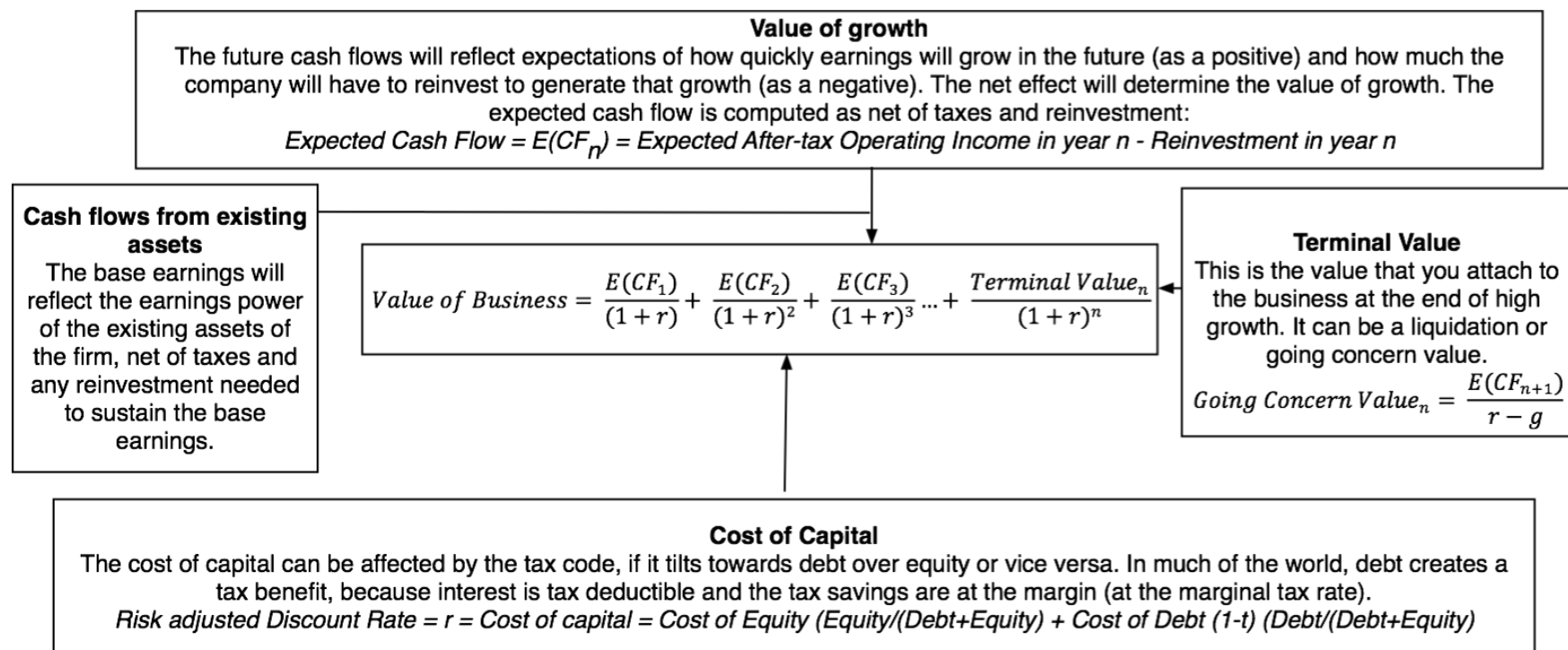


**THE VALUATION BERMUDA TRIANGLE:
BIAS, UNCERTAINTY AND COMPLEXITY**

