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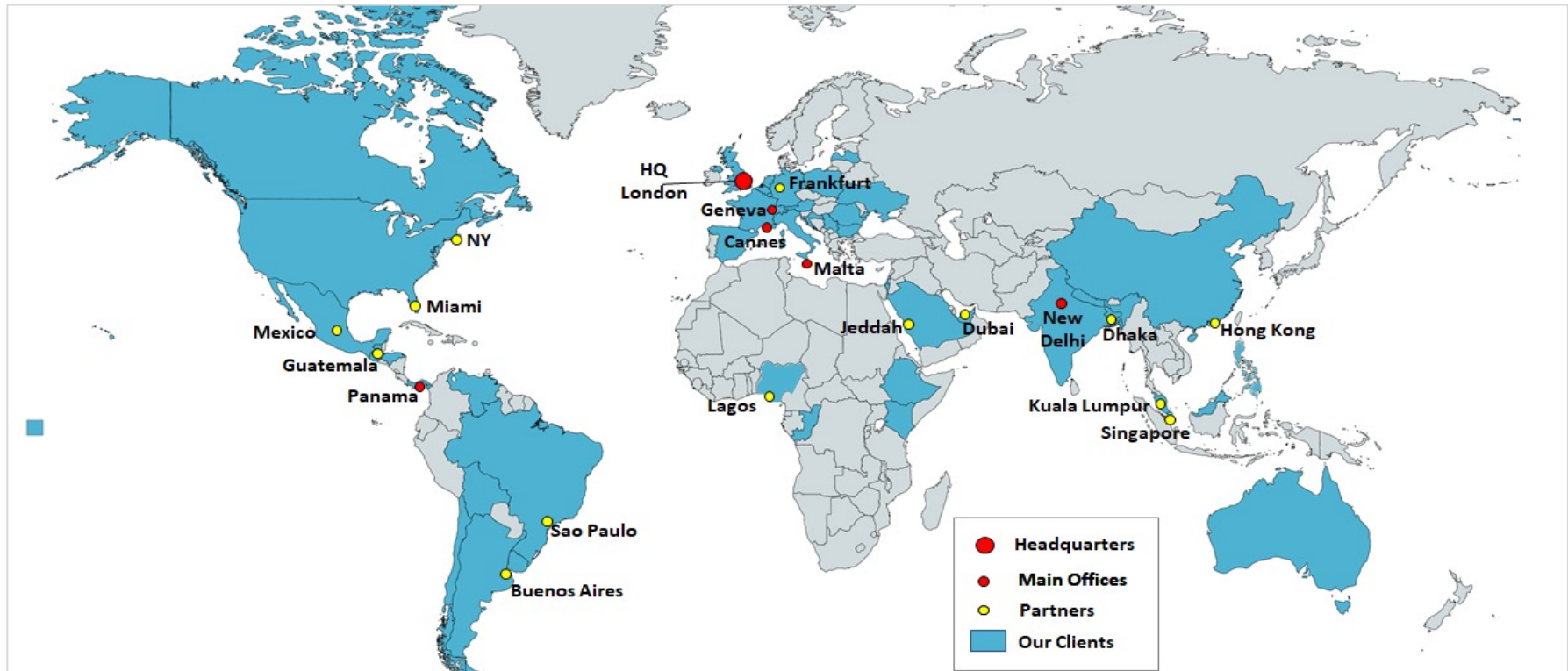
Advanced Valuation: Start-ups Valuations

By Dr. Fernando Scarpati



Introduction to BVint

- BVint provides Advanced Independent Valuations and Risk Models
- BVint was founded in 2012 as a response to the financial crisis
- BVint was the first company in Europe to offer Advanced Multidimensional Valuations with Stochastic Models
- Today, BVint has clients and partners in more than 30 countries



Main Services & Sectors

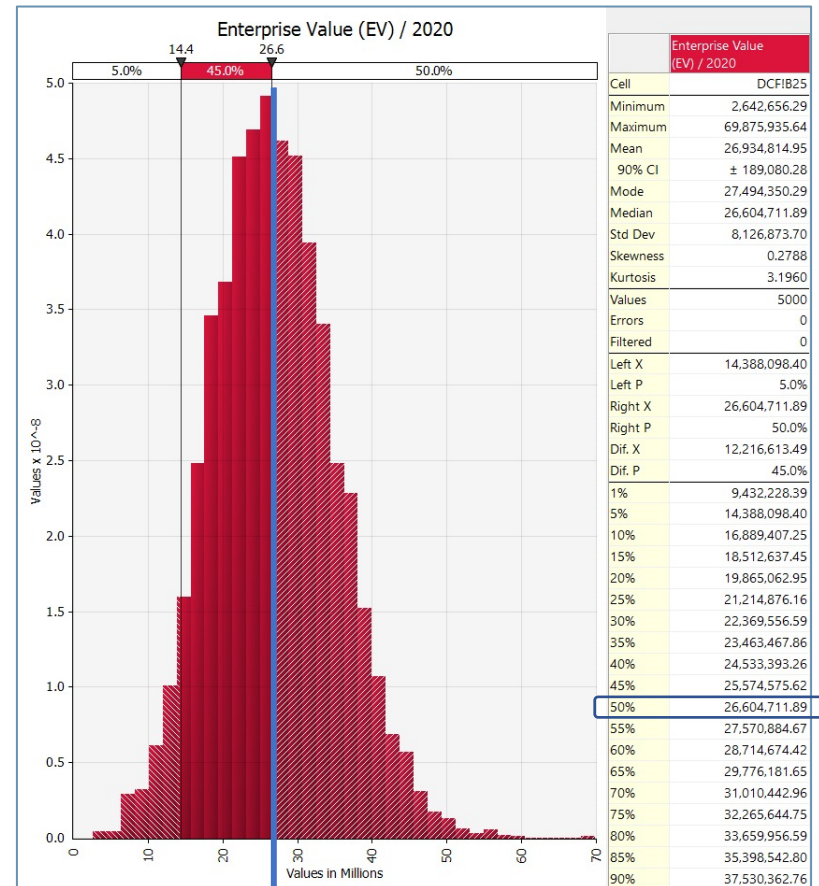
1. Advanced Multidimensional Valuations
2. Advanced Financial and Risk Modelling
3. Crypto Currency / ICO Valuations / Tokenization
4. Business Planning
5. Impact Valuation
6. Strategic Decisions and Value Creation Plan
7. Risk Management
8. Complex Assets and Securities Valuation

- Private Equity
- Banking
- Impact Investment
- Oil & Gas
- Biotechnology
- Healthcare
- Hospitality
- Mining
- Real Estate
- Industrial
- IT and Software
- High Tech / Fintech
- Luxury Goods
- FMCG and Retail
- Food and Beverage
- Pharmaceutical
- Entertainment
- Renewable Energy



Introduction to Advanced Valuations

- An advanced valuation calculates the value of a company using probabilistic and uncertainty risk analysis with stochastic long term forecast: DCF at Risk and Value at Risk (VaR).
- We need to identify risk drivers and measure them using volatilities and probabilities based on statistical analysis.
- Advanced valuations are based on predictive rational models with a unique value for decision making.
- Value at Risk (VaR) methodology aims to quantify the level of the worst case outcomes in a situation where the future is uncertain.
- VaR is defined as a threshold value that the losses should not exceed in a given time period and a given confidence level.
- Traditional Valuations can only be used to calculate the fair value of a company or an asset. Advanced valuations can be used to identify and understand the value drivers of a business in the long term at take value driven decisions.



