Econometrics in action

Enterprise valuation: help from Econometrics

Giuliano Palermo
giuliano.palermo@gmail.com

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Giuliano Palermo: Who am I?

London – ’05-’09

UBS Investment Banking

- *M&A - Financial Advisory*

Rotterdam – ’04-’05

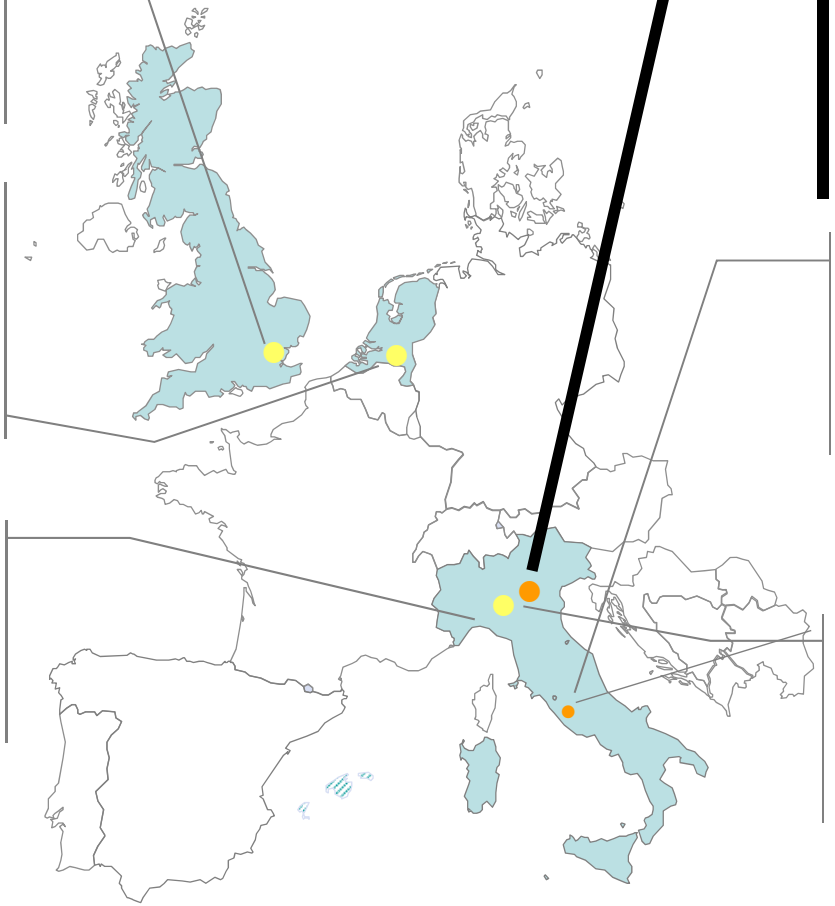
Master Business Administration

- *Corporate Finance*

Milan – ’94 -’99

Economics Degree

- *International Monetary policies*



Bergamo/ Milan – ’10 - Now

Italcementi S.p.A.

Corporate Finance & M&A

- *Acquisition and Disposals*

Rome – ‘09

Atlantia - Infrastructure Sector

- *Investor Relation and Corporate Finance*

Milan/ Rome – ’01-’04

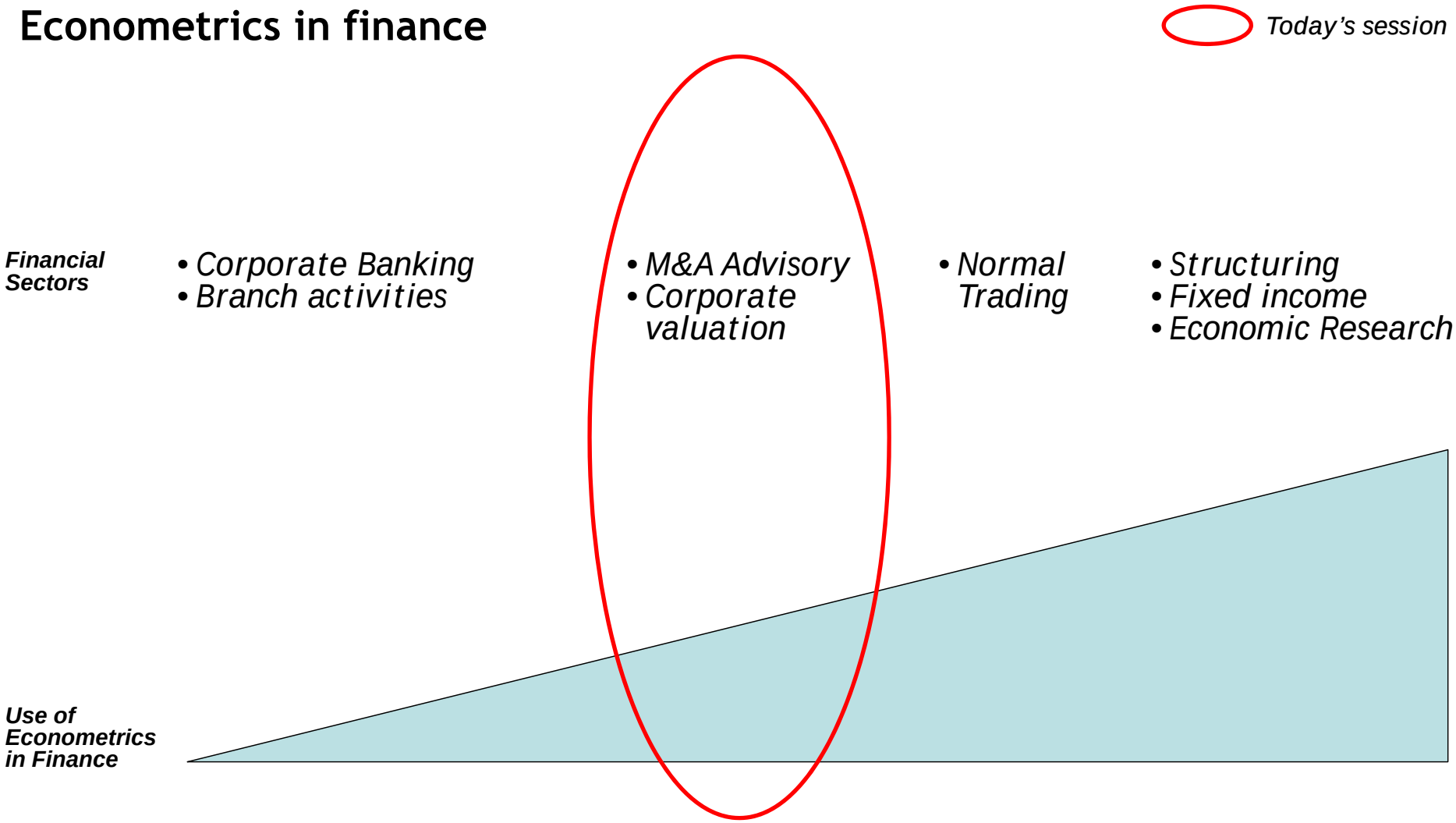
Value Partners

- *Strategic Consulting*

“A single job for life is boring..”

