



CS-18: The Case for Adaptability of your ERM Program.

November 10, 2021

Bruce Beck, Michael Thompson, Bob Wolf & Dave Ingram



1



Antitrust Notice

- The Casualty Actuarial Society is committed to adhering strictly to the letter and spirit of the antitrust laws. Seminars conducted under the auspices of the CAS are designed solely to provide a forum for the expression of various points of view on topics described in the programs or agendas for such meetings.
- Under no circumstances shall CAS seminars be used as a means for competing companies or firms to reach any understanding – expressed or implied – that restricts competition or in any way impairs the ability of members to exercise independent business judgment regarding matters affecting competition.
- It is the responsibility of all seminar participants to be aware of antitrust regulations, to prevent any written or verbal discussions that appear to violate these laws, and to adhere in every respect to the CAS antitrust compliance policy.



2



Modeling the variety of decision making

- Bruce Beck
- Dave Ingram
- Michael Thompson
- Bob Wolf



3



Three men walked into a bar . . .

- An anthropologist,
- A Control Engineer, and
- An Actuary

And they started to talk about how decisions are mad in the real world,
and how that does or doesn't align with how we model decisions.

That was in 2015.



4

That discussion continued

In 2017, while Dave was in Panama City presenting at an AFIR/ERM conference there, they had a heated email exchange which resulted in a plan of action

- Phase 1 – COMPLETED
 - Model Governance and Rational Adaptability in Enterprise Risk Management written for AFIR/ERM 2019
- Phase 2 – COMPLETED
 - Modeling the Variety of Decision Making written for JRMS 2021
- Phase 3 – In Progress
 - **Institutional Evolutionary Economics** – Likely to become a stand alone book