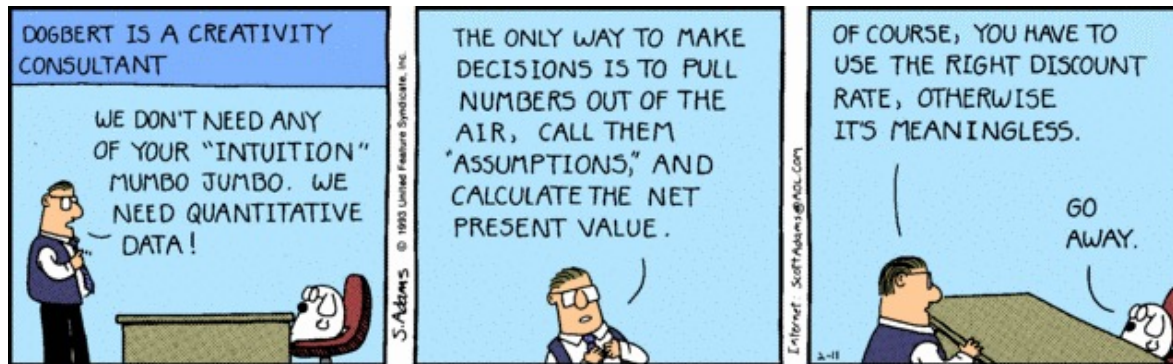
VaR 50%

The Problems of the Traditional Valuations and DCF Models

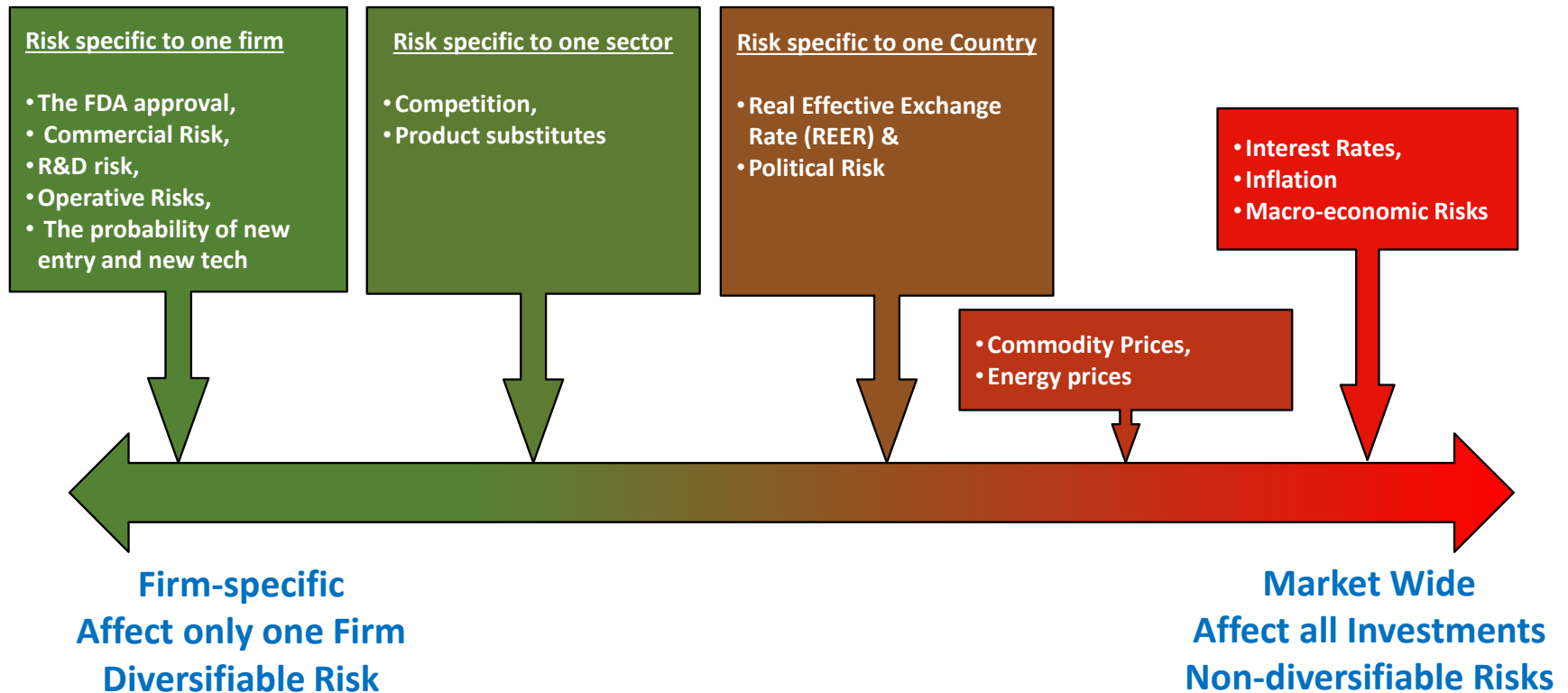
1. A deterministic DCF uses deterministic forecasts which are driven by only one scenario of variables. Such approaches do not work with multiple variables that change in time.
1. Manipulation of the Information.
2. The lack of probabilistic and volatile driven forecasts causes valuations to miss valuable information for decision making. In particular, deterministic systems cannot correctly model the following cases:
 - Businesses dealing with volatile commodities.
 - Start ups where probabilities of success are low.
 - When a proxy for risk that can be used to obtain discount rates are not available.
 - Businesses located in emerging countries with volatile economies, currencies, and inflation.
 - Businesses dealing with the probabilities of discovering natural resources.
 - Pharmaceutical and Biotech firms in which clinical trials of new products takes years with four or five phases in with probabilities of approval may be low.
 - All businesses and open economies where their internal environments are affected by random events.

When the Traditional DCF doesn't Work

- **Traditional approach does not work well in some of the following situations:**
 - Start ups project where default risk is very high.
 - Companies and Projects where cashflows are negative for a long time and risk for those years cannot be easily assessed.
 - Where a proxy for risk that can be used to obtain discount rates are not available or is difficult to calculate.
 - Some volatile businesses as probabilistic scenarios are not included
 - Business located in emerging countries with very volatile economies.
- **In other words, traditional DCF doesn't work when specific risks are high.**



Types of Risk



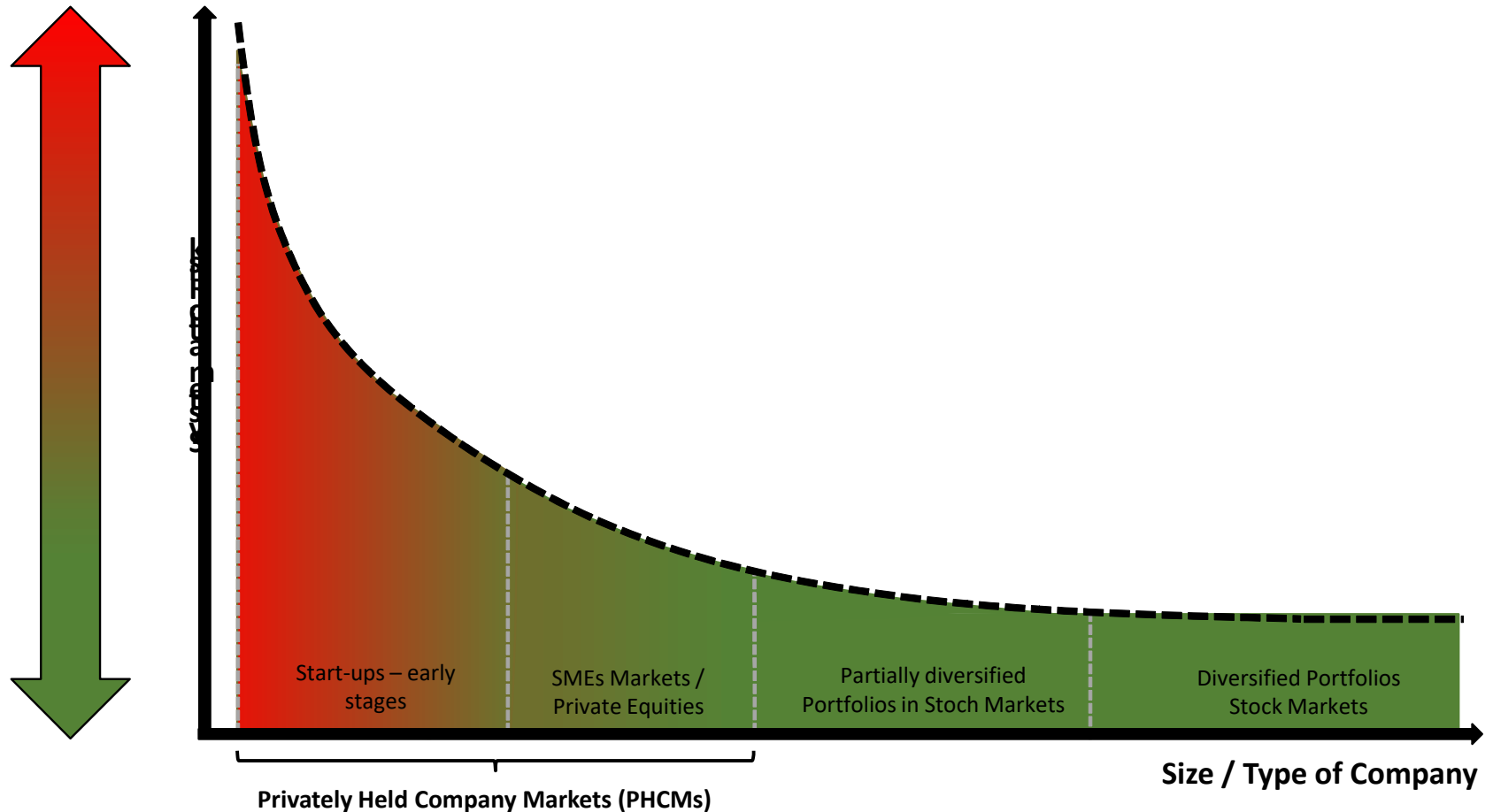
Diversifiable risk is simply the risk that is specific to a particular security or sector so its impact on a diversified portfolio is limited.