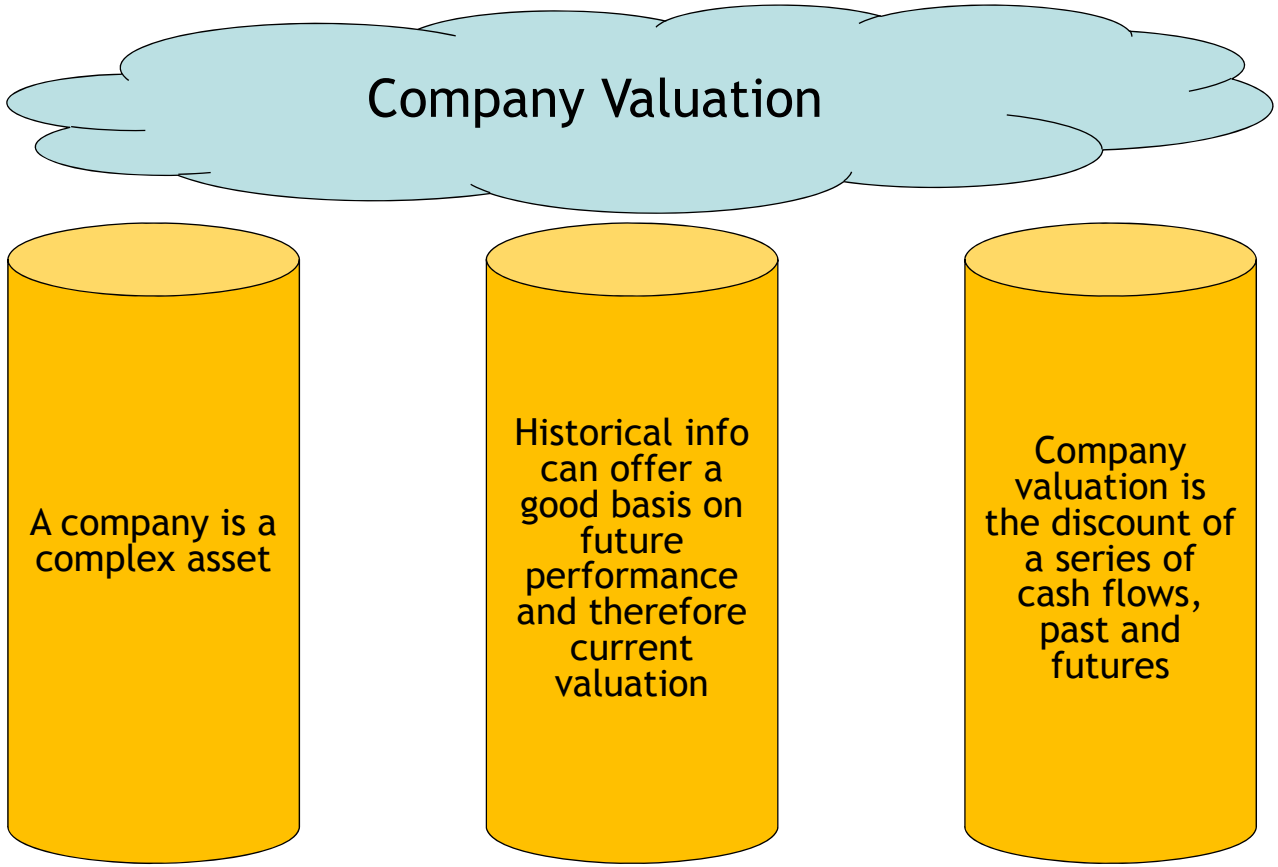
Mario Monti

Econometrics in finance



2. Valuation of a company

Valuation Pillars



Key factors	Uncertainty Risks …..	Reliability Sector …..	Forecasts Performances …..

"Price is what you pay, Value is what you get .."

Warren Buffett

Valuation miths

A valuation is an objective search for “true” value

A good valuation provides a precise estimate of value

The more quantitative a model, the better the valuation

Key Valuation Techniques

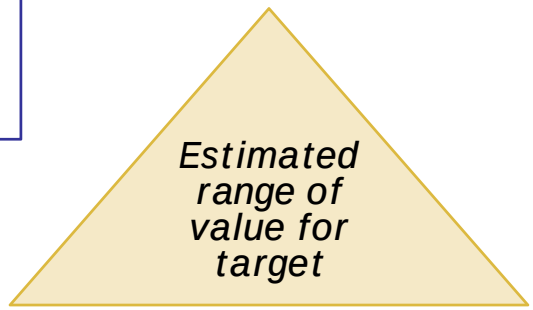
- **Different method are used to calculate the intrinsic value of an asset**

Precedent Transaction analysis ("deals")

A control or transaction valuation assigned on the basis of multiples of net income, EBIT, EBITDA, or sales for comparable companies which have recently been acquired

Comparable company analysis ("Comps")

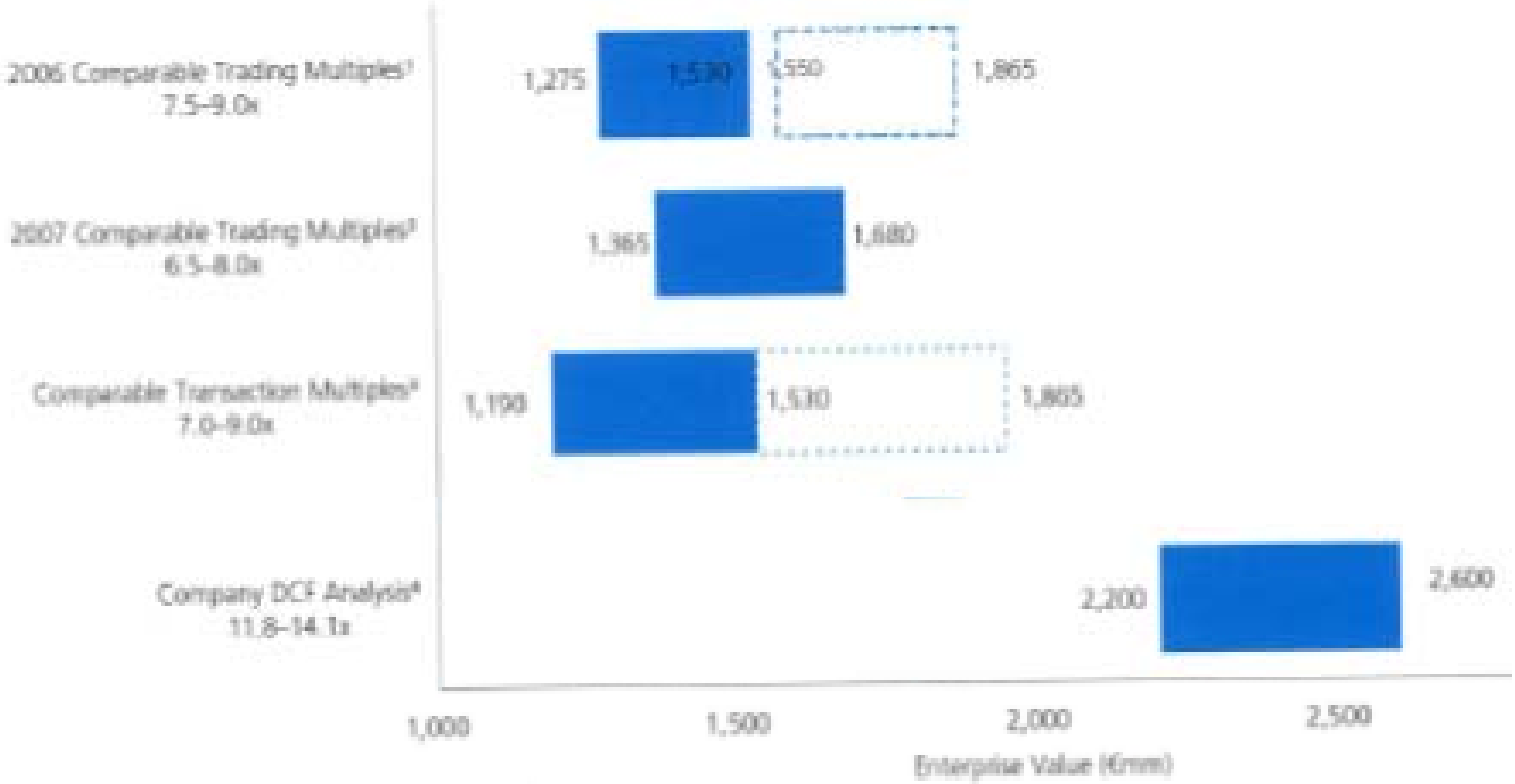
A public market valuation assigned on the basis of certain key ratios, or "market trading multiples" of net income, EBIT, EBITDA, or sales for comparable public companies

