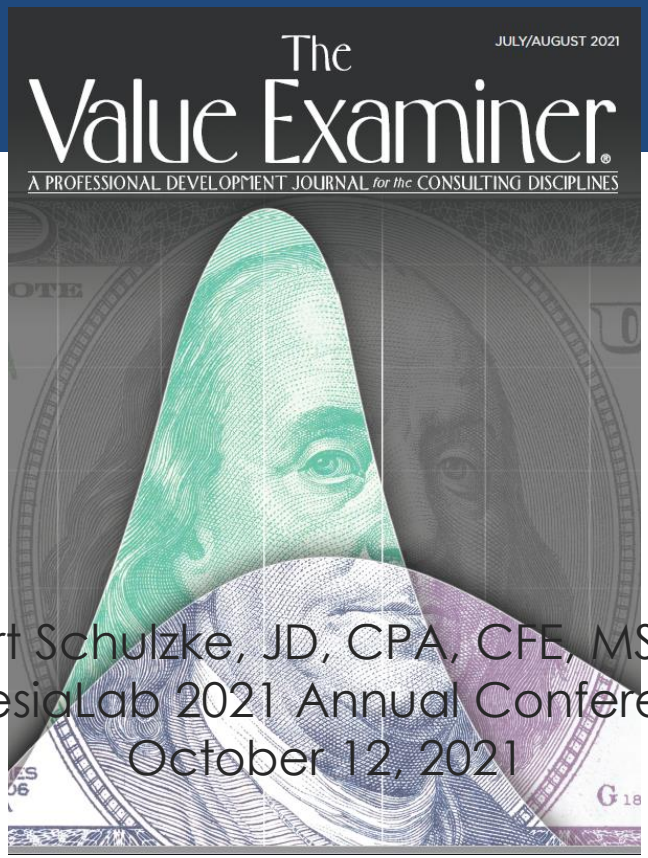
Estimating Business Value With Bayesian Networks



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Outer Limits of Plausibility

In Delaware valuation disputes, the parties must prove their valuations by a preponderance of evidence

Experts must persuade a "law-trained," non-expert judge based on "all relevant factors."

Yet courts often deride expert valuations as "widely divergent," "bracketing the outer limits of plausibility," or "ridiculously biased."

Three experts, ten valuations

Bruce B. Bingham (Polaris's Expert)

Method	Weight	Value (in millions)
Discounted Cash Flow	50%	$860
Guideline Public Companies	45%	$810
Comparable Transactions	5%	$540

David G. Clarke (Ad-Venture's Expert)

Method	Weight	Value (in millions)
Discounted Cash Flow	60%	$662
Guideline Public Companies	40%	$620

Daniel Beaulne (ISN's Expert)

Method	Weight	Value (in millions)
Discounted Cash Flow	25%	$100
Direct Capitalization of Cash Flow	25%	$94
Guideline Public Companies	25%	$109
Prior Transaction #1	12.5%	$124
Prior Transaction #2	12.5%	$119

In re ISN Software Corp

(Del. Ch. 2016)

Three experts, ten valuations

- High discounted cash flow (DCF) valuation was 8X the low.
- Court: "An optimist might [wrongly] assume that experts hired to examine the same company, analyzing the same set of financial data, would reach similar results," [yet] "the best scenario is that one expert, at the least, is wildly mistaken."