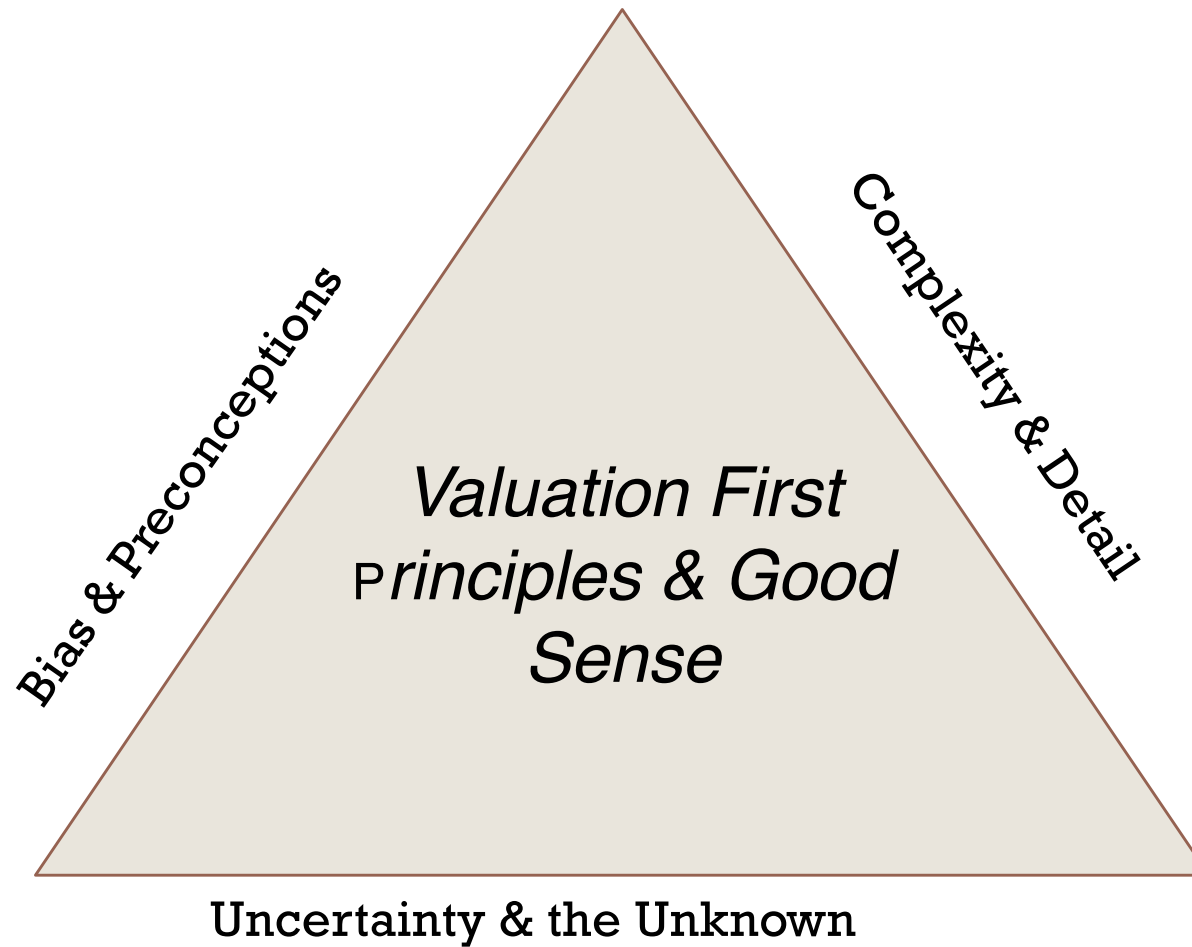
Aswath Damodaran

VALUATION IS SIMPLE. WE CHOOSE TO MAKE IT COMPLEX!