In Traditional Valuations CAPM is adjusted with some additional premium trying to capture those specific risks with two problems:

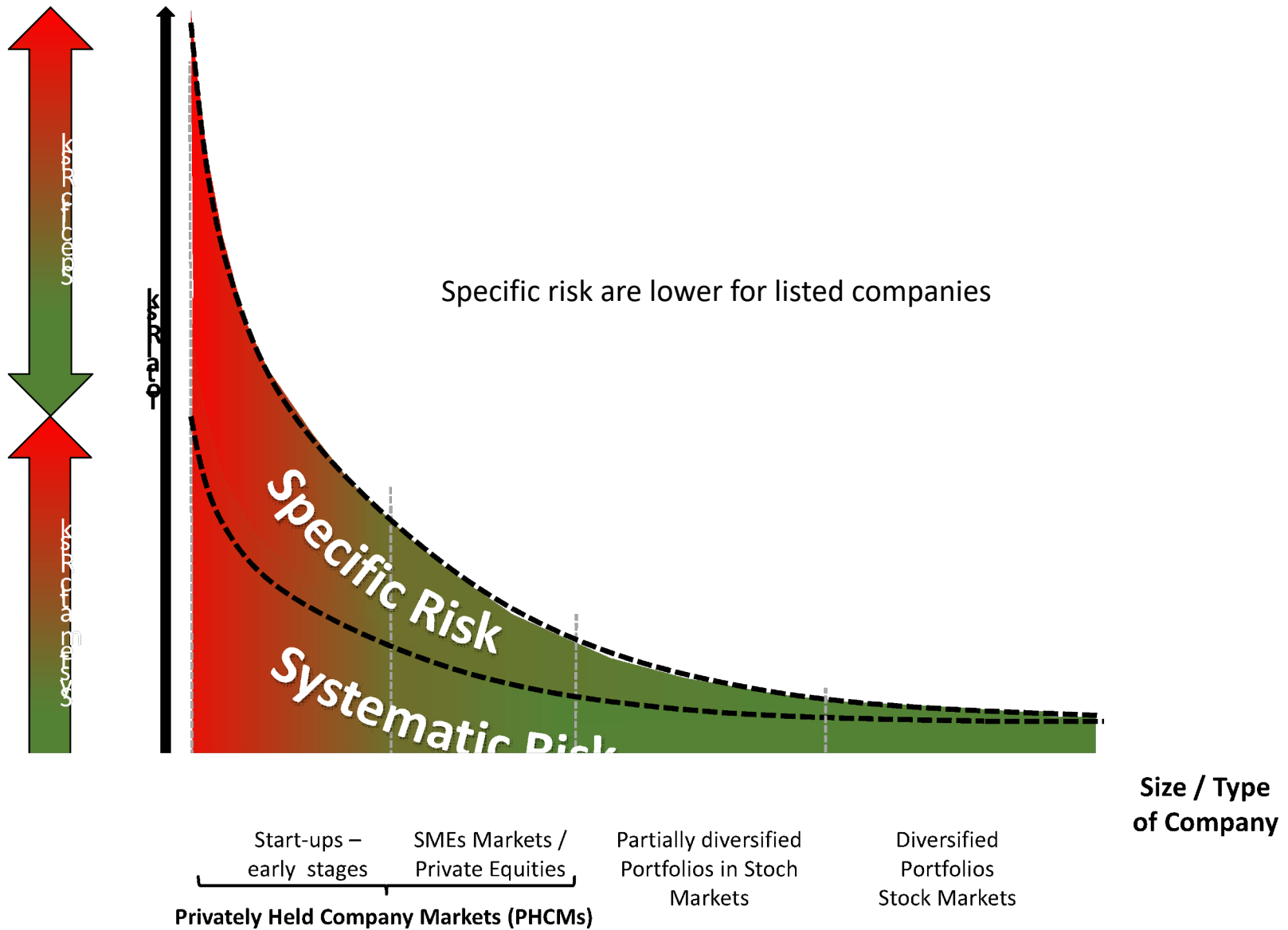
- They don't clearly show which drivers are behind
- It has no clear rationale

The problem of the CAPM in Some Cases

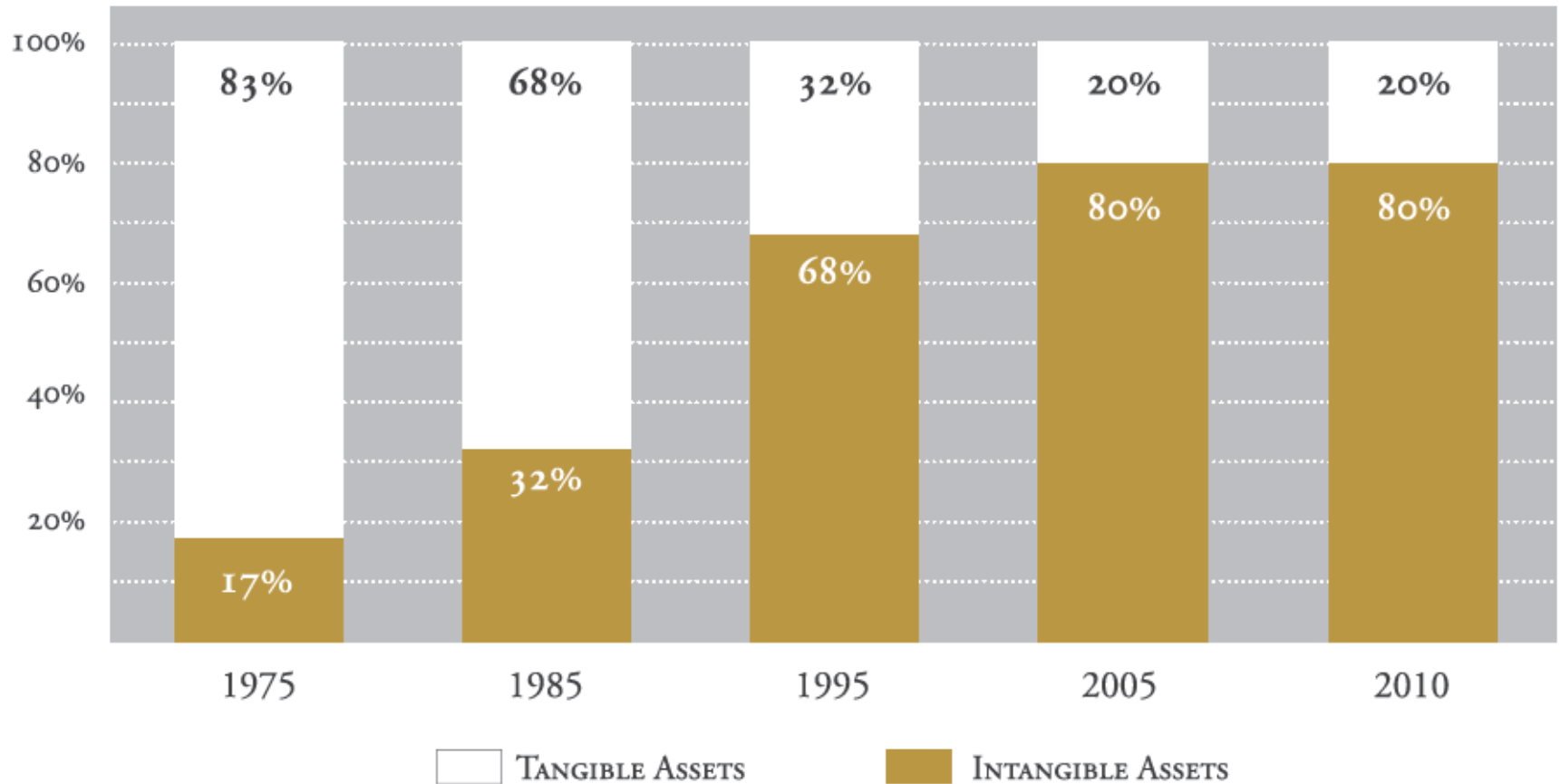
1. The CAPM takes into account the asset's sensitivity to non-diversifiable risk (systematic risk or market risk).
2. Specific Risks are not captured by the CAPM & portfolios that are not fully diversified (private equities).
3. Therefore, we need advanced valuations to include specific risks in the stochastic forecasts.



Systematic Risks vs. Specific Risks



Intangibles Today Increases Specific Risk



Source: Ocean Tomo

Intellectual Knowledge, technology, management skills

Traditional vs. Advanced Valuations: The Strategic Priority

In traditional valuation processes, risk assessment and attention has historically focused more than half its time on legal, compliance, and financial reporting functions. However, most big hits come from market, macro economic, strategic and operative risks.

Strategic Risks Destroy the Greatest Value

Share Price Impact and Audit Time Allocation Across Risk Categories

n = 61.