Three experts, ten valuations

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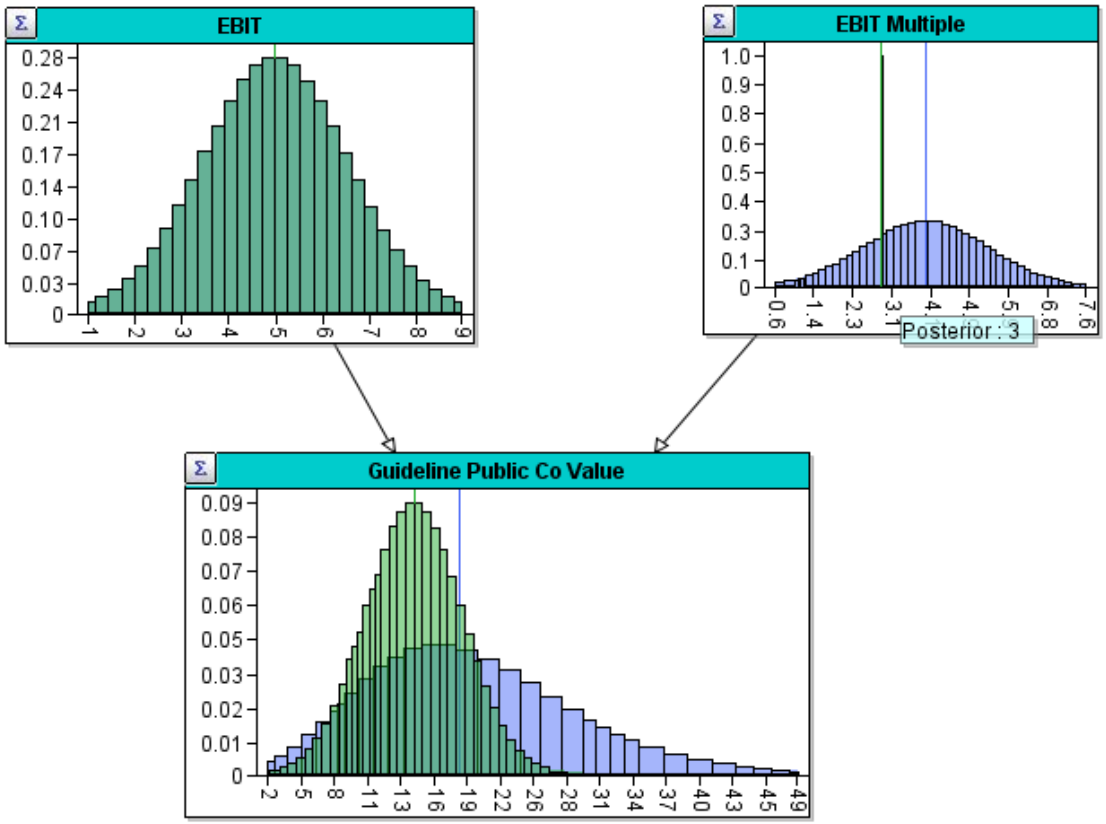
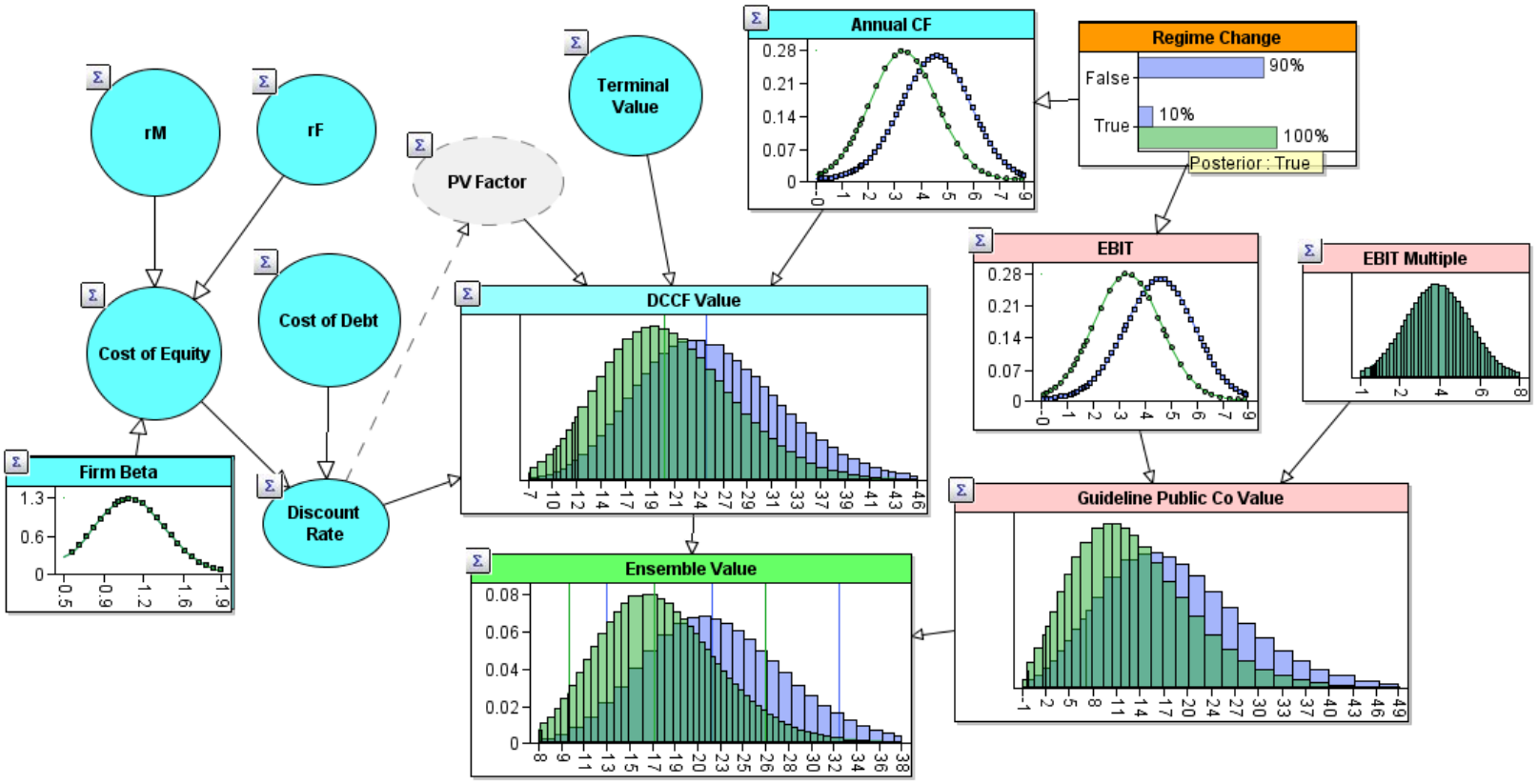
Court's own DCF value = $98,783 per share

