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GIRO50 Conference 2023

1–3 November, EICC Edinburgh

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Non-Life Share Price forecasting with ORSA applications

An Actuarial Perspective

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What has happened since I last attended GIRO in 2009 (Edinburgh)
Leicester City win the 2016 Premier League

Boyhood dream

- Born in Leicestershire (Kirby Muxloe)
- Went to School in Leicestershire
- Schoolboy forms with Leicester City for 3 years
- Gary Lineker's greatest nemesis in School and Sunday Youth football.

Now the Interesting Stuff -- >

- 5000 – 1 < Actuarial 99.5% Modelling threshold

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1. Introduction
Why this Presentation

A bit of History

- I have been specifying, designing and building multi-year Non-Life P&L, Balance Sheet and Cashflow models on and off since 1984 (eighty four)
    - It began at Royal London under Alan Spence FIA (ex KPMG, FSA, RSA) (whose PC innovation is unknown to the Actuarial profession)

- I first became interested in this topic in 1997, via Goldman Sachs ("GS") Dynamic ROE model
    - A Two period EVA model where the ROE > COE for N years and for time period (N+1) and later ROE = COE (Steady State)
    - I followed this up by obtaining a copy of their paper and attending Graham Warren's (GS) Workshop at GIRO in 1997 on the said topic

- I became a Sell Side Equity Analyst at Credit Lyonnais during 2000 / 2001
    - This turned out to be rather short lived as many of us were made redundant in the recession of late 2001

Fast Forward to August 2022

- This was to meant to be a paper on Solvency ratio forecasting with a sideline of the impact on the Share Price now the roles are reversed

- However during the Autumn of 2022 as I was implementing the Dynamic ROE methodology some questions began to surface
    - (i) What do the P&Ls look like, (ii) Are they reasonable, (iii) What is the increase in premium, (iv) What do the Combined Ratio and Premium Growth look like when ROE = COE, (v) Why can't the ROE < COE in the "Steady State" condition

- **After reviewing some Equity Analyst reports in 2022 I came to the conclusion that something more interesting could be said**

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1. Introduction
Scope

What this paper is about

- This presentation focuses on the **"theoretical" value of a company's share price** using methods typically used by Sell Side Equity Analysts, in particular,
    - How these are implemented via Ground Up or Top Down approaches
    - Advantages and Disadvantages of each
    - How to reconcile the different approaches
- This is limited to methods based on company data and does look at what value the market might place on a share

An Actuarial Perspective

- I am not an expert in all of the nuances of this complex but interesting area
- My approach has been to view the area from the perspective of how an Actuary might look at the topic.