Likelihood of Occurrence

Percentage of Risk Failure
Leading to a Significant
Market Decline^a

Executive Time Spent

Percentage of Time Spent
by Audit Departments
on Risk Types



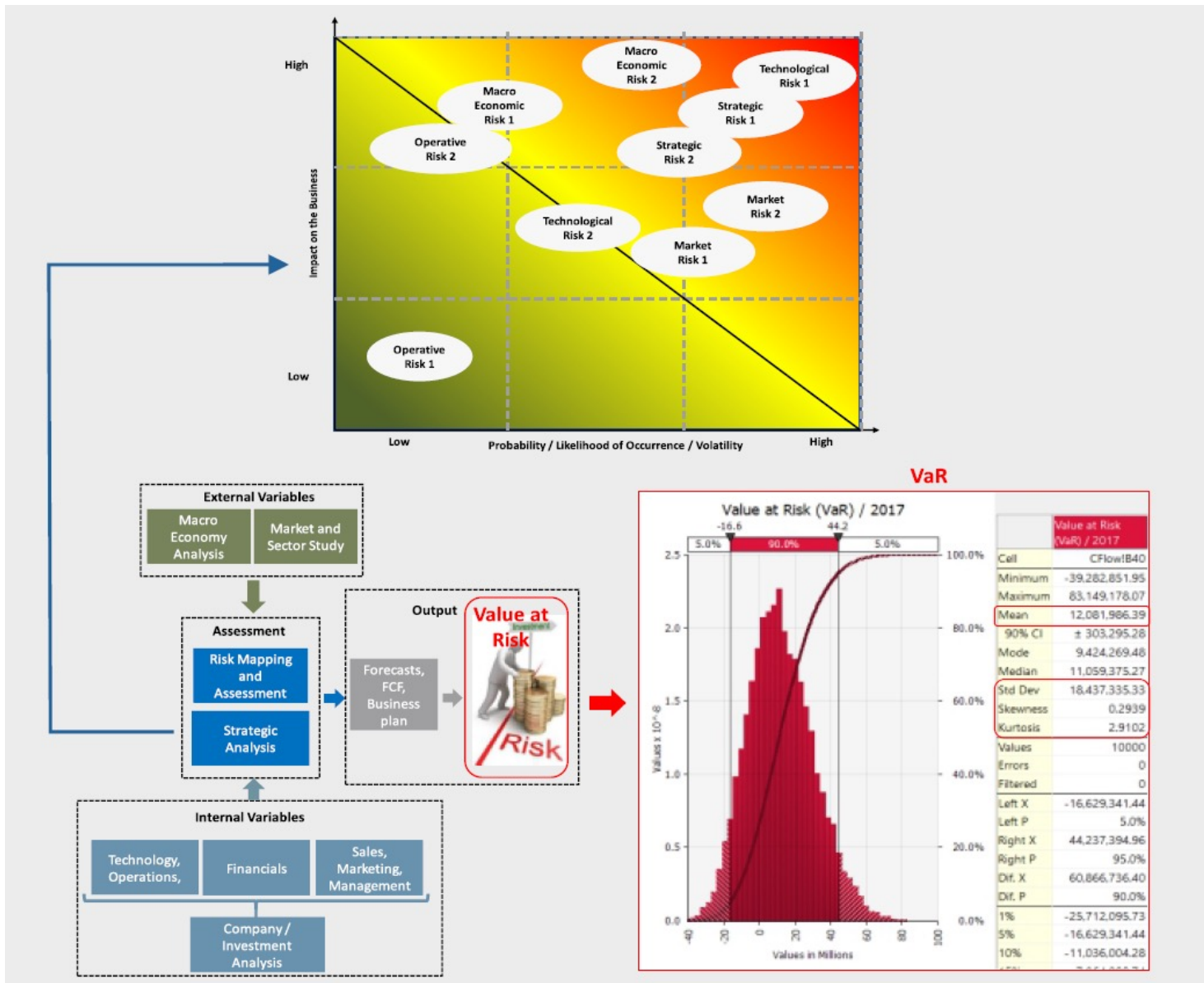
Institutional Investors today pay more attention to market, strategic and operative risks. Our valuations do the same.

STRATEGIC RISKS ARE ALSO SPECIFIC AND ARE PARTICULARLY IMPORTANT AT AN EARLY STAGE

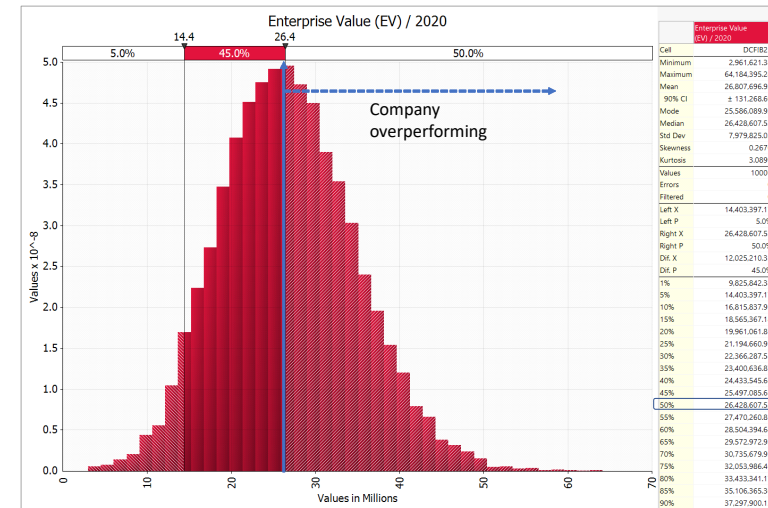
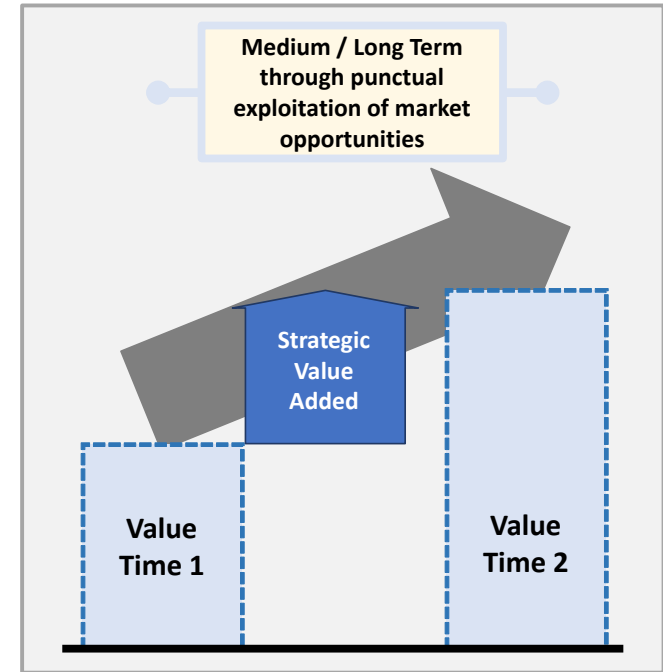
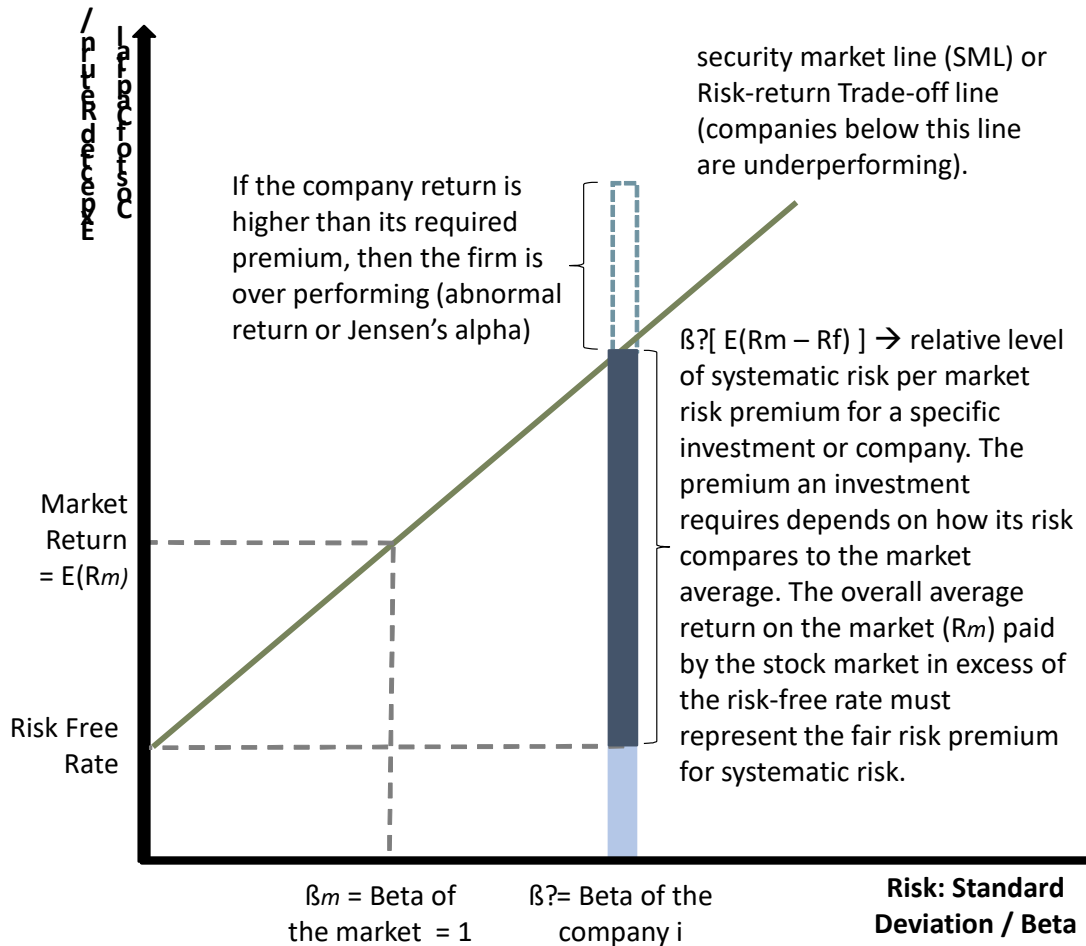
Source: CEB 2014 Share Shocks Analysis.