The court was wrong, too!

Every point estimate of value has a probability of zero. We need probability distributions!



Ensemble valuation model



Persuading the courts

- Global GT LP v. Golden Telecom, Inc (Del. Ch. 2010)
  - A central issue: which "beta" model to use in estimating Golden's cost of capital
  - Experts claimed that a new, 13-factor, "predictive" MSCI Barra model was "academically and professionally sound"
  - Court rejected the new model b/c it was a "black box" with concealed factors and no previous supporting research
- Roadmap for introducing new modeling methods
  - Beyond excellent proprietary platforms like BayesiaLab, BNs are available through open-source platforms
  - The math of BNs is also open-source and well known
  - BNs have been tested extensively in academic and industry settings
  - BNs are used or discussed in many research publications

Why Bayesian networks?

- ***Transparently present*** variables, dependencies (causal or not), and probability distributions over sample space (i.e., uncertainty)
- ***Eliminate*** zero-probability point estimates and bogus "confidence" intervals
- ***Facilitate*** model exploration, validation, and sensitivity analysis by fact-finders, thereby encouraging buy-in (ownership) and corrective feedback (credit: Hunkar Toyoglu)
- ***Streamline*** dockets by encouraging parties to admit or stipulate to negotiated valuation estimates before trial or *even before filing* (huge ADR potential)
- ***Focus*** debate on nodes that matter most to valuation estimates

Q&A

Thank you!

Questions?