5

Modeling the variety of decision making

Part 1 – Institutional Evolutionary Economics – Michael Thompson

Part II – Control Engineering and the Adaptor – Bruce Beck

Part III – Regime Switching Model of Adapting – Dave Ingram

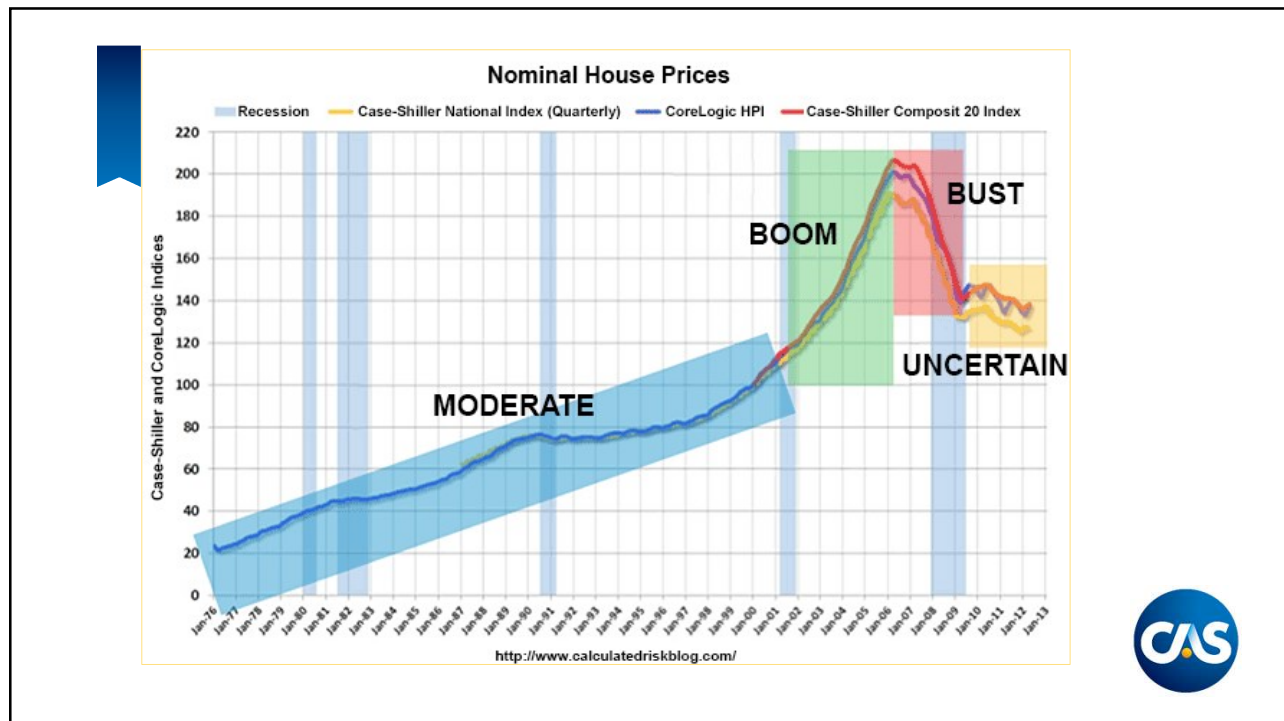


6

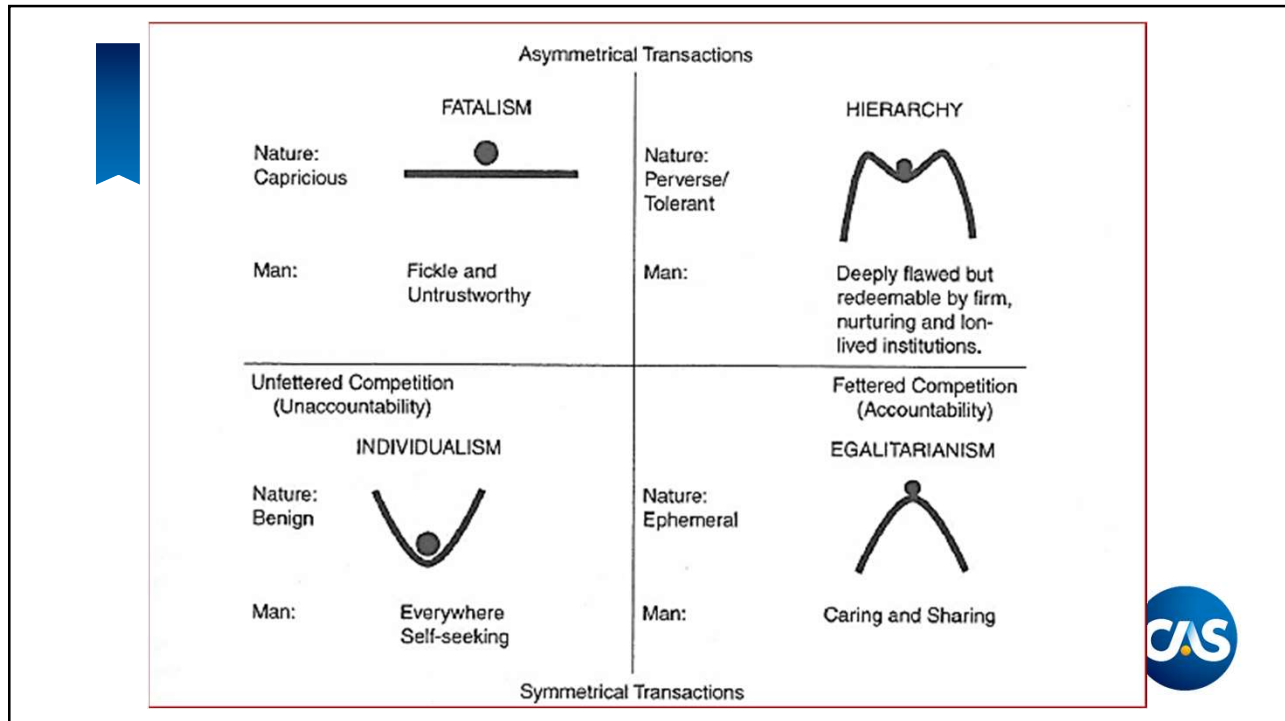
Institutional Evolutionary Economics



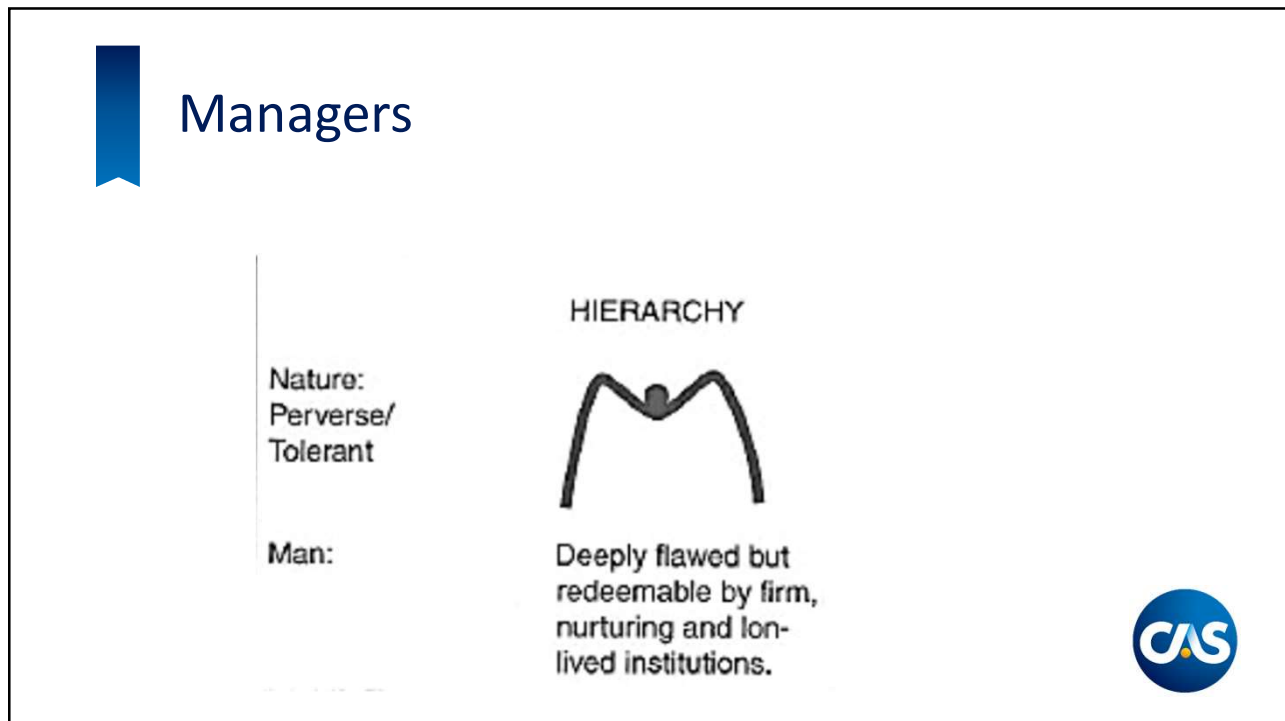
7



8

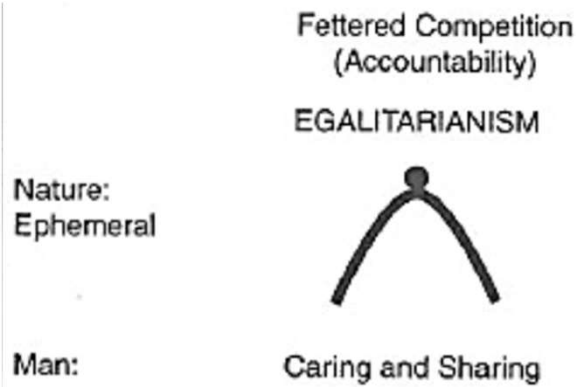


9



10

Conservators



11

Maximizers

Unfettered Competition
(Unaccountability)