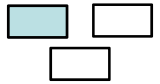


Discount Cash Flow analysis ("DCF")

The value of future free cash flows discounted to the present at an appropriate discount rate or the weighted average cost of capital ("WACC")

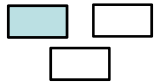
Football Fields or valuation map





Precedent Transaction (1/2)

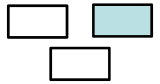
- Precedent Transaction analysis is used to **derive multiples from relevant precedent transactions.**
- It is based on selected precedent transactions in the **same industry as the target company** to establish valuation benchmarks
- The **quality** of comparables is far **more important than the quantity** of comparables
  - Check for comparability of the business and operations in terms of product mix, revenue / operating income split, size and geographic coverage
- The quality of a **Precedent Transaction** analysis is materially influenced by the selection of the most applicable transactions



Precedent Transaction (2/2)

Example: Bus Sector

Date	Target	Acquiror	Country	Stake	EV[1] ($m)	LTM EV/ EBITDA	LTM P/E	CS Assessed Relevance
Oct-05	Alsa	National Express	Spain	100%	807	9.3x	NA	✓✓✓
Aug-05	National Express Australia	JV Incl. ComfortDelGro	Australia	100%	78	~9x[2]	NA	✓
Jul-05	ATC (National Express)	Connex	US	100%	93	5.1x	NA	✓✓
May-04	Keolis	3i	France	53%	663	4.7x	15.6x[3]	✓✓✓
Jun-03	Citybus	Delta Pearl Limited	Hong Kong	100%	290	6.9x	18.9	✓✓
Jul-02	Stagecoach Portugal	Vimeca Transp. Viacao	Portugal	100%	21	7.1x	NA	✓✓
Oct-99	Swebus	Concordia	Sweden	100%	261	5.9x	25.0x	✓✓✓
Jul-99	Ryder Public Transp Svcs	FirstGroup	US	100%	940	9.7x	NA	✓
Jun-99	Coach USA	Stagecoach	US	100%	1,836	11.7x	24.0x	✓
Dec-98	Citybus Group	Stagecoach	Hong Kong	100%	450	12.4x	17.4x	✓✓
Oct-98	Greyhound Lines	Laidlaw	US	100%	604	7.5x	22.2x	✓
Sep-98	VSN North	Arriva	Netherlands	100%	79	3.3x	34.3x	✓✓✓
Aug-98	Yellow Bus	Stagecoach	New Zealand	100%	67	8.2x	15.9x	✓
Dec-97	Linjebuss	GIBC Transport	Sweden	67%	309	6.2x	25.4x	✓✓✓
				Median	**300**	**7.8x**	**22.2x**	
				Mean	**645**	**7.8x**	**21.0x**	

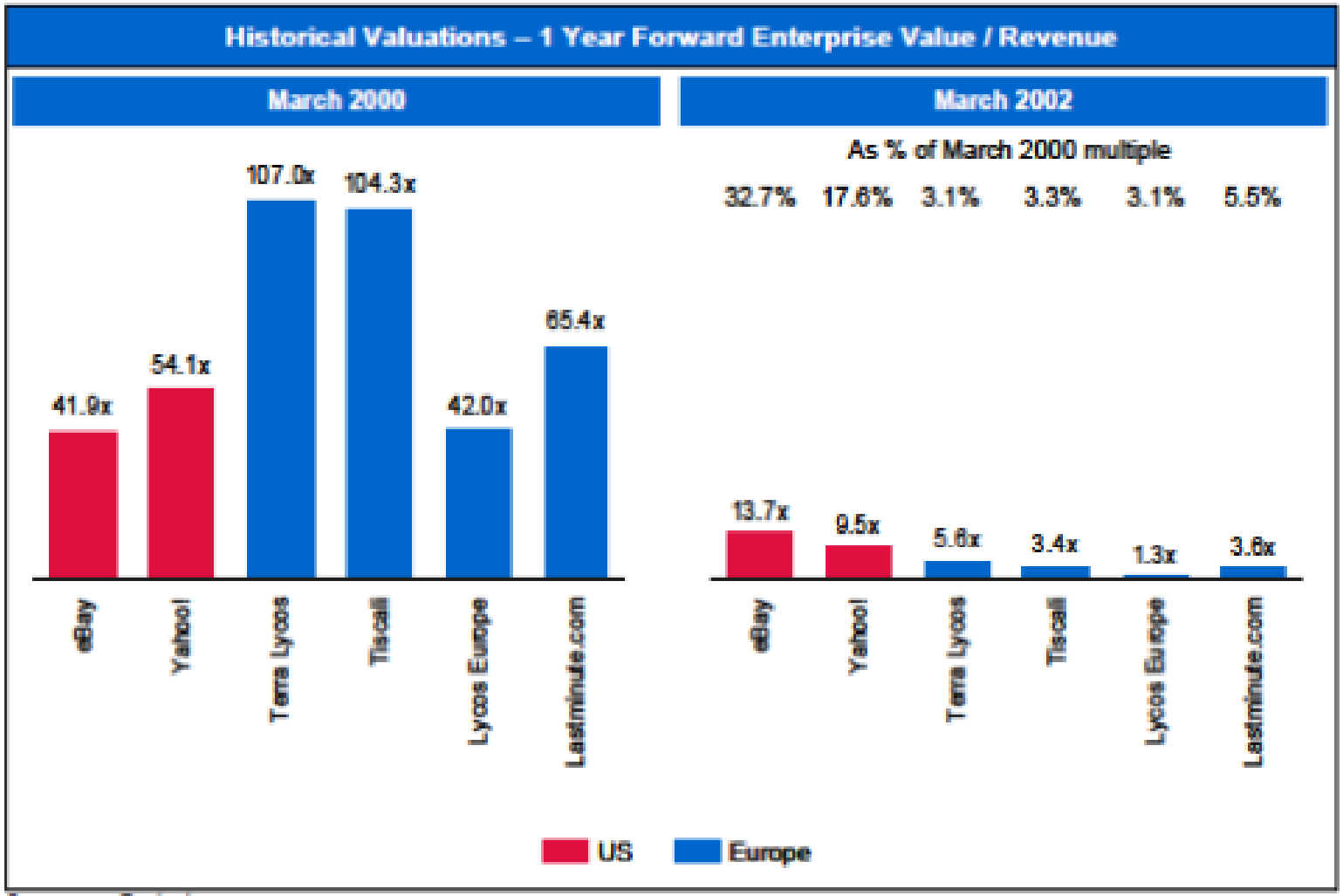


Comparable analysis (1/3)

- Comparable Companies analysis provides a **market-based valuation**
- Therefore, to the extent that the market is over- or under-valuing an asset, the Compco analysis will reflect this and will mirror these market biases (e.g. Tech boom)
- The **quality** of comparables is far **more important than the quantity** of comparables
  - Check for comparability of the business and operations in terms of product mix, revenue / operating income split, size and geographic coverage

Comparable analysis (2/3)