^a A significant market decline is defined as a drop in market capitalization of more than 40% in a single year.

Advanced Valuations



Capturing the Alpha Value and the Strategic Specific Value



Monte Carlo simulations are used to model the probability and volatility of different outcomes in a process that cannot easily be predicted due to the intervention of random variables. Since business and finance are plagued by random variables, Monte Carlo simulations have a vast array of potential applications in these fields. They are used to assess the risk that an entity will default and to analyze derivatives such as options. Insurers and oil well drillers also use them. BVint also use them to assess all risks and variables driving the value of companies and investments. Sample of uncertain variables assessed by BVint in its advanced valuations:

- Currency Risk,
- Interest Risk,
- Credit Risk,
- Potential Contingencies Risk,
- Commodity prices,
- Growth rates evolution,
- Markets, Strategic, Operative and Technological Risks and value drivers,
- Success probabilities to achieve certain goals in a given business plan,
- Start-up Risks according to stage of development and sector,
- Systematic and non-systematic Risks (beta),
- Etc.

We assess the value and the risk associated with a new globally patented biotechnology. Still two years needed for FDA approval (last two phases). The technology was developed by a team an extensive and successful track record in research and development and the management is made by top executives coming from the biggest players in the industry. Consequently, the value is driven not only by the technology and its marketability but also by a very skilled, experienced and successful management team. Given that the technology is in the process of approval, we had to assess not only the market drivers but also the probabilities of success during the remaining stages of the FDA process. In addition, after FDA approval we have also considered the default risk according to sector statistics.

Early Stage Risks and The Problem of CAPM

- Traditional risk and return models (CAPM) that we use to estimate the cost of equity focus only on market risk, i.e., the risk that cannot be diversified away, based on the implicit assumption that the marginal investors in a company are diversified
- The risks associated with investing in a young company include not only the traditional factors – earnings volatility and sensitivity to macroeconomic conditions, for example – but also the likelihood that the firm will not survive to make a run at commercial success.
- When valuing private businesses, analysts often hike up discount rates to reflect all of the concerns that they have about the firm, including the likelihood that the firm will not make it. The Table summarizes the target rates of return demanded by venture capitalists, categorized by how far along a firm is in the life cycle.

<i>Stage of development</i>	<i>Typical target rates of return</i>
Start up	50-70%
First stage	40-60%
Second stage	35-50%
Bridge / IPO	25-35%



Which are the risk drivers ??

Source: Damodaran, 2010

The Scope of the Risk Map

The main scope of the risk-value mapping is to identify all those business factors affecting the value of the company. It is the starting point to understand and assess risk and value, and to prioritize the steps for improvement and development.

The risk-value mapping provides a more holistic understanding of the company itself. It complements the day-to-day monitoring of risks related to market, strategy, macro economics, operations and finance. It also covers the overall approach to risks that have a more medium or long-term lifecycle (e.g. external risk).

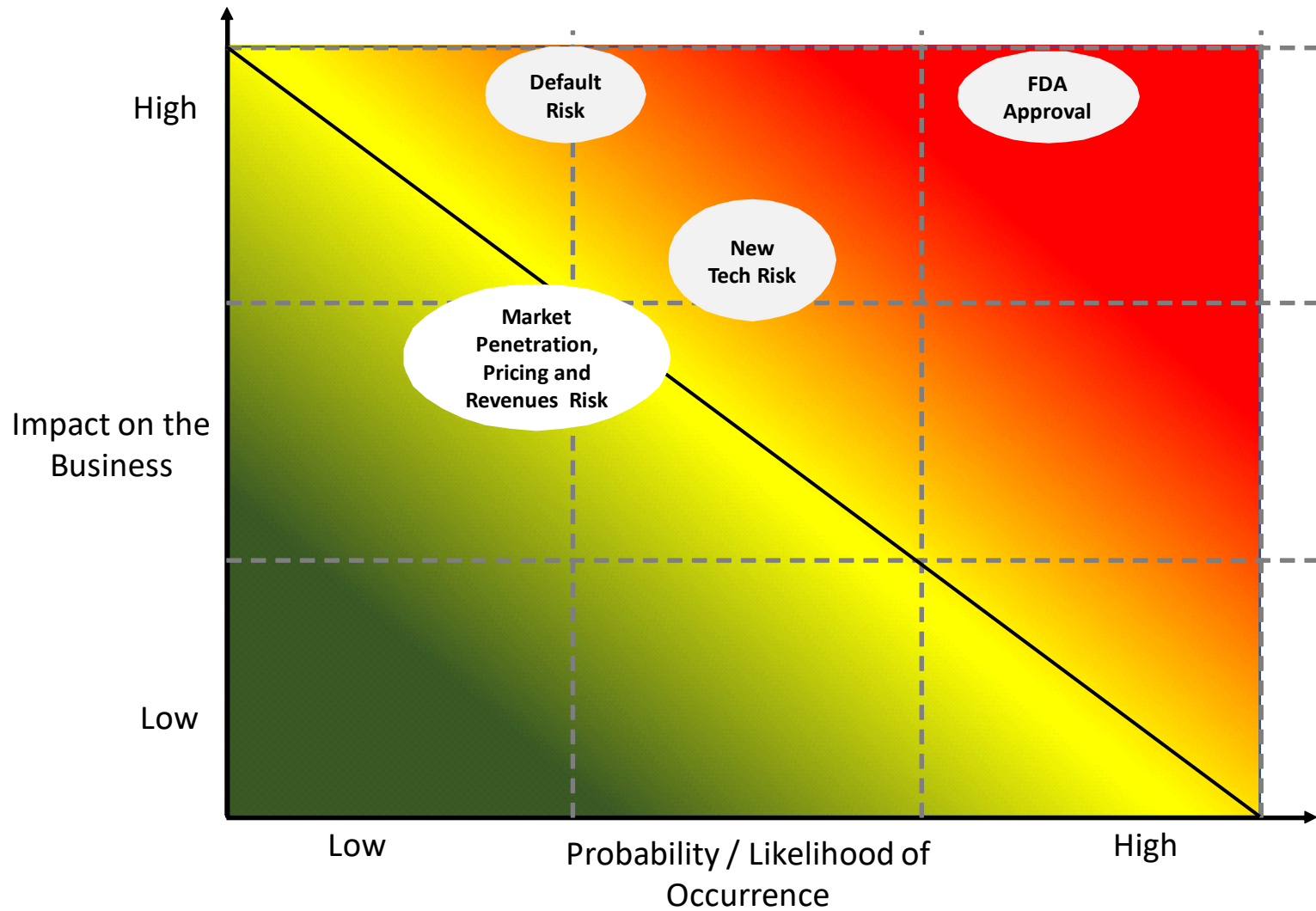
The risk-value mapping is also necessary to understand the nature of each factor (Risk type and Risk profile) influencing the value of the company. Drivers are then assessed qualitatively and quantitatively. Risks are classified as diversifiable and non diversifiable. Those risks that can be diversified are normally measure by the regression β used in the Capital Asset Pricing Model. Beta is a measure of the volatility of a security in comparison to the market as a whole.

Risks can also be internal or external to the company. Some internal could include: Technological risk, operative risks, financial risks, etc. Some external risks could include: Country risk, country inflation, exchange rate, market risks, etc.

Each risk has its own profile in terms of frequency, volatility, standard deviation, regularity, persistence, probable, etc. The assessment will be made according to each profile.



Specific Risk not Capture by CAPM



Discount Rates Include:

- Risk Free
- Market/systematic risks (beta and risk premium)
- Time value of money
- DLOM
- Size

Is that enough for this case?

Discount Rate Adjustment Technique

The problem

The single and base scenario assumes success with expected revenues, so it is conditional with no probabilistic assessment. Variables are not subject to volatility as it should be in reality. A static DCF is not considering following scenarios

- FDA approval,
- Risk of Failure,
- Probability of New Technologies affecting Revenues ,
- Probable Market Penetration,
- Other specific Risks

Discount rate must therefore be adjusted (estimated) to capture all those risks but HOW??