INDIVIDUALISM

Nature:
Benign



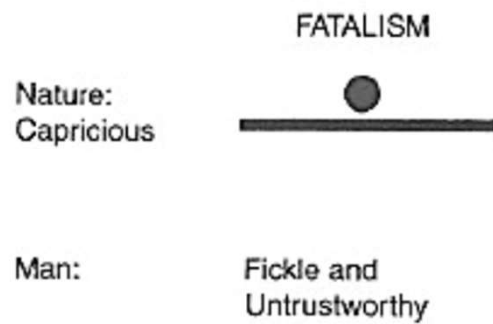
Man:

Everywhere
Self-seeking

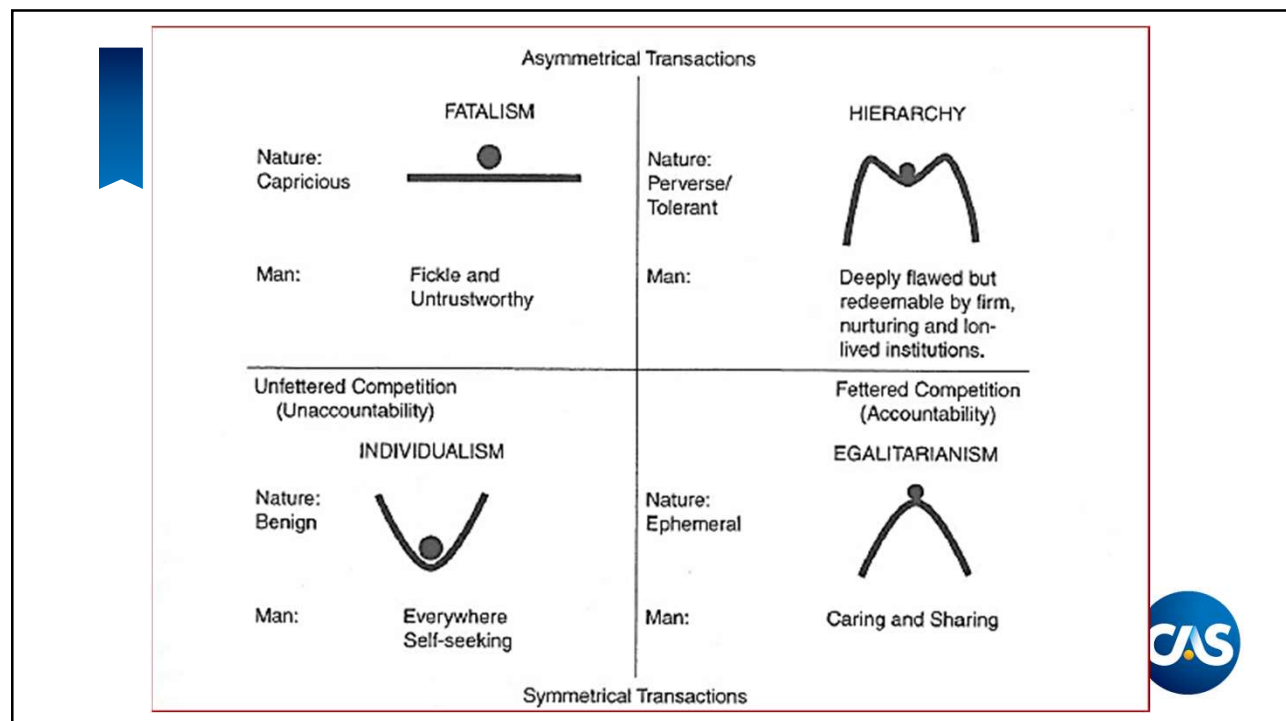


12

Pragmatists











13



14

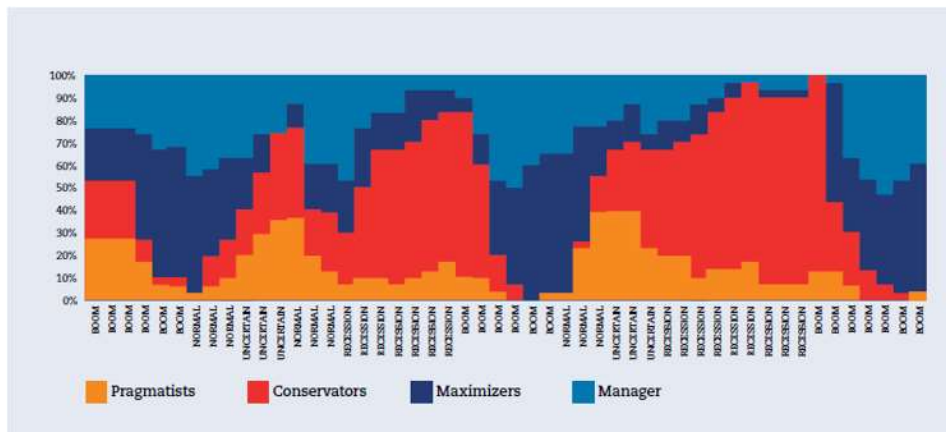
General Theory of Surprise

	 UNCERTAIN	 RECESSION	 BOOM	 MODERATE
 PRAGMATIST (Fatalism)	ALIGNED No surprises	Expected windfalls don't happen	Unexpected runs of good luck	Unexpected runs of good and bad luck
 CONSERVATOR (Egalitarian)	Caution does not work	ALIGNED No surprises	Others prosper (especially individualistic strategists)	Others prosper (especially hierarchical strategists)
 MAXIMIZER (Individualism)	Skill is not rewarded	Total collapse (when none was expected)	ALIGNED No surprises	Partial collapse
 MANAGER (Hierarchy)	Unpredictability	Total collapse (when only partial was expected)	Competition	ALIGNED No surprises