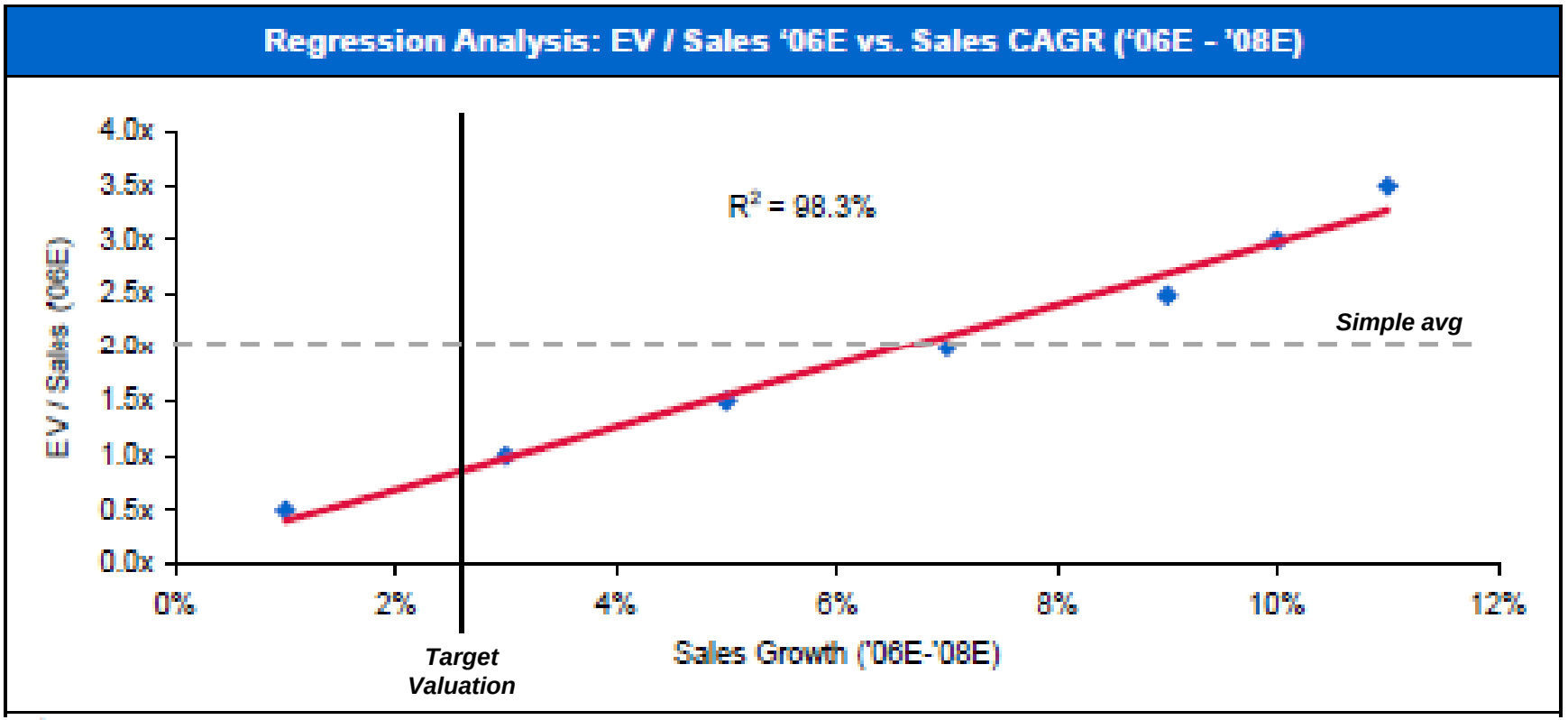
Comparison of Forward Multiples Over Time



Source: Factset

Comparable analysis (3/3) – Relative valuation

- Relative **valuation is theoretically correlated to the growth** prospects of a company (or margin capability, etc..)
- All other things being equal, if the target company has growth comparable to the high end of the comparables set, it should logically enjoy a valuation towards the high end of the comparables set
- E.g. A regression analysis of the 2 year forecast EBITDA Compound Annual Growth Rate ("CAGR") versus valuation multiple would typically show a strong correlation (high R2)



Discounted Cash Flow ("DCF")

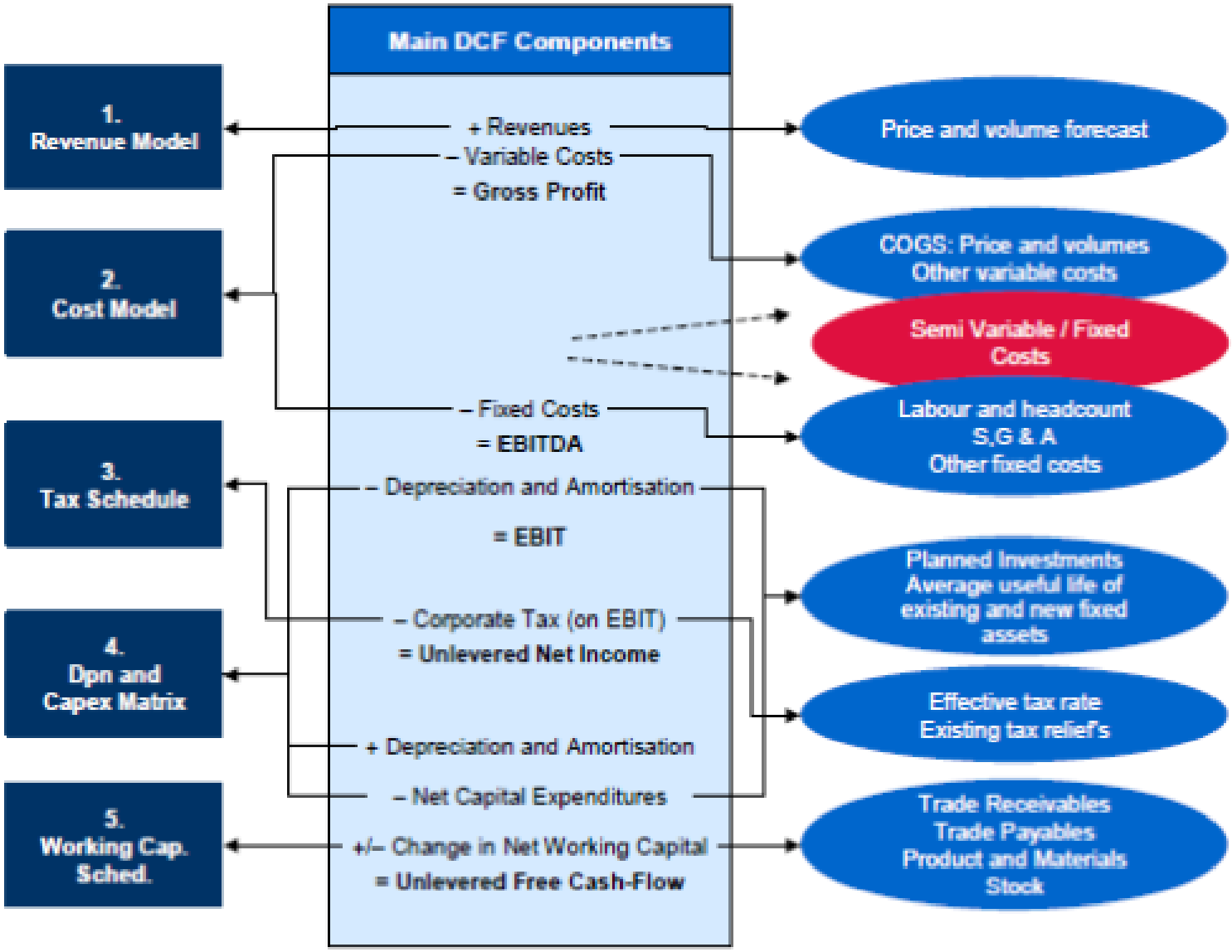
- The value of an asset is the present value of the expected cash flows on the asset
- **Philosophical Basis**: Every asset has an intrinsic value that can be estimated, based upon its characteristics in terms of cash flows, growth and risk
- **Information Needed**: To use discounted cash flow valuation, you need to estimate the
  - olife of the asset
  - ocash flows during the life of the asset
  - odiscount rate to apply to these cash flows to get present value
- **Market Inefficiency**: Markets are assumed to make mistakes in pricing assets across time, and are assumed to correct themselves over time, as new information comes out about assets

$$PV = \frac{CF_1}{(+r)^{1-\frac{7}{12}}} + \frac{CF_2}{(+r)^{2-\frac{7}{12}}} + \text{etc.}$$