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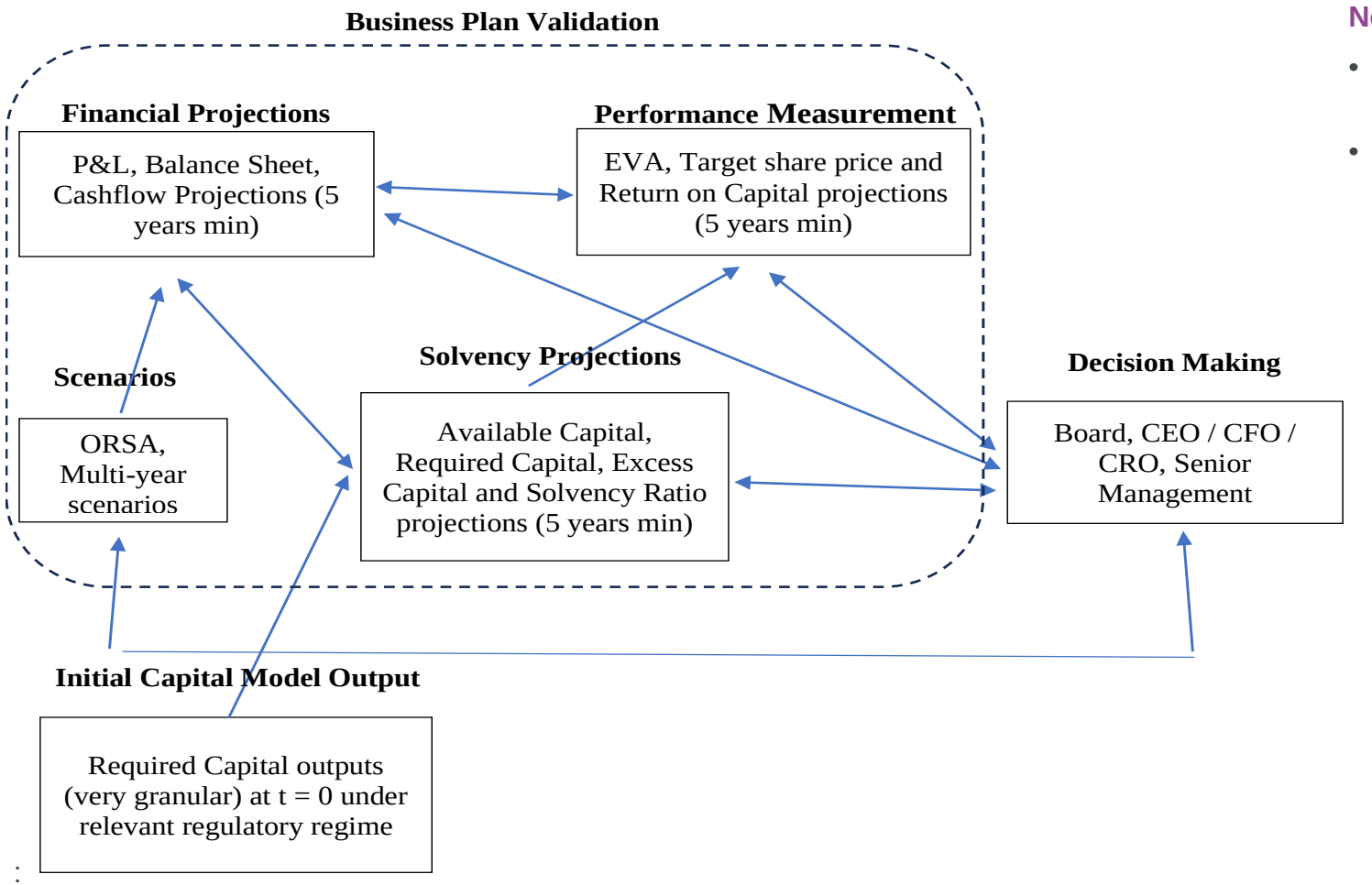
2. A Unifying Framework



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Notes

- The same suite of models is used for the Best Estimate Plan and Multi-year Scenarios
- Scenarios happening e.g. t = 4 years, rather than the next 12 months, more helpful because it is good to be aware of potential future solvency issues
  - Future 12 month plans are not independent as underlying infrastructure, headcount, classes of business etc.
  - Next year's 12 month plans infers the 12 month plan in 2 years time
  - Better to be aware of a potential medium-long term issue now than suddenly realise say at the end of year 3.
  - Has to be balanced by the uncertainty in plan projections increasing with time.

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3. Projection of Company Financials
Model Building Blocks

Notes

- Key Building Blocks are:
    - Profit & Loss Account
    - Balance Sheet
    - Cashflow Statement
    - Gross and Net Reserve Projections
- Projected Exposures are used to calculate future Required Capital needs
- Granularity can vary:

Risk	Very High	High	Medium	Low
Premium	Sub-class	Class	Segment	Combined class
Claims Reserves	Sub-class	Class	Segment	Combined class
Investment Assets	Individual assets / model points	Asset class	Asset class	No Asset class

- As this is an Actuarial paper with an aim of demonstrate a modelling framework simplicity has been adopted:
    - One class of business – trivial to add more
    - Gross and Net losses are considered in total and not separately by Attritional / Large / Catastrophe
- Models are easy to build – You can use IM granular model outputs to inform relationships in stressed conditions
- Calculations are illustrated for an Entity called Foxes Capital. [Rather more interesting than ABC Company]

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3. Projection of Company Financials

Profit & Loss Account ("P&L")

P&L

Entity	**Foxes Capital**
BS Date	**31/12/2021**
First AY	**2022**
Currency / Units	**£ m**

