1:M9	Model2Errors	Calculated	Numerical	VoteForIncumbent - M	lodel2Predi	tionsforVo	teforIncum	bent							
Datal:P1:P9	Model1ErrorsSquared	Calculated	Numerical	Square of Model1Error	rs										
Data!R1:R9	Model2ErrorsSquared	Calculated	Numerical	Square of Model2Error	rs										
Data!I11:M11		Statistical Summary	Numerical	Sum of Errors for Mode	el1Errrors a	nd Model2	Errors								
Data!M13:R13	MeanSquaredError	Statistical Summary	Numerical	Mean of the Squared E	Error for Mo	del1ErrorsS	Squared an	nd Model2E	rrorsSquare	ed					
	1														
															_
															_
															_
															_
															_
															_
															_
															-
															-
															_
															+
► ►I Introduce	ction ModelsAndAssumptions DataDict	ionary Data Present	ation / 🞾 🦯				4								

)]	9	• (" •) •	·						Analys	sisExampl	es_Pre	esidentsD	ataAndAi	nalysis_4	_2008030	6 [Compati	ibility M	ode] - Micro	soft Exce	1								- 7
2	Home	Insert	Page Lay	out	Formula	s D	ata P	Review	View	/																	0 -	. 🗖
				-	✓ Ruler		V Form	ula Bar	0	1		R	-			Split	VCC	iew Side by S	Side				_					
					Gridli	nes	V Head	lings	1	100		¥				Hide	mî s	ynchronous !	Scrolling				2					
mal	Page	Page Break	Custom F Views Scr	ull	Messa	age Bar		-	Zoon	n 100%		omito ection V	New /	Arrange	Freeze	Unhide		eset Window	-	Save	Swit	ch Ma	cros					
		orkbook Vi		een	messe	Show/	/Hide			Zoor		ection v	window	All	Paries			ndow	110510101	vvorksp	ace wind		cros					
			_	£ _1	VERAC					2001								10011				Jum	cros					
	R13		<u> </u>		VERAG			1	-		-										1 12				NI.	0 0		0
'ea	A In		C hangeDispos		come V	C oteForl		Incum	E hent∆d		F	Vodel1Pr	rediction	G	imbent4	dvantage	Mod	H el2Predictio	unsfor V			L Model1Er					1Error	ູ ursSqua
	1948 T		nangobiopot	Jabronn	3.4	0101 011	52.3		bontanan	0.09		inouorin i	- caroa on	iororinio.	annoonto	0.4140		54.823			in bont			2.52322			105	ooquu
	1952 S	tevensor			1.1		44.6			-0.41						0.0791	6	49.238	B13			-0.48	916 -	4.63813		0.239	928	
	1956 E	isenhow			2.6		57.8			1.15						0.2975	6	52.880	058			0.85	244	4.91942		0.72	665	
	1960 N				0		49.9			0.37						-0.08		46.5						3.333		0.20		
	1964 J				5.6		61.3			1.04						0.7343		60.165						1.13452		0.093		
		lumphrey			2.8		49.6			-0.35						0.3266		53.366						3.76624		0.45		
	1972 N				3.3		61.8			0.9						0.3994		54.580						7.21961		0.250		
	1976 F	ord			3.3		48.9			-0.221						0.3994	8	54.580	039			-0.62	2048 -	5.68039		0.3	385	
																			C	OfErrors		0.00	076	0.00143				
																			Sun	IOIEITOIS		-0.00	1070 -1	0.00143				
																							M	oanSaua	redError	0.307	765	
																							IN	eanoqua	Teachion	0.50	0.5	
											+																	
											+																	
											+																	
											\uparrow																	
									_		100																	
•	Intro	oduction 🏑	ModelsAndA	Assumptio	ons 🏑	DataDict	tionary	Data	Prese	ntation 🚽	<u> </u>							4									-	