where r = cost of capital

WACC: Weighted Average Cost Of Capital

Cash Flow Build Up



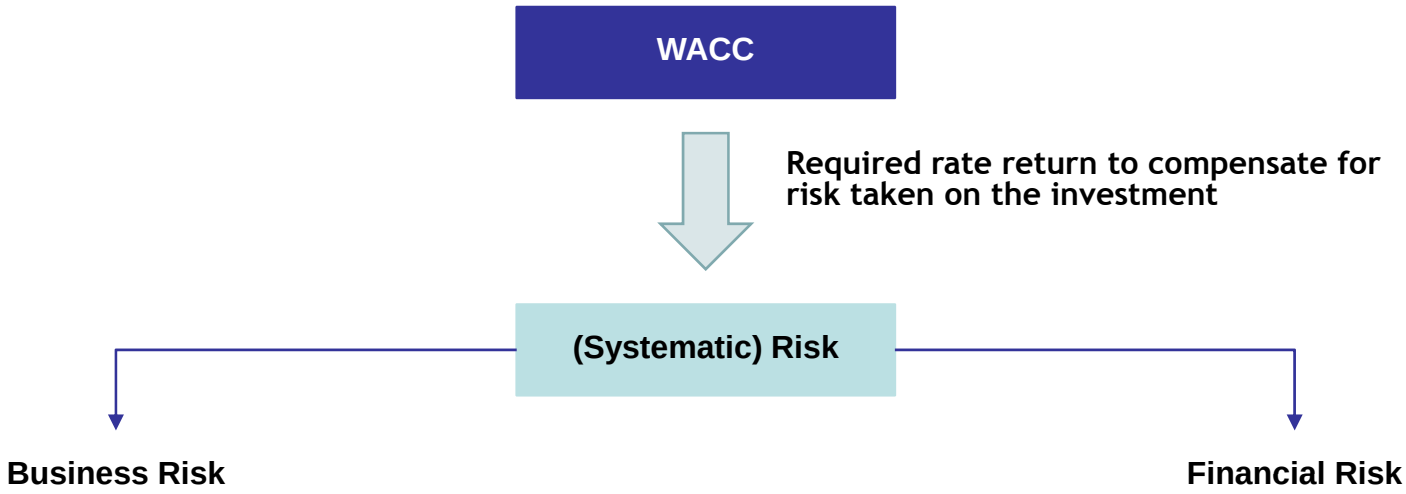
Detailed Cash flows

Free Cash Flow Calculation

($m)	2011E	2012E	2013E	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Revenue ($)	100	105	110	115	120	125	130	134	138	142
% growth		*5.0*	*4.8*	*4.5*	*4.3*	*4.2*	*4.0*	*3.1*	*3.0*	*2.9*
EBITDA ($)	**40**	**43**	**46**	**49**	**51**	**53**	**55**	**57**	**59**	**61**
% margin	*40.0*	*41.0*	*41.8*	*42.6*	*42.5*	*42.4*	*42.3*	*42.5*	*42.8*	*43.0*
% growth		*7.5*	*7.0*	*6.5*	*4.1*	*3.9*	*3.8*	*3.6*	*3.5*	*3.4*
Less: Depreciation ($)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
Less: Amortisation	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
EBIT ($)	28	31	34	37	39	41	43	45	47	49
Less: Taxes	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**(16)**	**(16)**	**(17)**	**(18)**	**(19)**
Unlevered net income ($)	**17**	**19**	**21**	**23**	**24**	**25**	**27**	**28**	**29**	**30**
% growth		*10.7*	*9.7*	*8.8*	*5.4*	*5.1*	*4.9*	*4.7*	*4.4*	*4.3*
Plus: Depreciation and amortisation ($)	12	12	12	12	12	12	12	12	12	12
Less: Capital expenditures	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
Less: Change in working capital	0	0	0	0	0	0	0	0	0	0
Unlevered free cash flow ($)	**22**	**24**	**26**	**28**	**29**	**30**	**32**	**33**	**34**	**35**

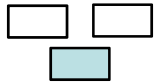
Discount Factor: WACC (1/3)

- **WACC reflects the opportunity cost of capital to all capital providers, weighted by their relative contributions to the total capitalisation of the company**



- **IF the firm has no debt**, i.e., it is equity-financed, then investors require **compensation only for bearing the business risk**

- IF the firm has **debt**, then the underlying business **risk is enhanced** by the leverage effect



Discount Factor: WACC (2/3)

- **WACC has two main components: Weighted cost of equity and weighted cost of debt**

Cost of equity can be calculated using the Capital Asset Pricing Model (CAPM) as follows

Ke

$$K_e = r_f + \beta\left[r_m - r_f\right]$$

Input		Source
r_f	= Risk Free Rate	10 Year UK / US Government Bond Yield
β	= Company Beta (Levered)	Barra Beta / Bloomberg
r_m	= Market Return	Bloomberg
$r_m - r_f$	= Equity Risk Premium	Bloomberg / ECM

Kd

Cost of debt should be the marginal cost, i.e., not just the average from the company's annual report

$$K_d = \left(r_f + m\right)\left(1 - t\right)$$

m	= Marginal spread on debt	Public Debt - Bloomberg / Bondware Check with DCM / Lev Fin

WACC = (E / E + D) * Ke + (D / E + D) * Kd

Discount Factor: WACC (3/3)

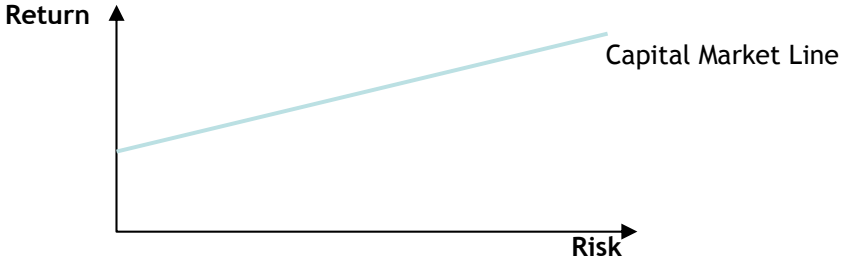
Betas

- The company's capital structure is represented in the discount rate used – the WACC
- A company's beta measures its risk – in terms of volatility – as compared to the market
- It is important to note that beta **does not measure non-systematic risks**, i.e., those specific to the firm. It measures only systematic risks that affect the market as a whole, e.g., oil prices and changes in interest rates

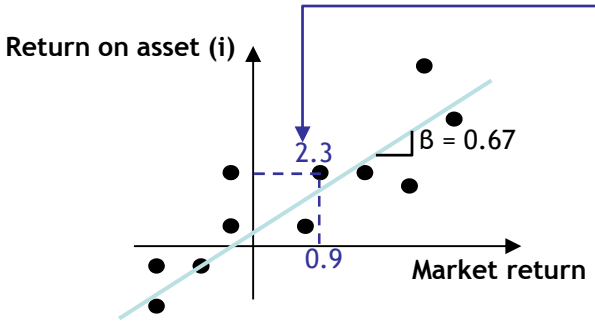
CAPM

- The Capital Asset Pricing Model (CAPM) was developed in the 1960s by William Sharpe
- CAPM aims to determine the pricing of different assets investors can choose from

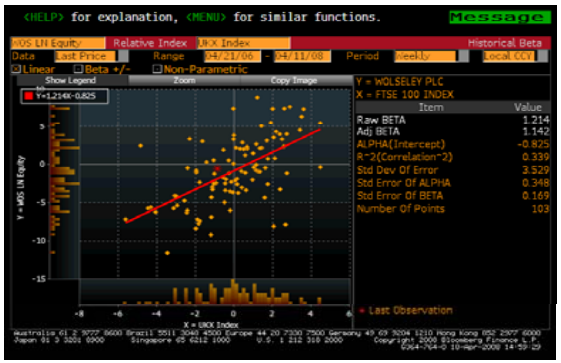
$$\beta = \frac{\text{Cov}\,(r_a, r_m)}{\text{Var}\,(r_m)}$$