Initial Assumptions

P&L	2020	2021	2022	2023	2024	2025	2026
Gross Written Premium	1,000	1,200	1,260	1,323	1,389	1,459	1,532
Ceded Written Premium	-280	-324	-340	-357	-375	-394	-414
Net Written Premium	**720**	**876**	**920**	**966**	**1,014**	**1,065**	**1,118**
Gross Earned Premium	1,050	1,220	1,233	1,295	1,359	1,427	1,499
Ceded Earned Premium	-335	-345	-333	-350	-367	-385	-405
Net Earned Premium	**715**	**875**	**900**	**945**	**992**	**1,042**	**1,094**
Gross Claims Incurred	-578	-659	-666	-699	-734	-771	-809
Ceded Claims Incurred	177	178	171	179	188	198	208
Net Claims Incurred	**-400**	**-481**	**-495**	**-520**	**-546**	**-573**	**-602**
Gross Acquisition Costs	-189	-220	-222	-233	-245	-257	-270
Ceded Acquisition Costs	60	62	60	63	66	69	73
Net Acquisition Costs	**-129**	**-158**	**-162**	**-170**	**-179**	**-188**	**-197**
Operational expenses	-125	-150	-154	-162	-170	-179	-188
Other expenses (e.g. foreign exchange)	-10	-5	-5	-5	-6	-6	-6
Total Expenses	**-264**	**-313**	**-321**	**-337**	**-354**	**-372**	**-391**
Net UW Result	**51**	**81**	**84**	**88**	**92**	**97**	**102**
Investment Income	38	45	56	57	59	61	64
Realised Gains / Losses	15	11	14	14	15	15	16
Investment expenses	-2	-3	-3	-3	-4	-4	-4
Net Investment Result	**50**	**53**	**67**	**67**	**70**	**73**	**76**
Other Income (Ceding Coom, Broker Fee)	25	28	28	30	31	33	35
Operating Result	**126**	**163**	**179**	**185**	**193**	**203**	**213**
Finance costs	-22	-25	-25	-27	-28	-29	-31
Other	0	0	0	0	0	0	0
Profit/(loss) before tax	**104**	**138**	**154**	**159**	**166**	**174**	**182**
Tax	-10	-14	-31	-32	-33	-35	-36
Net Income after Tax	**94**	**124**	**123**	**127**	**133**	**139**	**146**
Net Income Attributed to non-controlling	0	0	0	0	0	0	0
Other Net Income	50	16	16	16	16	16	16
Net Income before Dividend	**144**	**139**	**138**	**142**	**148**	**155**	**161**
Dividend	-45	-45	-49	-51	-53	-56	-58
Retained Earnings	**99**	**94**	**89**	**92**	**95**	**99**	**103**

Notes

- 5 year projections
- 1st AY / CY = 2022, Accident / Calendar year
- This P&L is a combination of typical Report & Account line items, plus Notes to the accounts and statement of Comprehensive Income
- Will vary by company to company.
- P&L class granularity can vary.
- P&L is developed iteratively
- The 5 year P&L can either be:
  - Built up from base assumptions or
  - Provided by Planning
- If P&L forecasts provided with no Balance Sheets then implied Balance Sheets are needed to test reasonableness of the Plan
  - Can highlight inconsistencies e.g. differences in investment asset projections
- P&L will likely be summarised for reporting.

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3. Projection of Company Financials

Balance Sheet ("BS")

Balance Sheet

Entity	**Foxes Capital**
BS Date	**31/12/2021**
First AY	**2022**
Currency / Units	**£ m**