15

Firms by Strategy



16

Five Theories of Economics

	Characteristics	Neoclassical Economics	Behavioral Economics	New Institutional Economics	Evolutionary Economics	Institutional Evolutionary Economics
1.	Rationalities	1	1	2*	2**	4-5
2.	The System	Simple	Simple	Simple	Complex	Complex
3.	Institutional Embeddedness***	No	No	Yes	No	Yes
4.	Increasing Returns: History Matters	No	No	No	Yes	Yes
5.	Equilibrium	Yes	Yes	Yes	No	No
6.	Technology Crucial	No	No	No	Yes	Yes
7.	Scarcity Crucial	Yes	Yes	Yes	No	No
8.	Emergent Behavior (Evolution)	Not Clear	Not Clear	Not Clear	Yes (Some)	Yes (More)
9.	Fit With Neuroscience	Not Clear	Not Clear	Sort of	Not Clear	Yes
10.	Ideas of Fairness	1	1-2	2	Not Clear	4-5
11.	Myths (Social Constructions) of Nature	No	No	No	No	Yes
12.	Allometric Relations (TIME-dynamics) Matter	Not Clear	Not Clear	Not Clear	Yes (in respect of scales of Time)	Yes



17

	Characteristics	Neoclassical Economics	Behavioral Economics	New Institutional Economics	Evolutionary Economics	Institutional Evolutionary Economics
1.	Rationalities	1	1	2*	2**	4-5
2.	The System	Simple	Simple	Simple	Complex	Complex
3.	Institutional Embeddedness***	No	No	Yes	No	Yes
4.	Increasing Returns: History Matters	No	No	No	Yes	Yes
5.	Equilibrium	Yes	Yes	Yes	No	No
6.	Technology Crucial	No	No	No	Yes	Yes
7.	Scarcity Crucial	Yes	Yes	Yes	No	No
8.	Emergent Behavior (Evolution)	Not Clear	Not Clear	Not Clear	Yes (Some)	Yes (More)
9.	Fit With Neuroscience	Not Clear	Not Clear	Sort of	Not Clear	Yes
10.	Ideas of Fairness	1	1-2	2	Not Clear	4-5
11.	Myths (Social Constructions) of Nature	No	No	No	No	Yes
12.	Allometric Relations (TIME-dynamics) Matter	Not Clear	Not Clear	Not Clear	Yes (in respect of scales of Time)	Yes