ß reflects how much market risk an investment carries to how much extra return will be required from the investment to compensate the investor



Time	January 1990	February 1990	March 1990	March 2008
Return on asset (i)	2.3	3.4	(0.4)	2.8
Market return (FTSE)	0.9	3.3	0.1	3.1



Discounted Cash Flow - Outputs

Mid-point valuation

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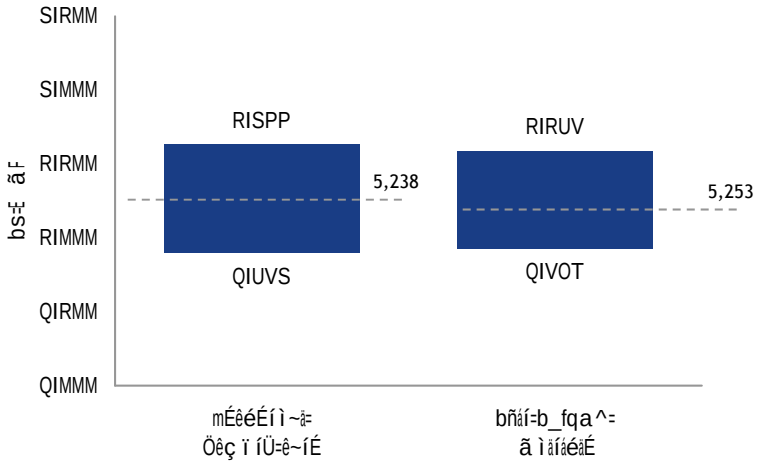
Valuation ranges



WACC (%)	7.75-8.25	7.75-8.25
PGR (%)	1.00-1.50	-
Exit multiple (x)[1]	-	7.0-8.0

TV based on PGR methodology

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	UKP=	QITTP=	QIUVS	RIMOT=	RINSU	RIPON=
	UKR	QIRVT	QITNM	QIUPN	QIVSN	RINMM=

TV based on exit EBITDA multiple

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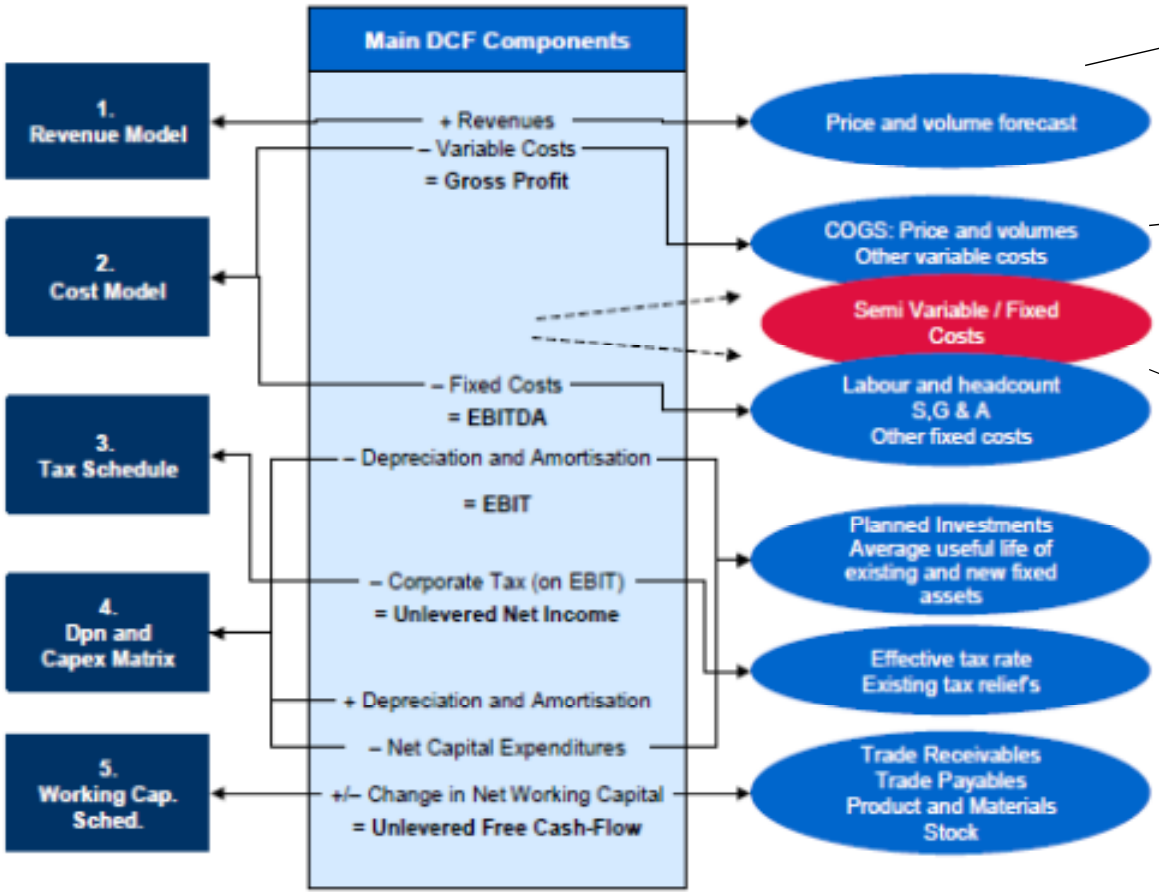
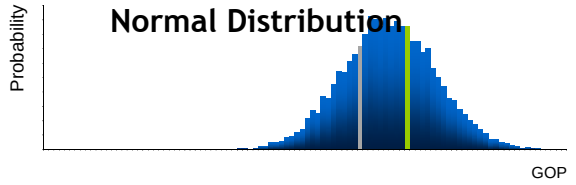
	UKR=	QIURQ=	QIVTS	RIMVU=	RIONV	RIPQN=

More Complex DCF - The use of Distribution

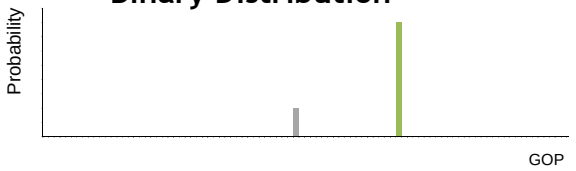


- **Market Share - Triangular Distribution**

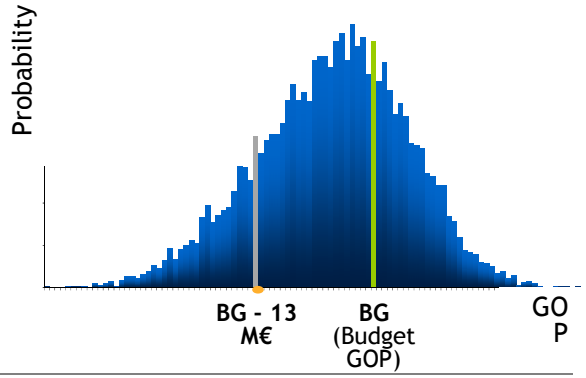
- **Commodity Price - Normal Distribution**



- **Legal & Contractual - Binary Distribution**



GOP distribution (aggregate risk scenarios)