Going Concern Va

BUT HERE'S WHY VALUATION FAILS – THE BERMUDA TRIANGLE OF VALUATION



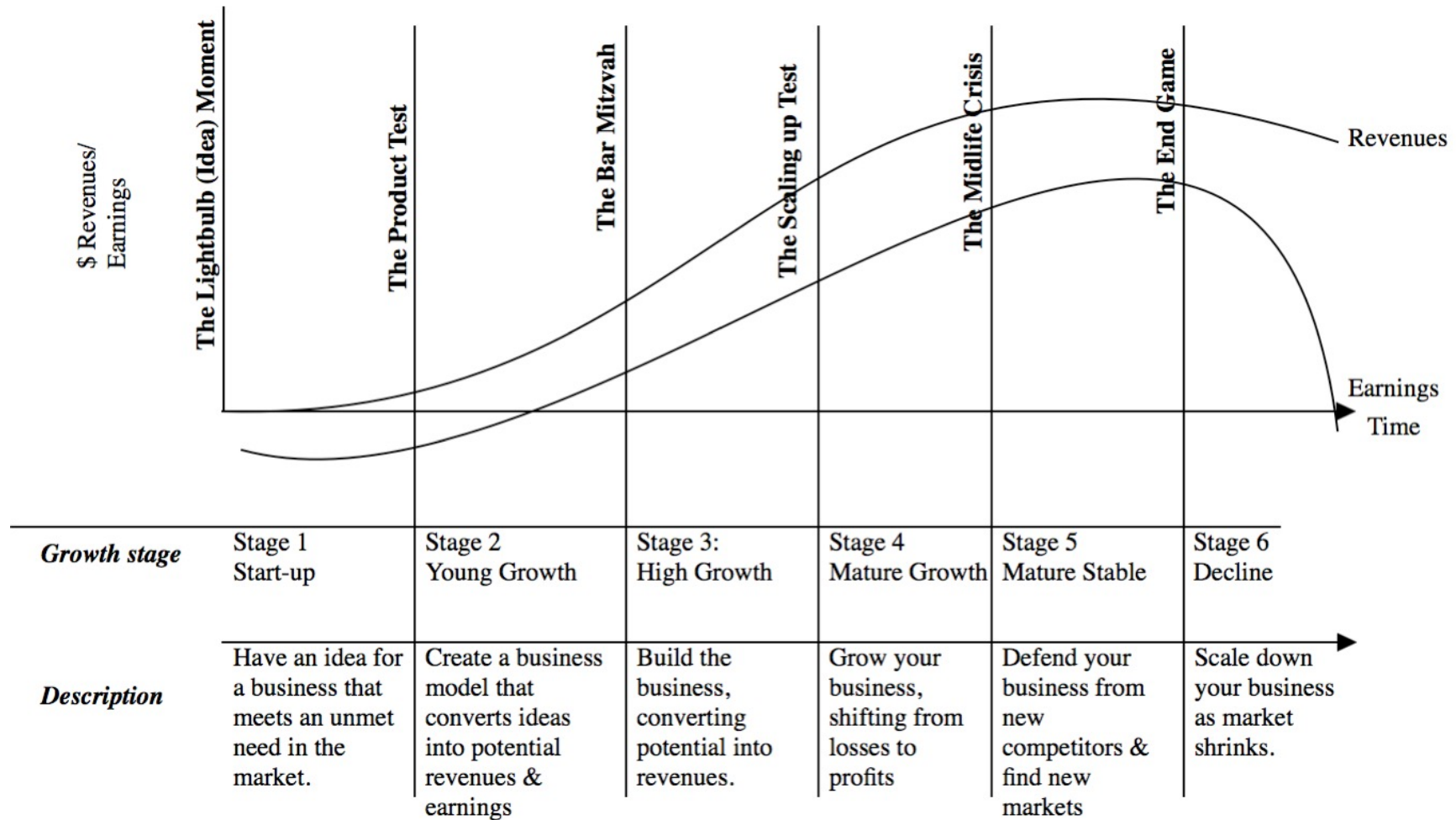
I. VALUATION BIAS

- Preconceptions and priors: When you start on the valuation of a company, you almost never start with a blank slate. Instead, your valuation is shaped by your prior views of the company in question.
 - Corollary 1: The more you know about a company, the more likely it is that you will be biased, when valuing the company.
 - Corollary 2: The “closer” you get to the management/owners of a company, the more biased your valuation of the company will become.
- Value first, valuation to follow: In principle, you should do your valuation first before you decide how much to pay for an asset. In practice, people often decide what to pay and do the valuation afterwards.