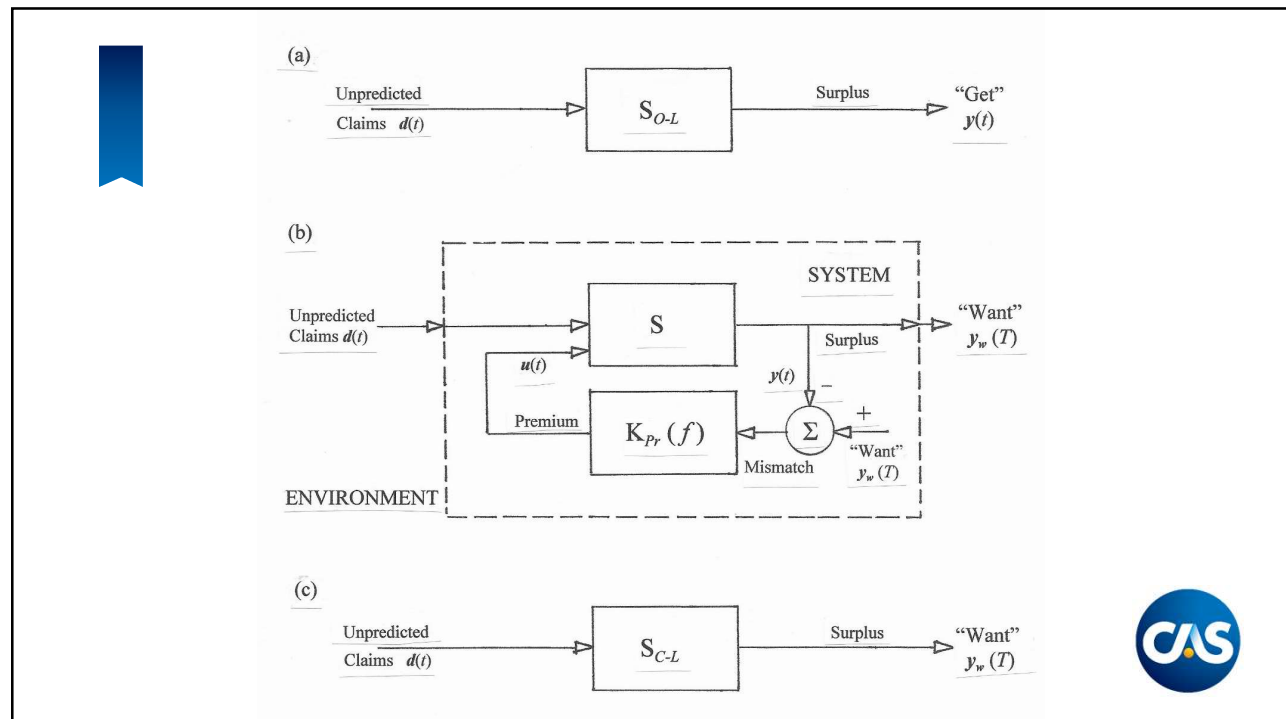


18

Control Engineering & The Adaptor

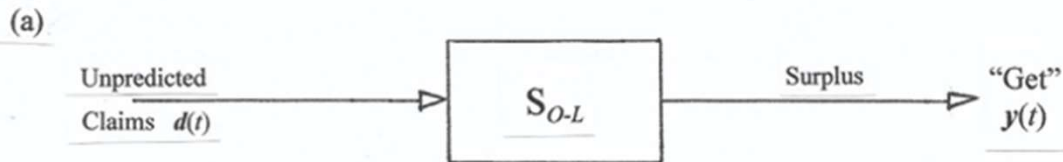


19



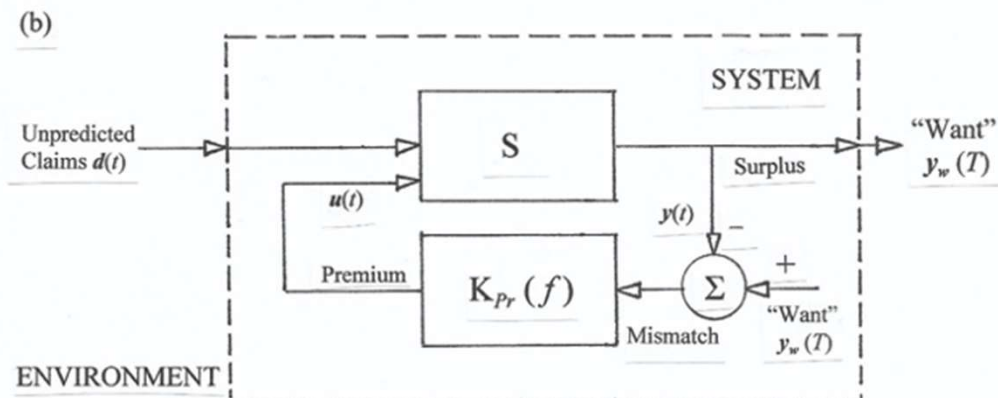
20

Company Gets what it gets



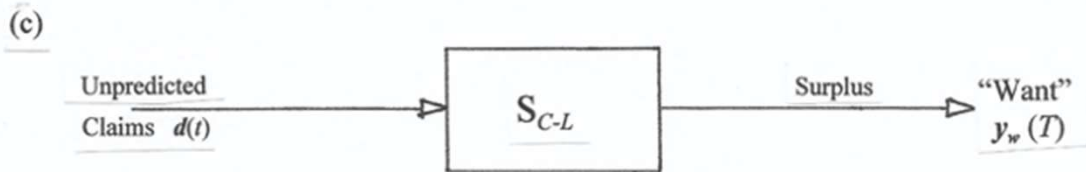
21

Feedback

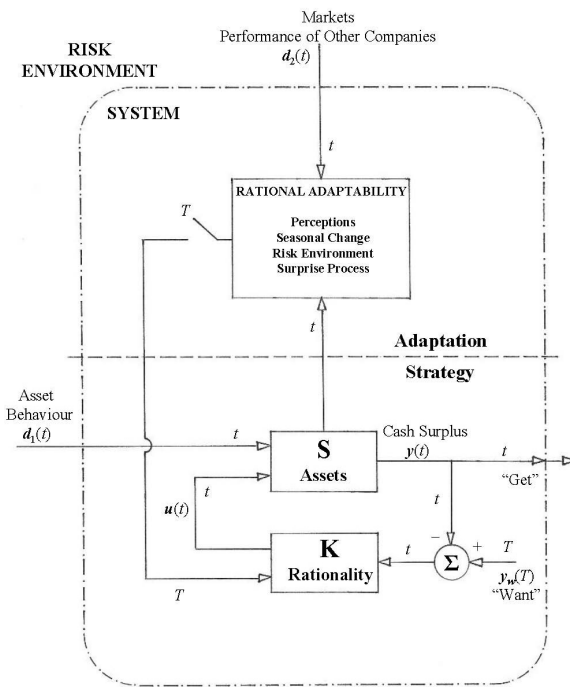


22

Company Gets what it wants











23



24

General Theory of Surprise

	 UNCERTAIN	 RECESSION	 BOOM	 MODERATE
 PRAGMATIST (Fatalism)	ALIGNED No surprises	Expected windfalls don't happen	Unexpected runs of good luck	Unexpected runs of good and bad luck
 CONSERVATOR (Egalitarian)	Caution does not work	ALIGNED No surprises	Others prosper (especially individualistic strategists)	Others prosper (especially hierarchical strategists)
 MAXIMIZER (Individualism)	Skill is not rewarded	Total collapse (when none was expected)	ALIGNED No surprises	Partial collapse
 MANAGER (Hierarchy)	Unpredictability	Total collapse (when only partial was expected)	Competition	ALIGNED No surprises