Actuals

Balance Sheet	**31/12/20**	**31/12/21**	**31/12/22**	**31/12/23**	**31/12/24**	**31/12/25**	**31/12/26**
Assets							
Investments	2,483	2,795	2,826	2,935	3,065	3,213	3,376
- Debt / Fixed Income	2,040	2,388	2,386	2,449	2,527	2,617	2,716
- Equities / Investment Funds	400	372	376	391	408	428	449
- Other	43	35	64	95	130	169	211
Cash	302	214	216	225	235	246	259
Investments and Cash	**2,785**	**3,009**	**3,042**	**3,159**	**3,300**	**3,459**	**3,635**
Property, plant and equipment	38	25	25	25	25	25	25
Goodwill & Intangibles	200	211	211	211	211	211	211
DAC	81	97	102	107	113	118	124
Ceded UPR	126	146	153	161	169	177	186
Reinsurance recoveries	608	621	589	589	597	612	632
Receivables on insurance / reinsurance	200	240	252	265	278	292	306
Reinsurance recoveries	**808**	**861**	**841**	**853**	**875**	**904**	**939**
Deferred tax assets	40	63	63	63	63	63	63
Premium Debtors	250	300	315	331	347	365	383
Other Assets	12	10	10	10	10	10	10
Total Assets	**4,338**	**4,721**	**4,761**	**4,919**	**5,110**	**5,331**	**5,574**
Liabilities							
Share Capital & Premium	210	210	210	210	210	210	210
Retained Earnings	600	700	789	881	976	1,075	1,178
Other	98	100	100	100	100	100	100
Equity	908	1,010	1,099	1,191	1,286	1,385	1,488
Non-controlling interest	6	6	6	6	6	6	6
Total Equity	**914**	**1,016**	**1,105**	**1,197**	**1,292**	**1,391**	**1,494**
Gross UPR	450	540	567	595	625	656	689
Gross Claims Reserves	2,250	2,300	2,210	2,233	2,284	2,357	2,447
Ceded DAC	23	26	28	29	30	32	33
Creditors insurance / reinsurance	224	259	272	286	300	315	331
Financial Liabilities	250	255	255	255	255	255	255
Deferred tax liabilities	3	5	5	5	5	5	5
Other Liabilities	225	320	320	320	320	320	320
Liabilities	**3,424**	**3,705**	**3,656**	**3,722**	**3,819**	**3,940**	**4,080**
Equity and Liabilities	**4,338**	**4,721**	**4,761**	**4,919**	**5,110**	**5,331**	**5,574**
Difference: Total Assets - Liabilities	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Net Cashflow			**33**	**117**	**140**	**160**	**175**

Notes

- 5 year projections
- Opening BS = YE 2021
- This BS is a combination of typical Report & Account line items plus Notes to the accounts
- Can vary by company to company.
- BS is developed iteratively using information in the current year P&L and CFS projections
- Gross and Ceded Reserves are projected separately and are inputs to BS YE
- The Assets and Liabilities are independently calculated of each other. There is no balancing item. A test of the difference at each YE is made.
- BS will likely be summarised for reporting.

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3. Projection of Company Financials
Cashflow Statement ("CFS")

Cashflow

Entity	**Foxes Capital**
BS Date	**31/12/2021**
First AY	**2022**
Currency / Units	**£ m**

Cashflow	2022	2023	2024	2025	2026
Gross Premium Received	1,245	1,307	1,373	1,441	1,513
Gross Paid Acquisition costs	-227	-238	-250	-263	-276
Ceded Premium Paid	-327	-344	-361	-379	-398
Ceded Acquisition costs	61	64	68	71	74
Gross Losses paid	-756	-676	-683	-697	-719
Ceded Losses received	203	180	180	183	187
Receivables on insurance / reinsurance	-12	-13	-13	-14	-15
Operational expenses	-154	-162	-170	-179	-188
Other expenses (e.g. foreign exchange)	-5	-5	-6	-6	-6
Investment Income Received	67	67	70	73	76
Other Income (Ceding Coom, Broker Fee)	28	30	31	33	35
Finance costs	-25	-27	-28	-29	-31
Other	0	0	0	0	0
Tax Paid	-31	-32	-33	-35	-36
Dividend Paid	-49	-51	-53	-56	-58
Increase in Deferred Tax Assets	0	0	0	0	0
Other Cashflows	16	16	16	16	16
Net Cashflow	**33**	**117**	**140**	**160**	**175**

Notes

- 5 year projections
- 1st AY = 2022, accounting year / accident year
- CFS line items different to typical report & account line items as they focus on the individual cash items themselves
- Report & accounts usually start with Profit/(Loss) before tax at the top with subsequent line entry adjustments for changes in the Balance Sheet assets or liabilities or P&L items that are not either earned, incurred, accrued or its equivalent
- For a company growing rapidly and/or one writing significant proportions of Long tail classes the Net Cashflow can be a significant component of the increases in Investments & Cash between YEs.
- CFS will likely be summarised for reporting.