DCF at Risk – Main Inputs and Drivers (1)

FDA Risk

Probability FDA Approval	I	II	III	FDA	Market
Per stage	100.0%	100.0%	65.0%	80.0%	
Cumulative	100%	100.0%	100.0%	65.0%	52.0%

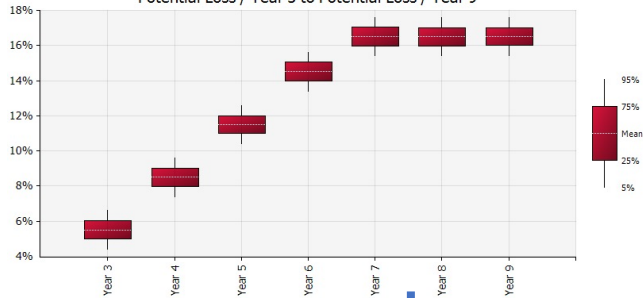
	Investment	Years	Success Probability
Probability FDA Approval Phase 1	2,000,000	1	100%
Probability FDA Approval Phase 2	1,000,000	1	100%
Probability FDA Approval Phase 3	2,000,000	1	65%
Probability FDA Approval Phase 4	3,000,000	1	80%
Total	8,000,000	4	52.0%

Default Risk

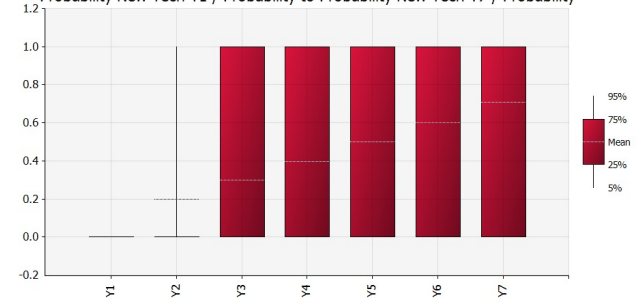
	Success Probability	Investment
Default Risk Year 1	100%	5,000,000
Default Risk Year 2	97%	
Default Risk Year 3	95%	
Default Risk Year 4	93%	
Default Risk Year 5	90%	
Default Risk Year 6	90%	
Default Risk Year 7	85%	
Default Risk Perpetuity	80%	
Total	59.00%	

New Tech Risk

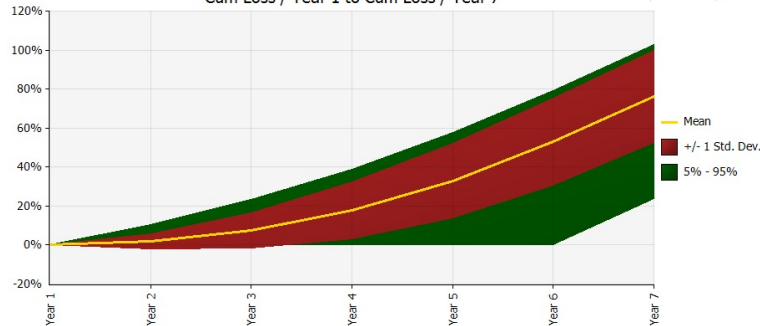
Potential Loss / Year 3 to Potential Loss / Year 9



Probability New Tech Y1 / Probability to Probability New Tech Y7 / Probability



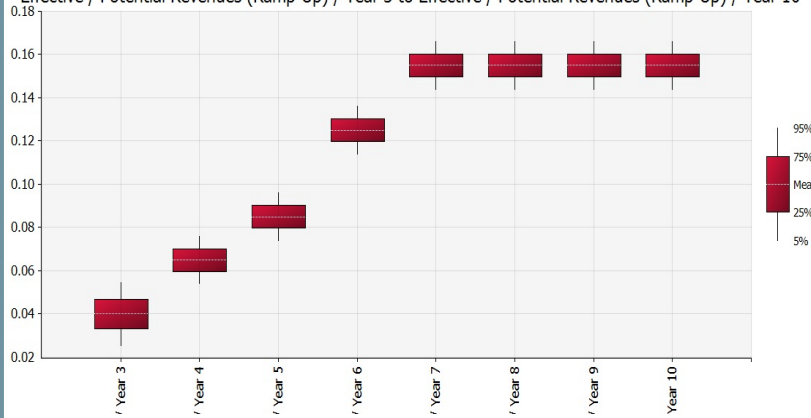
Cum Loss / Year 1 to Cum Loss / Year 7



DCF at Risk – Main Inputs and Drivers (2)

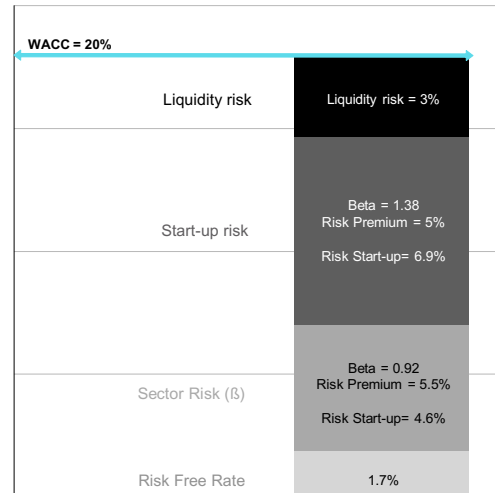
Effective Revenues / Potential Revenues

Effective / Potential Revenues (Ramp-Up) / Year 3 to Effective / Potential Revenues (Ramp-Up) / Year 10