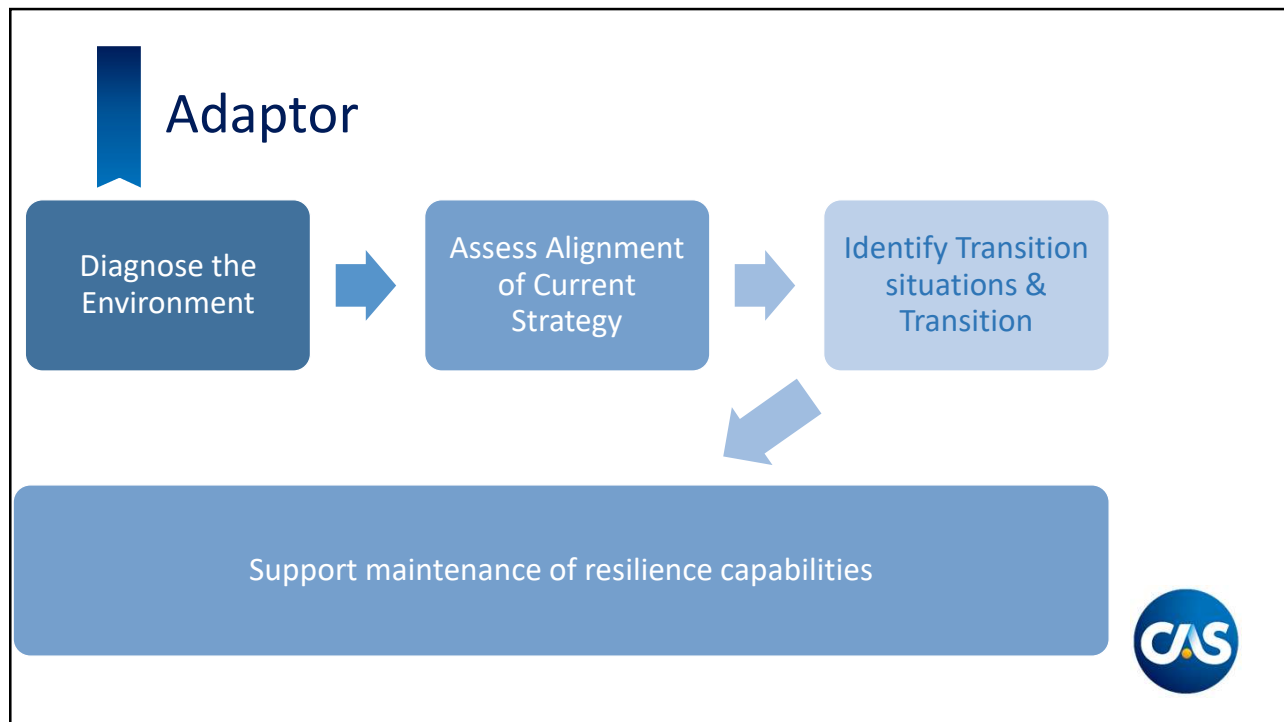


25

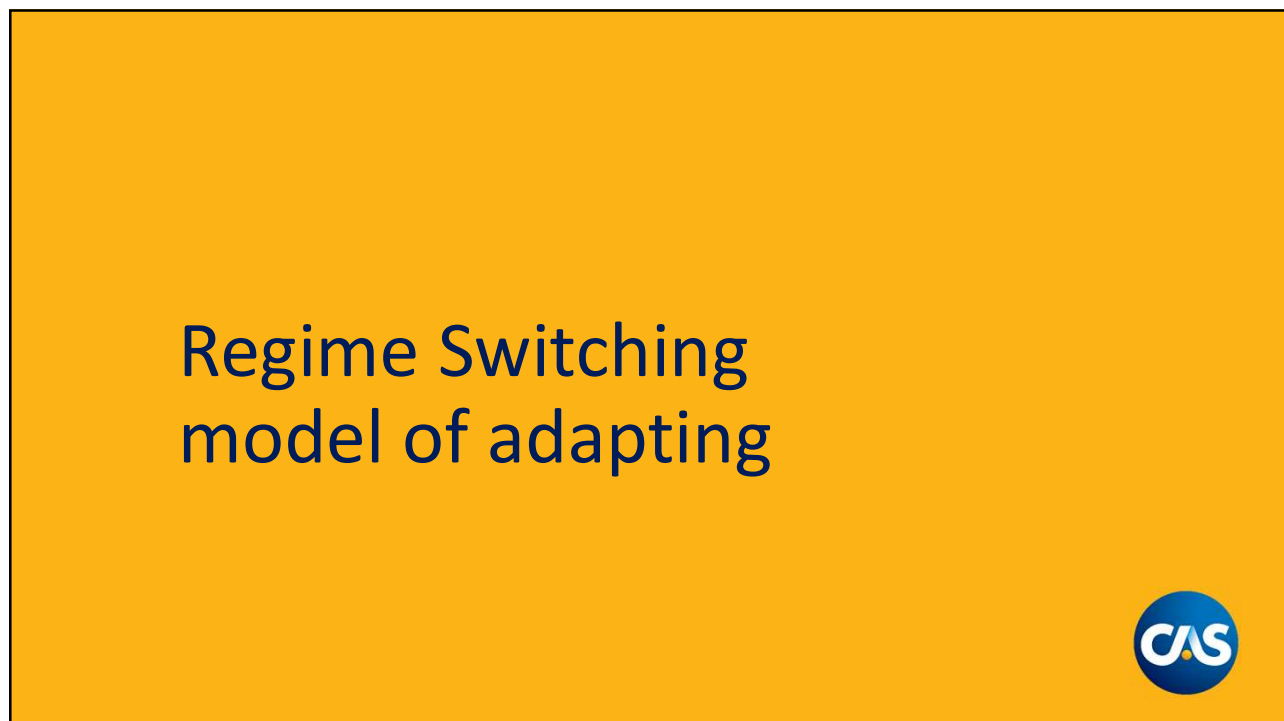
	Environment	Boom	Bust	Uncertain	Moderate
Mindset	Maximizer	Conservator	Pragmatist	Manager	
Strategy	Trading	Loss Controlling	Diversification	Steering	



26



27



28

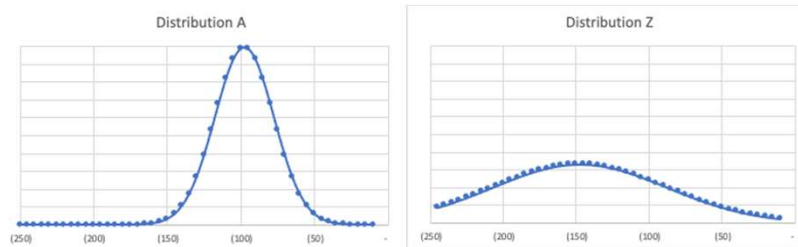
Regime Switching

- Model with multiple loss distribution functions
- With table of transition probabilities to go from one function to another
- Sometimes used to build models of Casualty losses that reflected the fact that claims were low for long periods of time and very high for shorter runs.