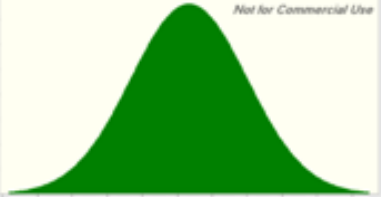
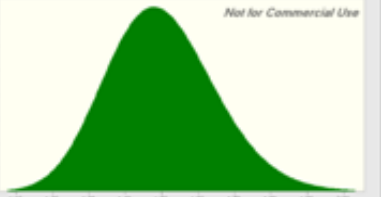

HEALTHY RESPONSES TO BIAS

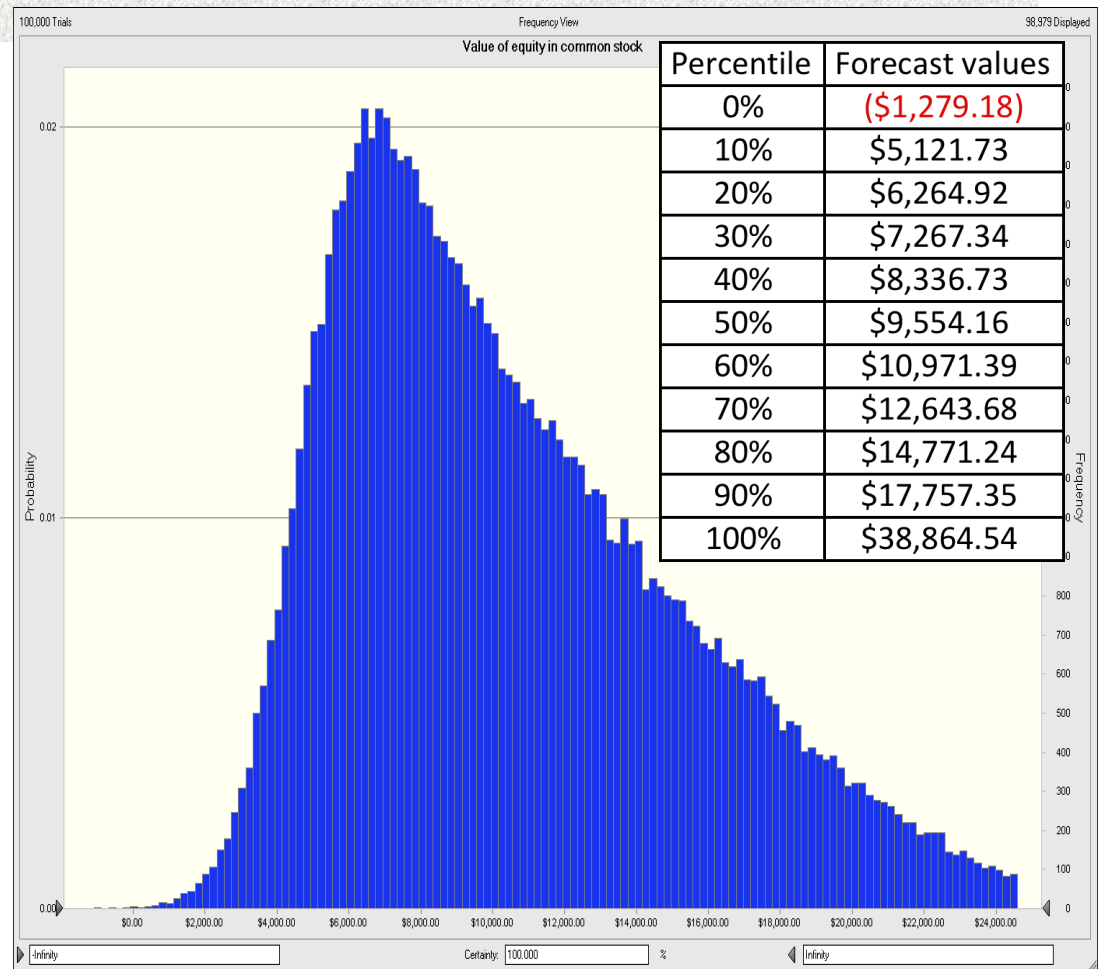
1. Build processes that minimize bias, not maximize it: To the degree that a significant portion of bias comes from reward/punishment mechanisms, we need to build processes that disassociate the valuation outcome from compensation.
2. Be honest (at least with yourself): Even if you may not want to reveal your biases to your clients, you should at least be honest with yourself.
3. Bayesian valuation: It may be a good idea to require anyone valuing a company to state what they believe that they will find in the valuation, before they actually do the valuation. Anyone using the valuation should then have access to both the analyst's priors and the valuation.
4. Transparency about motives: All valuations should be accompanied with full details of who is paying for the valuation and how much, as well as any other stakes in the outcome of the valuation.