More Complex DCF - Risk Adjusted Analysis

Risk Adjusted Analysis - *New Line Terminal NPV Distribution*

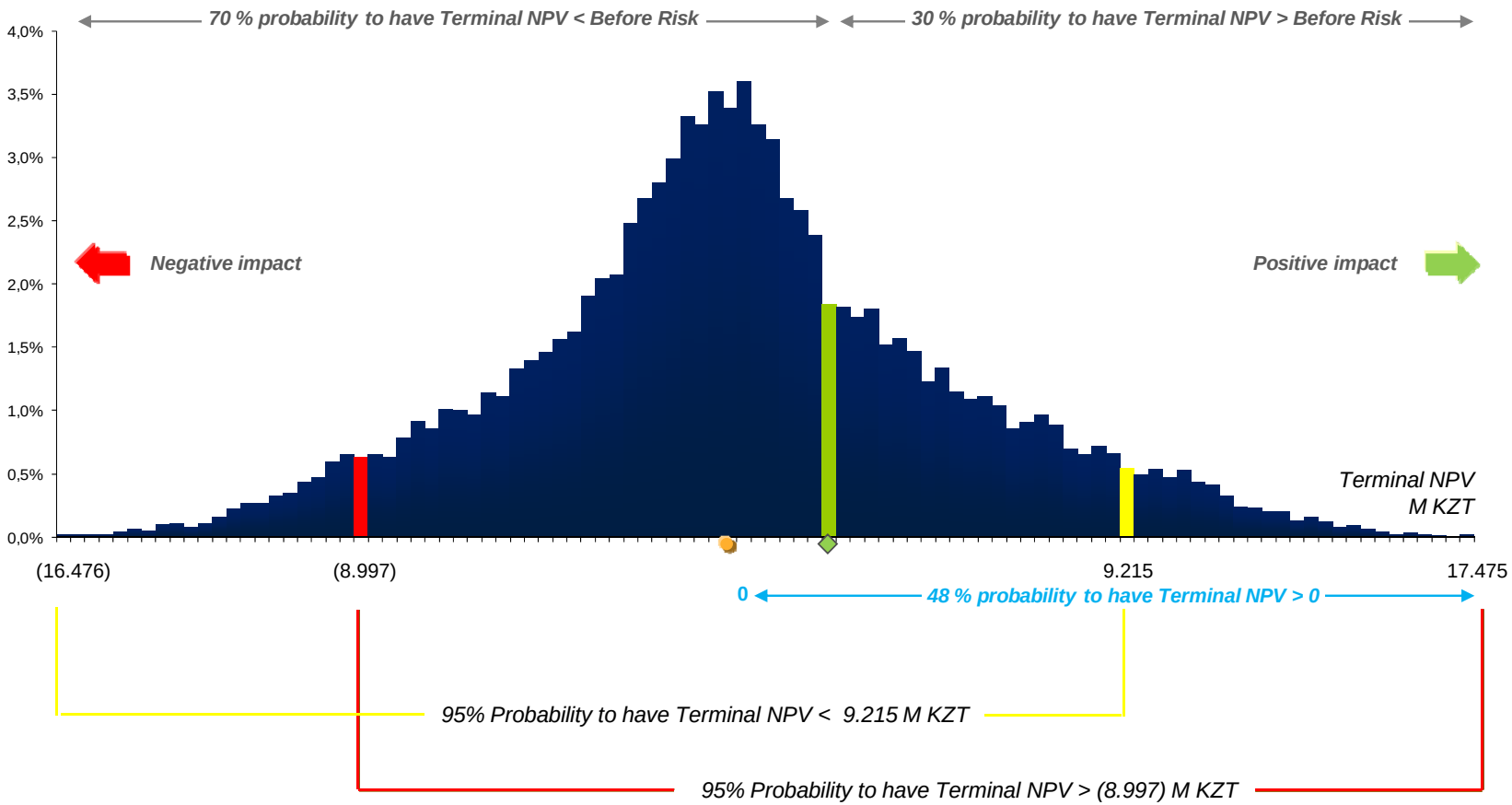
Italcementi Group

Terminal NPV = NPV_{2025} + Terminal Value

Terminal NPV Before Risk = 1.948 M KZT

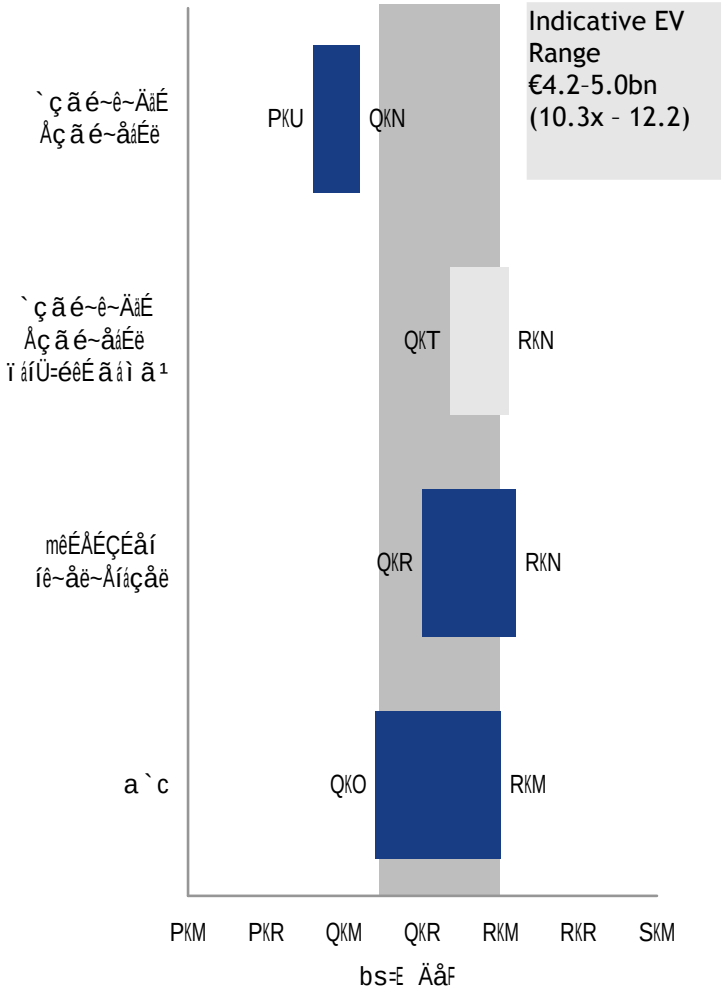
Expected Terminal NPV = (171) M KZT

Terminal NPV volatility due to risk impacts



Ultimate Output: valuation range – A real Case

Business plan valuation summary



Equity value calculation

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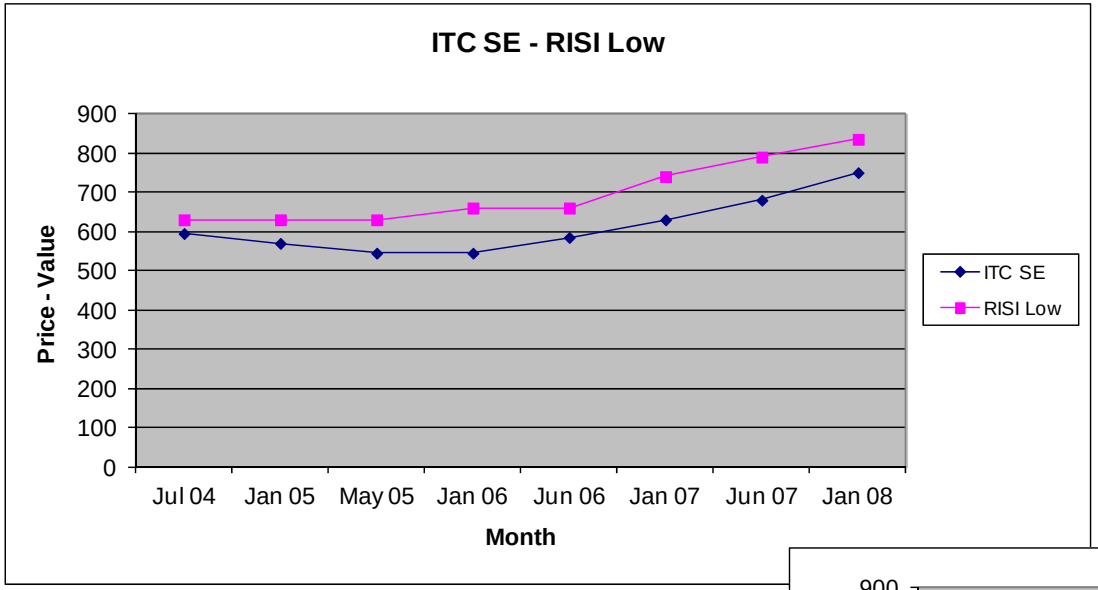
Businesses deemed of strategic / operational interest to Mercury