29

Regime Switching



Transition Matrix		Next	
		A	Z
Current	A	90%	10%
	Z	50%	50%

30

Regime Switching

- Calibrate from history by sorting past observations between the regimes
- Each projection period will use one RV to determine regime
- Second RV to get loss amount from selected regime



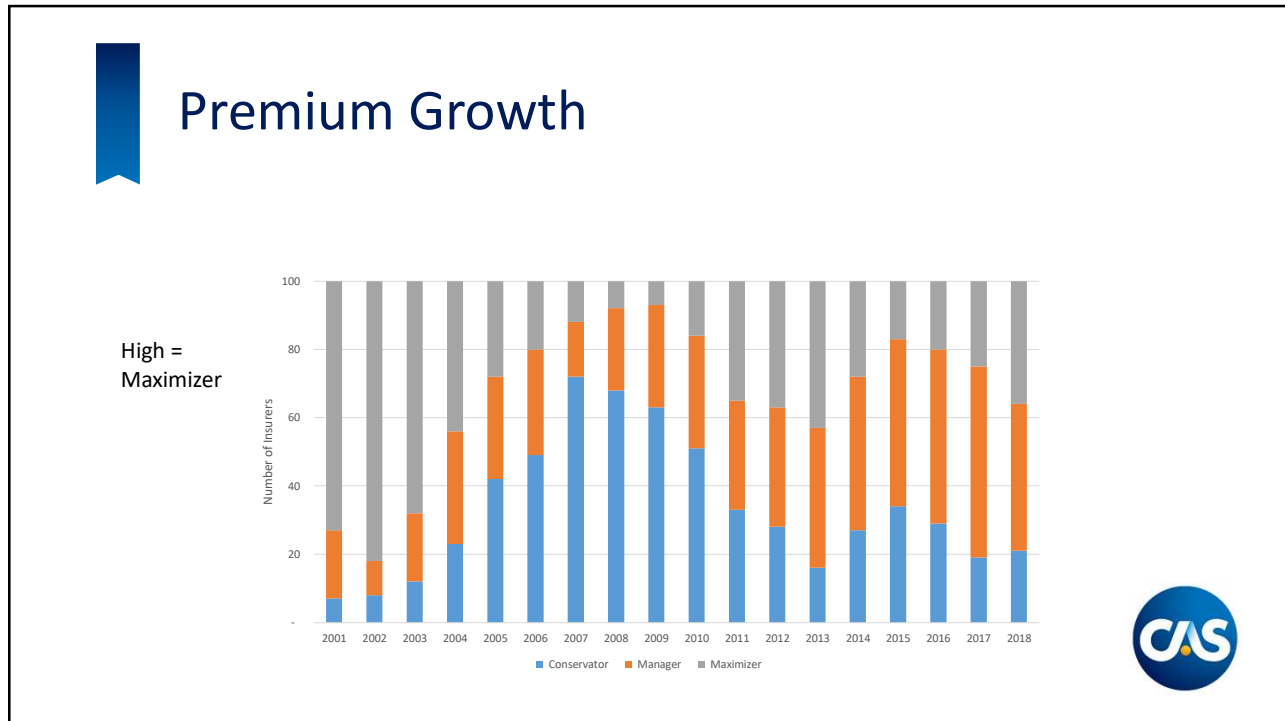
31

Calibrating Insurance Company transition matrix

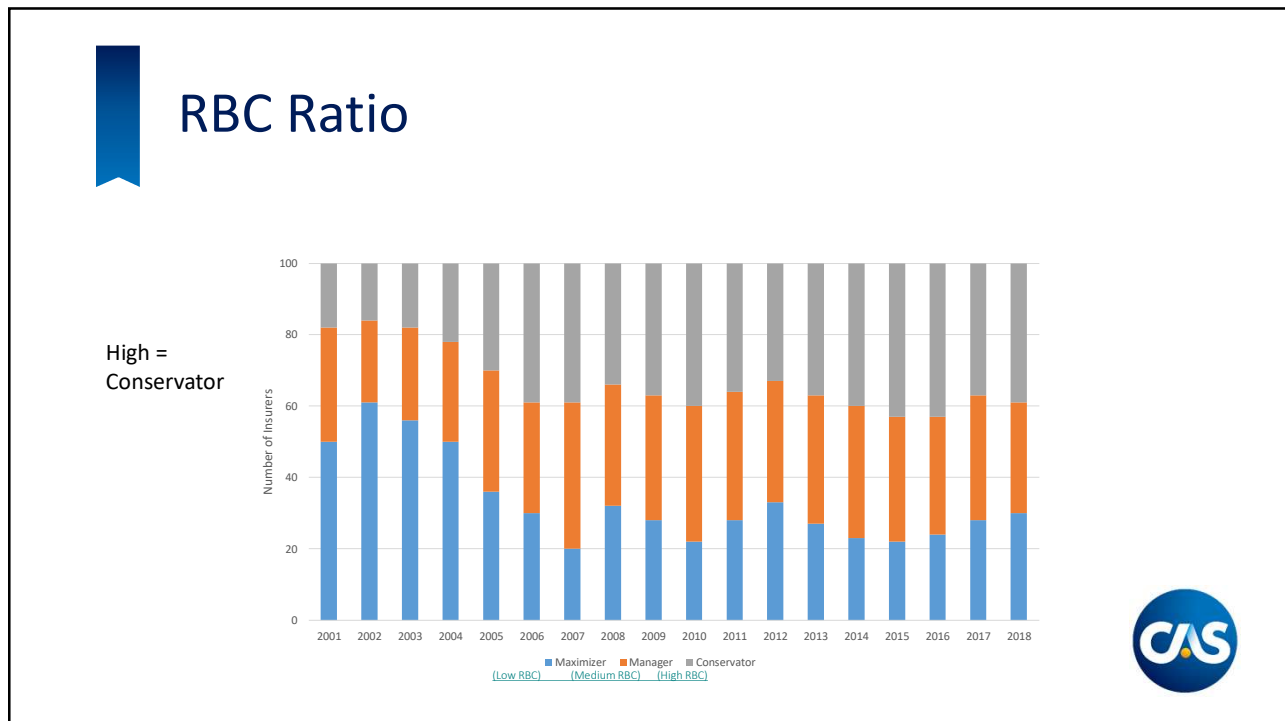
- Looked at 100 mutual P&C insurers from 2001 to 2018
 - Premium Growth
 - RBC Ratio
 - Common Stocks as Pct Surplus
- Assigned 1/3 High, 1/3 Medium, 1/3 Low
 - Looking at the entire set of each parameter (1800) by company, by year