II. VALUATION UNCERTAINTY: A FEATURE, NOT A BUG..



FACE UP TO UNCERTAINTY

<p>Revenue Growth Rate Distribution: Uniform Expected Value = 55% Minimum Value: 40% Maximum Value: 70%</p>	<p>Compounded annual revenue growth rate over next 5 years =</p>  <p>Not for Commercial Use</p>
<p>Target Operating Margin Distribution: Normal Expected Value = 25% Standard Deviation = 5%</p>	<p>Target pre-tax operating margin (2005 as % of sales in year 10) =</p>  <p>Not for Commercial Use</p>
<p>Sales to Capital Ratio Distribution: Lognormal Expected value: 1.50 Standard deviation: 0.15</p>	<p>Sales to capital ratio (for computing investment) =</p>  <p>Not for Commercial Use</p>
<p>Cost of Capital Distribution: Triangular Expected value: 11.22% Minimum value: 10.02% Maximum value: 12.22%</p>	<p>Initial cost of capital =</p>  <p>Not for Commercial Use</p>



AND DON'T GIVE UP, SINCE YOUR PAYOFF IS GREATEST WHEN YOU FEEL MOST IMMEDIATELY

Weather changeability for Honolulu, Hawaii

Temperature	Last Month	Last Year	Precipitation	Last Month	Last Year
Average change in high temperature day-to-day	1.7°	1.2°	Chance of dry day after a precip day	67%	81%
Average change in low temperature day-to-day	1.5°	2.0°	Chance of precip day after a dry day	7%	13%

[Further changeability analysis »](#)

Weather forecast accuracy for Honolulu, Hawaii

Last Month		Last Year	
MeteoGroup	88.44%	MeteoGroup	88.50%
Persistence	81.80%	CustomWeather	85.87%
CustomWeather	78.23%	AccuWeather	81.82%
The Weather Channel	73.12%	The Weather Channel	81.56%
AccuWeather	69.89%	Persistence	80.44%
Weather Underground	62.10%	Weather Underground	67.07%
National Weather Service	48.39%	National Weather Service	59.90%
Foreca	44.35%	Foreca	57.52%
WeatherBug	32.26%	WeatherBug	37.09%