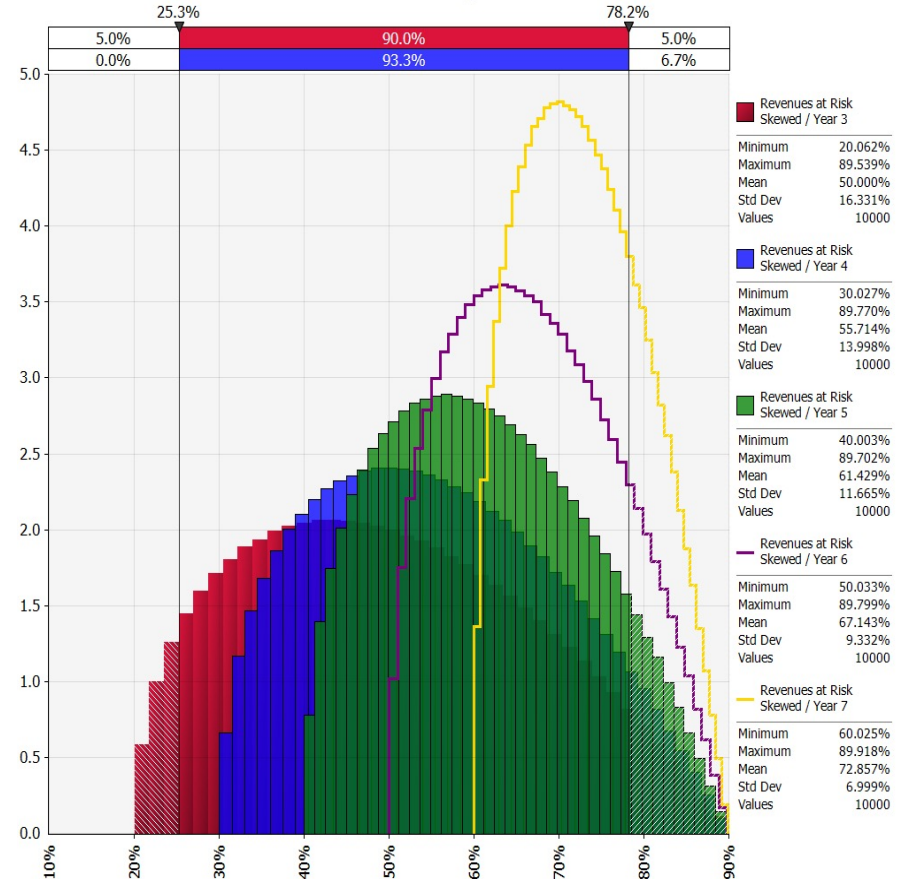


WACC

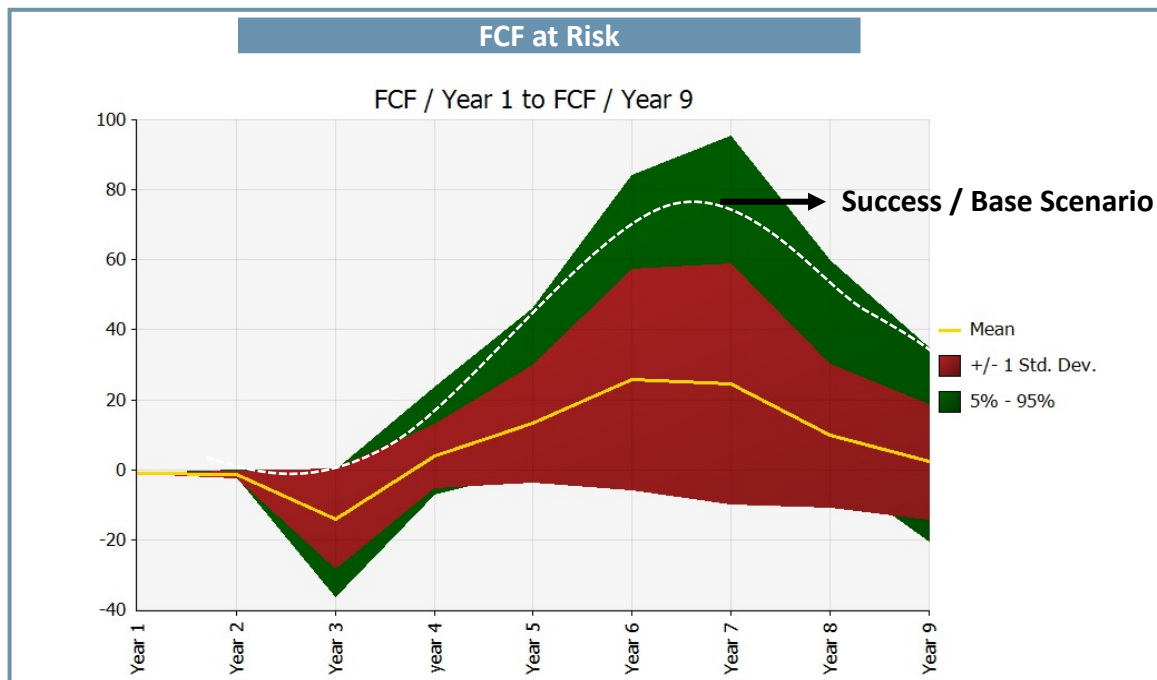
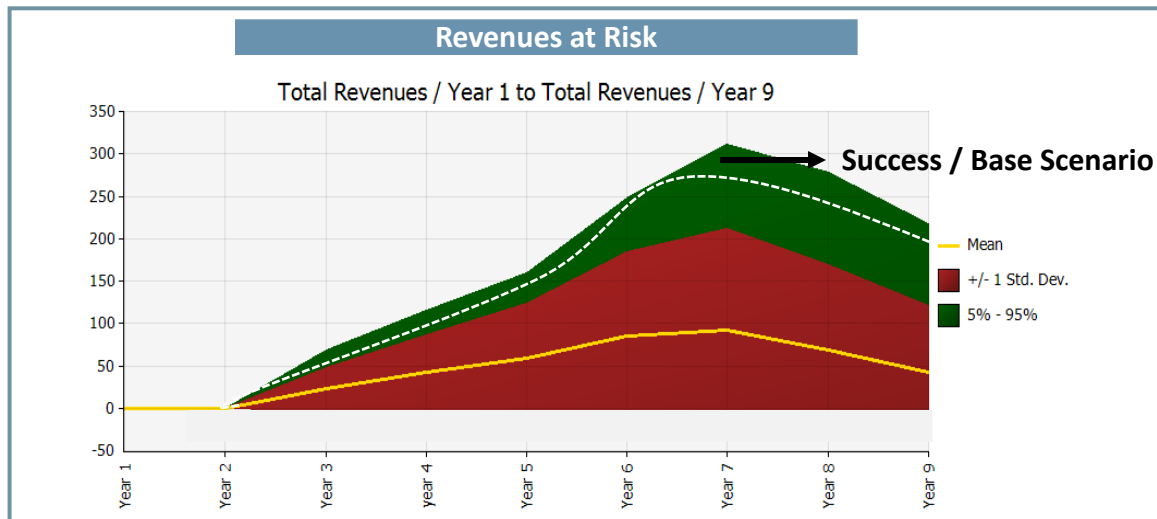
WACC / Expected Return