Valuation Myths and Truth

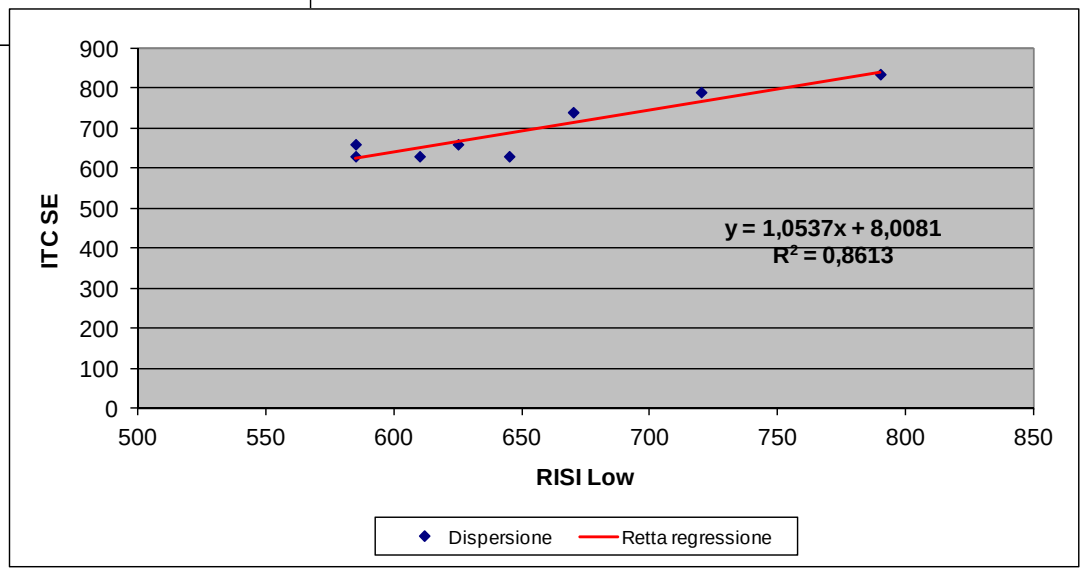
Myth	Truth
A valuation is an objective search for “true” value	All valuations are biased. The only questions are how much and in which direction
	The direction and magnitude of the bias in your valuation is directly proportional to who pays you and how much you are paid
A good valuation provides a precise estimate of value	There are no precise valuations
	The payoff to valuation is greatest when valuation is least precise
The more quantitative a model, the better the valuation	One’s understanding of a valuation model is inversely proportional to the number of inputs required for the model
	Simpler valuation models do much better than complex ones

3. Other examples of use of Econometrics in corporate life

Other Examples of using Econometrics - Hedge for paper cost (1/3)



- Pulp index as a way to hedge paper costs for bags
- R^2 is quite high, therefore Pulp Index could be used to hedge position on paper costs



Other Examples of using Econometrics - Hedge on currencies (2/3)

FOREIGN CURRENCY ANALYSIS
VOLATILITY & CORRELATION

	EUR/ FOREIGN CURRENCY 1 Y ROLLING 30/09/2010 - 30/09/2011				USD/ FOREIGN CURRENCY 1 Y ROLLING 30/09/2010 - 30/09/2011						
	MIN (*)	MAX (*)	MEAN (*)	Annual Historical Volatility (**)	MIN (*)	MAX (*)	MEAN (*)	Annual Historical Volatility (**)	Delta volatility	Correlation % Vs USD	R^2
AMERICAN DOLLAR	1.29	1.48	1.39	11.09%	0.00	0.00	0.00	0.00%	-11.09%	100%	100%
EGYPTIAN POUND	7.49	8.82	8.21	11.15%	5.69	5.98	5.85	2.36%	-8.79%	98%	96%
CHINESE RENMINBI	8.54	9.64	9.12	10.52%	6.38	6.69	6.54	2.06%	-8.46%	98%	97%
KAZAKHSTAN TENGE	189.87	216.07	204.33	11.17%	145.19	148.10	146.51	3.18%	-7.99%	96%	92%
THAILAND BAHT	39.07	44.62	42.11	9.72%	29.48	31.17	30.21	4.69%	-5.03%	91%	82%
INDIAN RUPEE	58.53	66.91	62.92	9.61%	43.90	49.57	45.12	6.67%	-2.94%	80%	64%
MOROCCAN DIRHAM	11.09	11.39	11.24	4.30%	7.66	8.60	8.07	8.47%	4.16%	74%	55%
SWISS FRANC	1.03	1.38	1.26	15.51%	0.72	1.00	0.90	15.38%	-0.14%	37%	14%

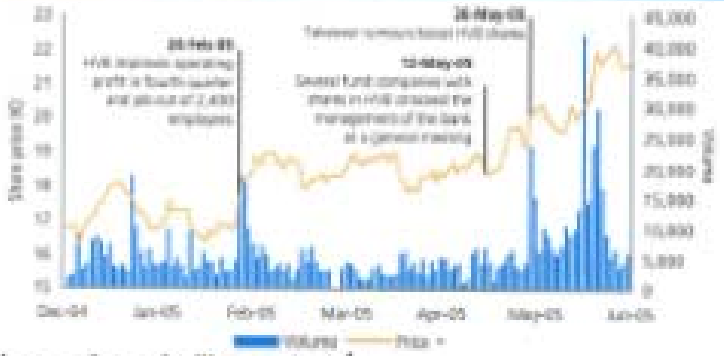
- Dollar is a natural hedge for different currencies
- R2 shows the “pegged” currencies
- Dollar is liquid, and hedge could be done with dollar derivatives

Other Examples of using Econometrics (3/3) – Use of residuals

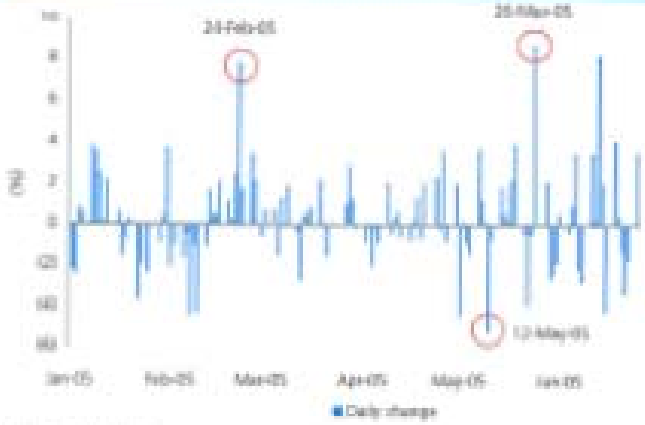
Stock price analysis—HVB

An analysis of HVB's trading history suggests ...

Price performance and volume



Share price volatility analysis[1]



Comments

- HVB's volumes showed a steep increase on 26 May 2005
- The increase in volume was a consequence of a persistent rumours during that day on the merger between UCI and HVB Group
- Volumes steadily increased up to when the official offer from UCI was published
- The analysis of the residuals of the regression of HVB over MSCI Bank index shows the specific performance of HVB during the last six months
- The graph shows the abnormal distortions of HVB's price on 26 May 2005, caused by the rumours generated in the market
- We believe that we should consider HVB's 25 May price as a reference price for the transaction

Source: Datastream

Note:

1 A 5 year regression between HVB and MSCI Bank index has been performed. Analysing the residuals of this regression for the last 6 month, we can capture the stock specificity compared to the index. This would highlight any exceptional behaviour of HVB's stock price performance

... that there was no significant takeover speculation in the HVB share price prior to 25 May 2005

In the job environment, you can decide if you want to be a teddy bear, or an aggressive bear …

…and everything depends on how you use your knowledge and tools