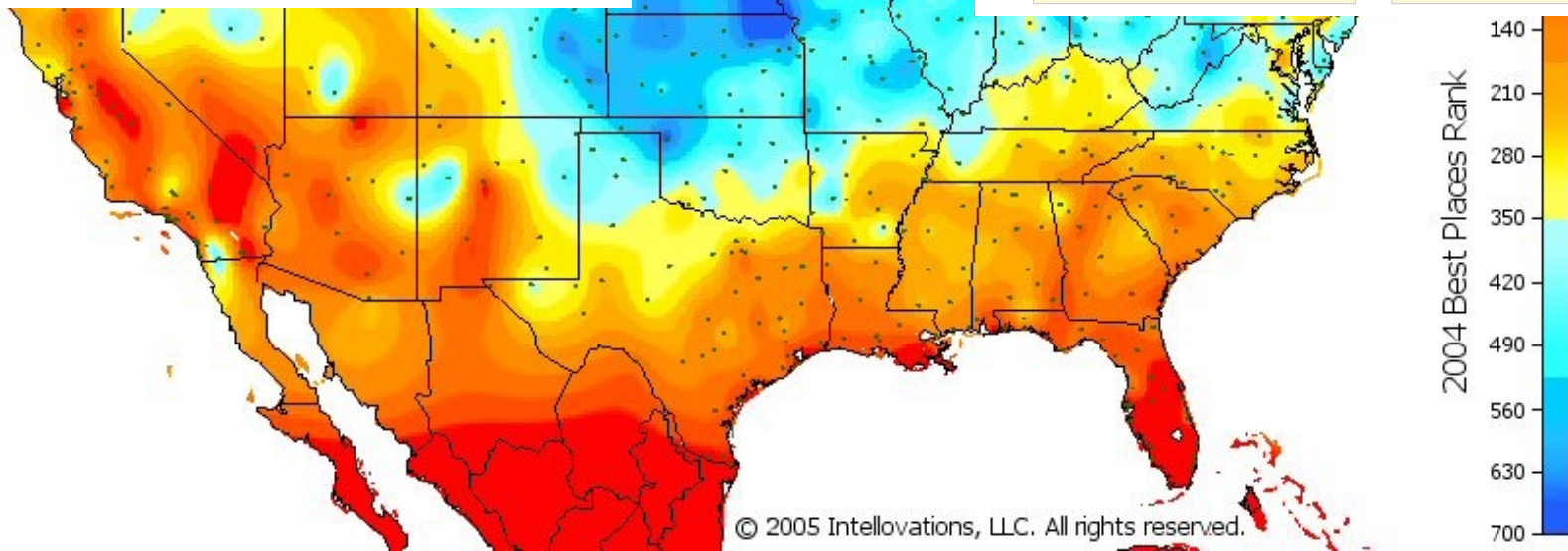
Weather changeability for Epping, North Dakota

Temperature	Last Month	Last Year	Precipitation	Last Month	Last Year
Average change in high temperature day-to-day	8.5°	7.7°	Chance of dry day after a precip day	50%	65%
Average change in low temperature day-to-day	7.1°	8.6°	Chance of precip day after a dry day	38%	20%

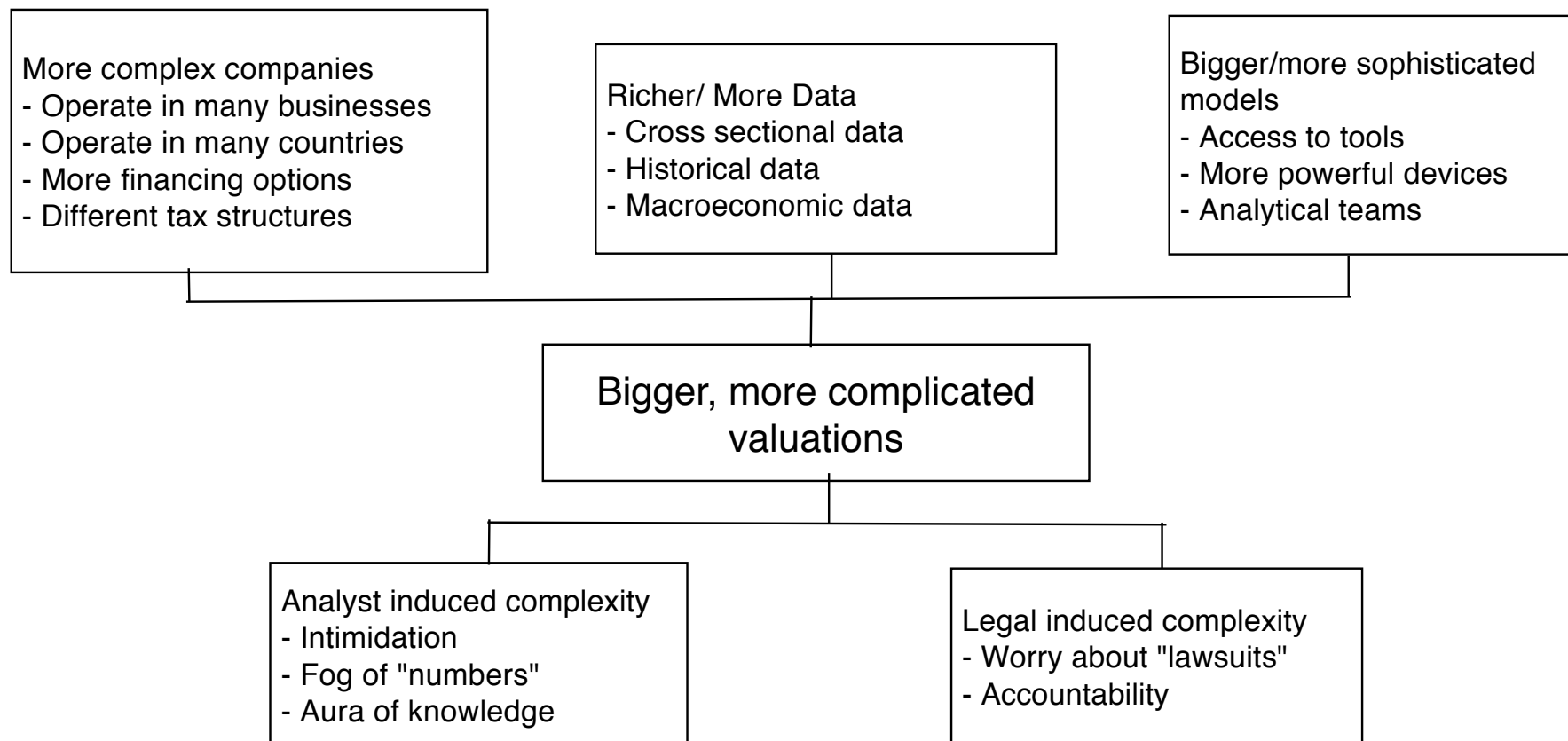
[Further changeability analysis »](#)