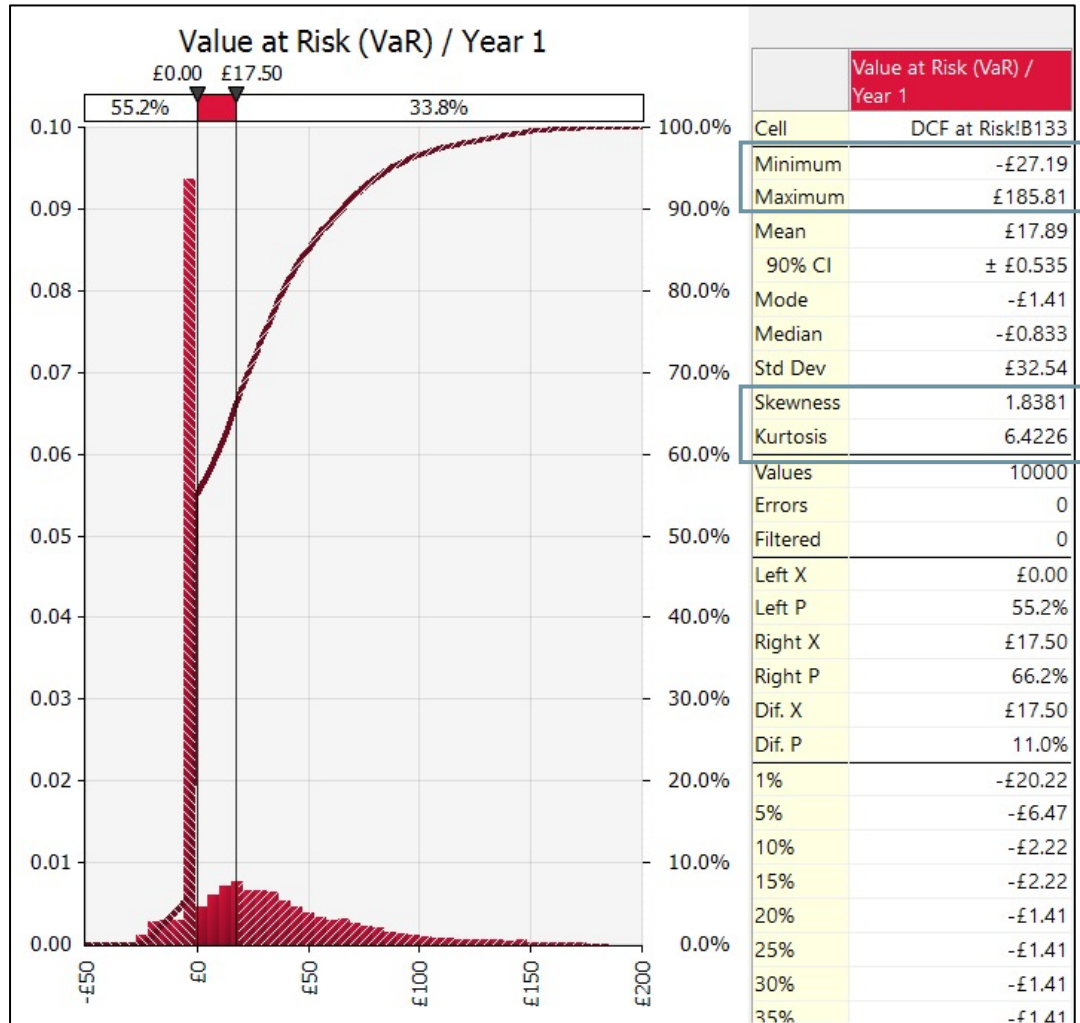
Probability of Accomplishing the Target



DCF at Risk – Outputs



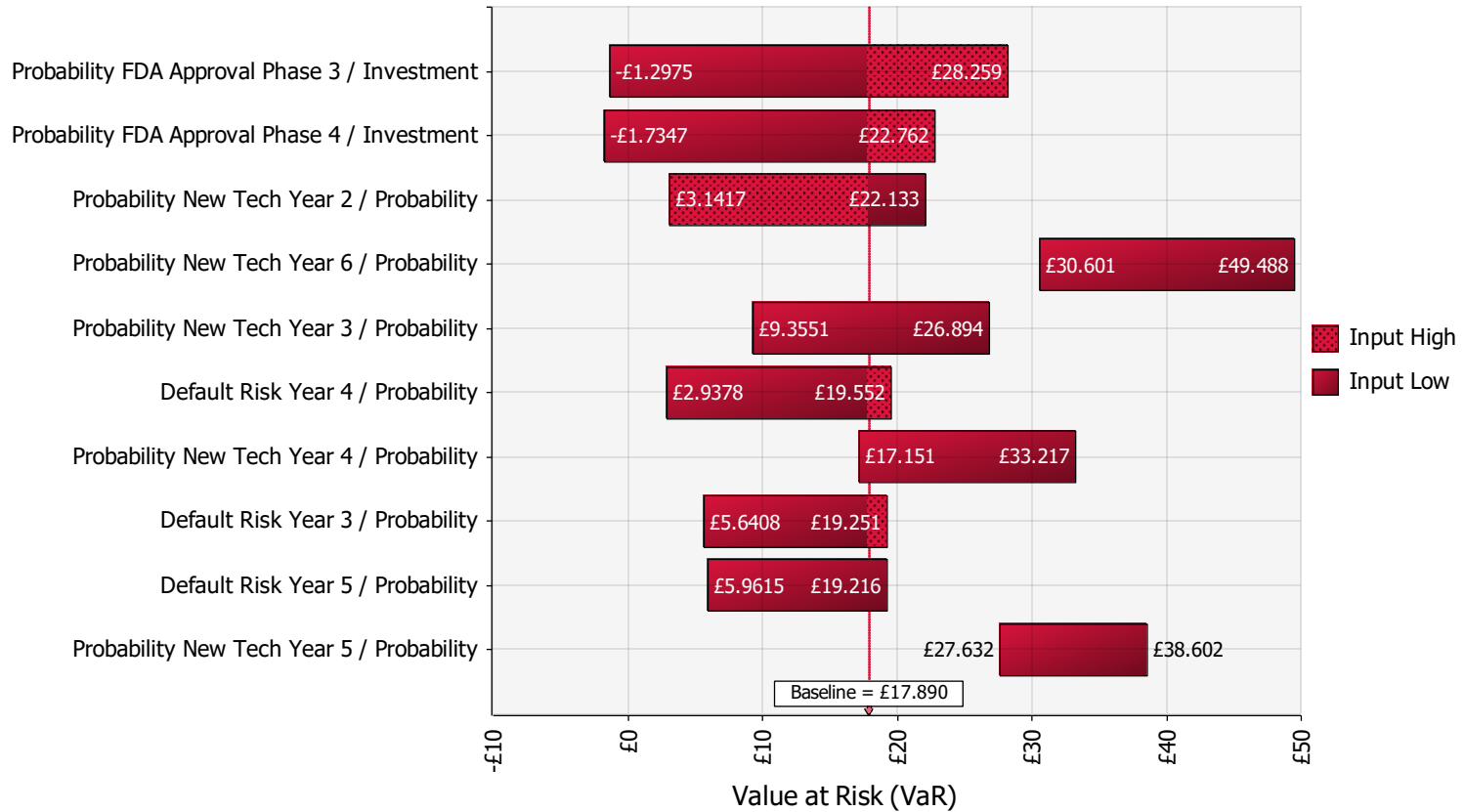
DCF at Risk – Value at Risk (VaR)



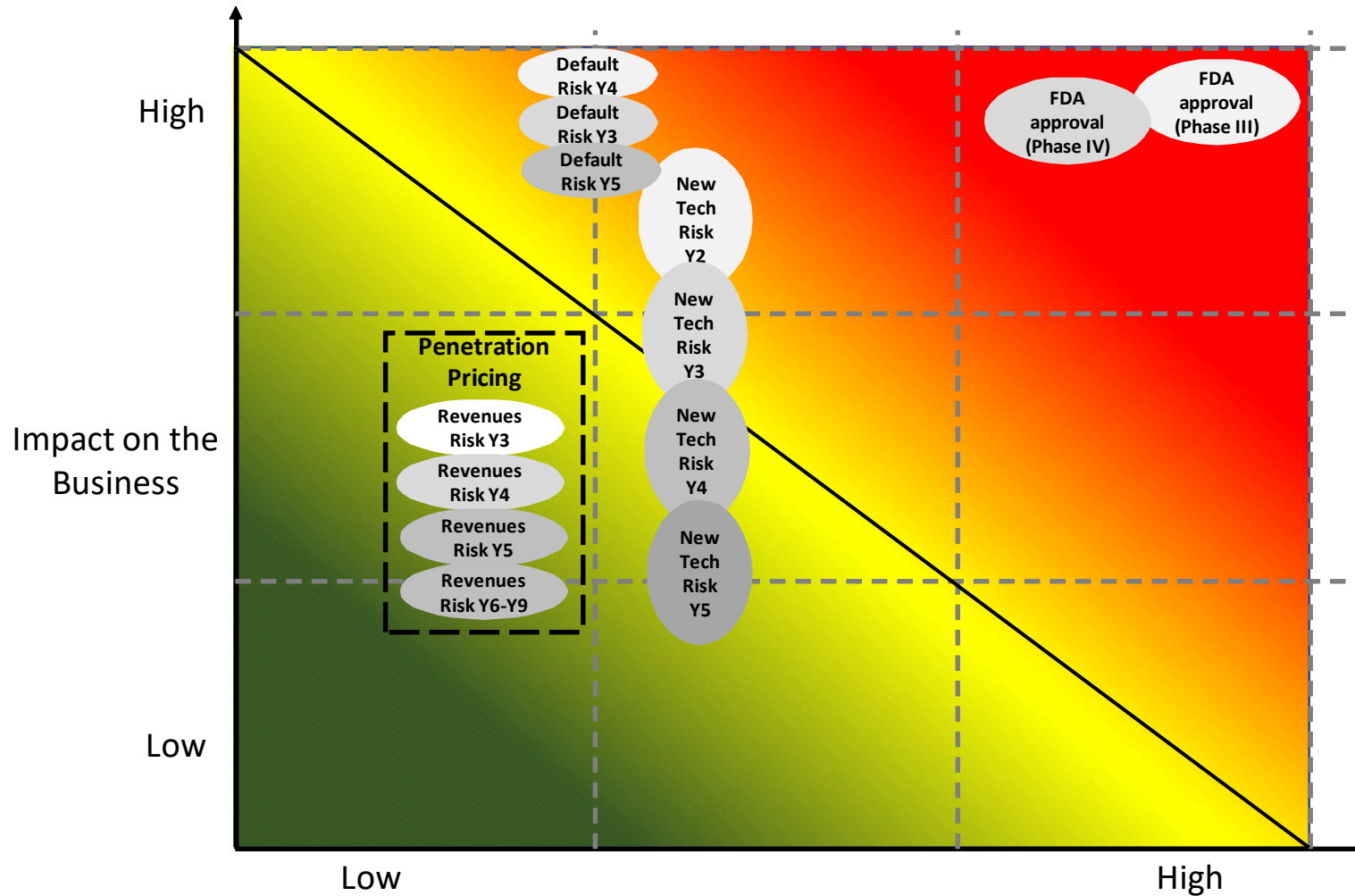
- 33.8% of having a value superior to the mean (~ 17.5)
- 45% of having a value superior to zero
- 55% of having a negative value

Tornado Analysis

Value at Risk (VaR)
Inputs Ranked By Effect on Output Mean



Risk Map and Main Specific Risks Detail



Deterministic DCF with Adjusted WACC

(USDm)	Year 1	Year 2	Year 3	year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Total Revenues			216	280	379	545	580	613	646
COGS			(50)	(64)	(87)	(136)	(174)	(215)	(226)
Gross Margin			166	216	292	409	406	399	420
Total Operating Costs			(83)	(71)	(82)	(102)	(114)	(133)	(138)
EBITDA			83	144	210	307	291	266	282
(-) Income Tax (40%)			(57)	(99)	(144)	(210)	(200)	(182)	(193)
EBIT after tax			26	45	66	97	92	84	89
(-) Capital Expenditure	(1)	(2)	(6)	0	0	0	0	0	0
(-) Change in Working Capital			(6.5)	(8.4)	(11.4)	(16.3)	(17.4)	(18.4)	(19.4)
FCF	(1)	(2)	13.7	37.1	54.6	80.3	74.4	65.3	69.4

Value (Static) £17.98

Adjusted WACC = 68.5%



THOUGHT OF THE DAY

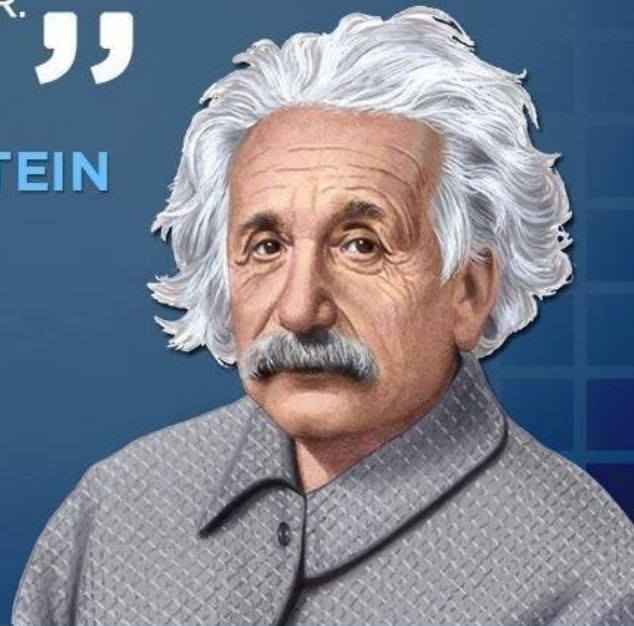
“

EVERYTHING SHOULD BE
MADE AS SIMPLE AS POSSIBLE,
BUT NOT SIMPLER.

”

-ALBERT EINSTEIN

(AS QUOTED BY RICHARD
RAZGAITIS, DEAL MAKING
USING REAL OPTIONS AND
MONTE CARLO ANALYSIS)





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