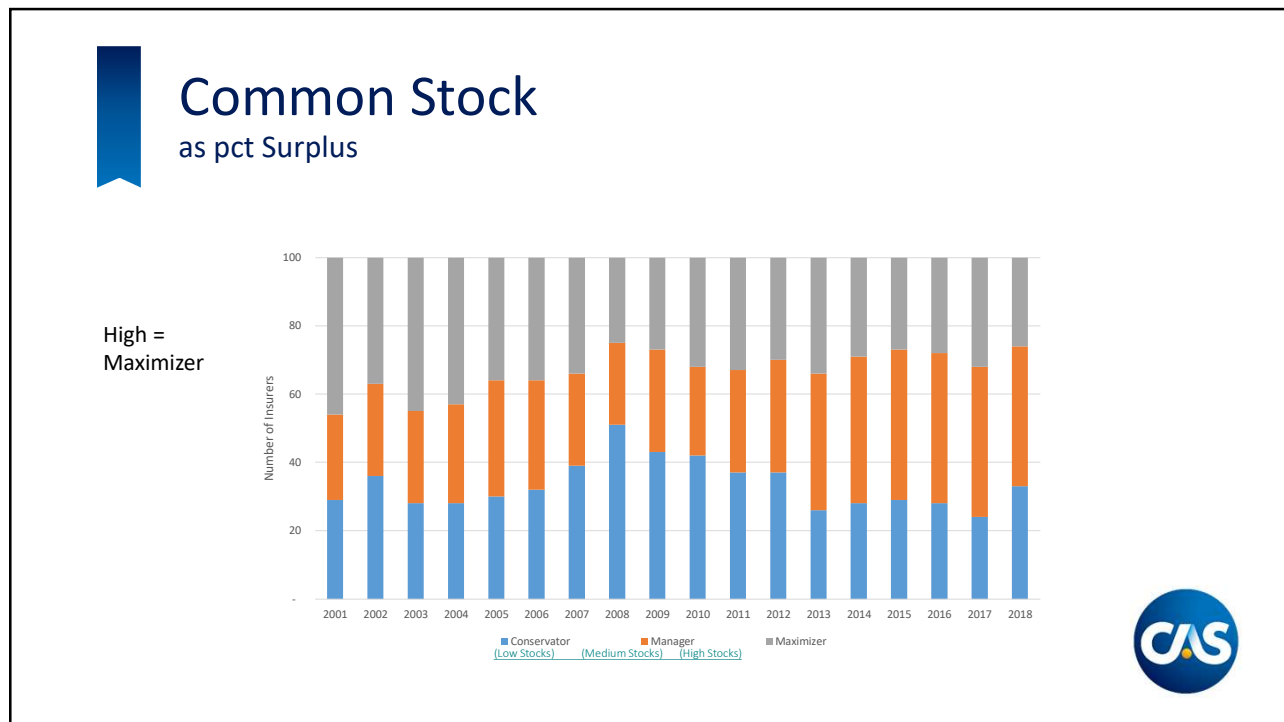
32



33




34



35

Overall Belief

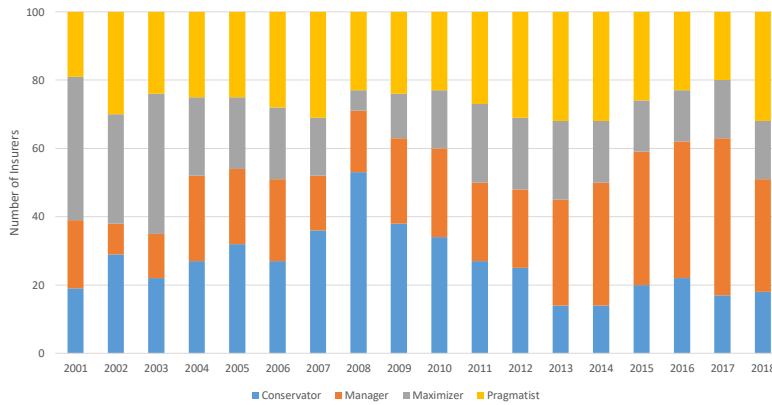
- For each year, look at the three scores for each insurer
 - If two or three are Maximizer, then overall belief is Maximizer
 - If two or three are Conservator, then overall belief is Conservator
 - If two or three are Manager, then overall belief is Manager
 - If there are three different scores, then overall belief is Pragmatist



36



Overall Belief



37



Transition Matrix (Observed)

Current Year Belief	Future Year Belief			
	Pragmatist	Conservator	Maximizer	Manager
Pragmatist	46%	16%	13%	25%
Conservator	16%	66%	4%	13%
Maximizer	17%	7%	66%	10%
Manager	26%	12%	6%	56%



38

By Company

Pragmatist	Conservator	Maximizer	Manager	Number of Companies
	X	X	X	1
X		X		5
X	X	X		6
	X			3
X		X	X	14
	X		X	5
X	X	X	X	27
X	X		X	20
X			X	6
X	X			5
		X		5
		X	X	2



39

Transition Matrix (Smoothed)

Current Year Belief	Future Year Belief			
	Pragmatist	Conservator	Maximizer	Manager
Pragmatist	45%	15%	15%	25%
Conservator	15%	65%	5%	15%
Maximizer	15%	5%	65%	15%
Manager	25%	10%	5%	60%



40

Conclusions



41

Conclusions

1. Plural Rationality may provide a theory of economics as well as risk management
2. A company can transition from one strategy to another via SURPRISE or ADAPTING
 - ADAPTING will require additional resources
3. Analysis of Insurance industry shows that this theory may be observable
 - Observations can be mined to develop Transition Matrix for multi year modeling



42

Casualty Actuarial Society
4350 North Fairfax Drive, Suite 250
Arlington, Virginia 22203

www.casact.org