Weather forecast accuracy for Epping, North Dakota

Last Month		Last Year	
MeteoGroup	62.50%	MeteoGroup	66.97%
Foreca	61.61%	The Weather Channel	66.73%
The Weather Channel	61.31%	AccuWeather	64.86%
AccuWeather	60.42%	WeatherBug	64.80%
Weather Underground	56.85%	Foreca	62.75%
WeatherBug	56.17%	CustomWeather	62.70%
National Weather Service	54.76%	National Weather Service	62.64%
CustomWeather	54.46%	Weather Underground	61.38%
Persistence	38.01%	Persistence	44.09%



III. COMPLEXITY IN VALUATION



SOURCES OF COMPLEXITY

- Globalization: As companies globalize, valuations are getting more complex for a number of reasons:
 - Risk assessment has to factor in where a company operates and not where it is incorporated.
 - Currency choices proliferate, since a company can be valued in any of a half a dozen currencies (often to value different listings)
- Shifting and volatile macro economic risks have created changing risk premiums and strange interest rate/exchange rate environments.
- More complex accounting standards have created longer, more complicated, more difficult to read financial statements.
- More complicated holding structures (cross holdings, shares with different voting rights), motivated by tax and control reasons, make valuations more difficult.

DEALING WITH COMPLEXITY: THE "BAD" WAYS

- Input fatigue: Analysts who are called upon to estimate dozens and dozens of inputs, often with little information to do so, will give up at some point and input “numbers” just to get done. It is “garbage in, garbage out...”
- Black box models: The models becomes so complicated that what happens inside the model becomes a mystery to those outside. Consequently, analysts essentially claim no ownership or responsibility for the output from the model. “The model did it” becomes the refrain.
- Suspension of common sense: The dependence on models becomes so complete that analysts lose sight of common sense and mangle the valuation of the simplest assets.

HEALTHY RESPONSES TO COMPLEXITY

1. Parsimonious valuations: Never estimate more inputs than you absolutely have to. Less is more. When faced with the question of adding more detail/complexity, ask yourself whether it will make your valuation more precise (or just make it look more precise).
2. Go back to first principles: The fundamentals of valuation don't change, just because you are faced with complexity. Always fall back on first principles.
3. Focus on key levers: Even when there are dozens of inputs in a valuation, the valuation itself is a function of three or four key value drivers (which may be different for different companies). Keep your focus on those variables

AND TIE IT TO A STORY...