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3. Projection of Company Financials

Cashflow Statement ("CFS") – Getting the Cashflow formulas right

Profit & Loss Account	Balance Sheet	Cashflow Statement
Gross Written Premium Ceded Written Premium	Change in Premium Debtors Change in Rein payables	Gross Premium Received Ceded Premium Paid
Gross Incurred Claims Ceded Incurred Claims	Change in Gross Reserves Change in Ceded Reserves	Gross Paid Claims Ceded Paid Claims
Gross Acquisition Costs Ceded Acquisition Costs	Change in Gross DAC Change in Ceded DAC	Gross Paid Acquisition Costs Ceded Paid Acquisition Costs

Notes

- The Total Assets and Liabilities will reconcile if you get the CFS right. The CFS is the real balancing item
- Requires mapping of related items between P&L, BS and CFS and a bit of patience
- Three (x2, gross and ceded) accounting items are shown in the table on the LHS
- Start off with the obvious items e.g. as per this table and then work your way down a list

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3. Projection of Company Financials

Gross Reserve Projections

Reserve Projections

Entity	**Foxes Capital**							
BS Date	**31/12/2021**							
First AY	**2022**							
Currency / Units	**£ m**							
			Projection					
Gross	AY	**Incurred**	**31/12/21**	**31/12/22**	**31/12/23**	**31/12/24**	**31/12/25**	**31/12/26**
	2007		0	0	0	0	0	0
	2008		0	0	0	0	0	0
	2009		0	0	0	0	0	0
	2010		23	0	0	0	0	0
	2011		23	0	0	0	0	0
	2012		46	0	0	0	0	0
	2013		46	18	0	0	0	0
	2014		69	38	15	0	0	0
	2015		92	55	30	12	0	0
	2016		138	98	59	32	13	0
	2017		230	156	111	66	36	14
	2018		253	187	126	90	54	30
	2019		345	268	198	134	95	57
	2020		460	360	280	206	140	99
	2021		575	472	369	287	212	143
	2022	666		559	459	359	279	206
	2023	699			587	482	377	293
	2024	734				616	506	396
	2025	771					647	531
	2026	809						679
	Total		**2,300**	**2,210**	**2,233**	**2,284**	**2,357**	**2,447**
Reserve Increase / Decrease %			0%	0%	0%	0%	0%	0%
Reserve Increase / Decrease			0	0	0	0	0	0

Notes

- Gross and Ceded claims reserves are an important component of the BS
- YE Totals reconcile with BS
- Models the run-off of gross and net reserves by AY
- Projection period = Run-off of liabilities by YE 2036
- Opening reserves as at YE2021 plus reserves generated from new CY business 2022 to 2026
- For any given AY the reserves at any future YE are derived by the application of Unpaid % ratios
- Requires gross and net payment patterns
- Ceded reserves = Gross reserves – Net reserves
- Class granularity can vary
- ORSA Example (Section 6)
    - If a Reserve Increase / Decrease in a future CY then a P&L hit in that year
    - Reserve run-off from higher reserves.

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3. Projection of Company Financials

Net Reserve Projections

Reserve Projections

Entity	**Foxes Capital**
BS Date	**31/12/2021**
First AY	**2022**
Currency / Units	**£ m**

Net	AY		**Projection** **31/12/21**	**31/12/22**	**31/12/23**	**31/12/24**	**31/12/25**	**31/12/26**
	2007	**Incurred**	0	0	0	0	0	0
	2008		0	0	0	0	0	0
	2009		0	0	0	0	0	0
	2010		17	0	0	0	0	0
	2011		17	0	0	0	0	0
	2012		34	0	0	0	0	0
	2013		34	13	0	0	0	0
	2014		50	28	11	0	0	0
	2015		67	40	22	9	0	0
	2016		101	72	43	24	9	0
	2017		168	114	81	48	27	10
	2018		185	136	92	66	39	22
	2019		252	196	144	98	70	42
	2020		336	263	204	151	102	73
	2021		420	345	270	210	155	105
	2022	495		415	341	267	207	153
	2023	520			436	358	280	218
	2024	546				458	376	294
	2025	573					481	395
	2026	602						505
	Total		**1,679**	**1,621**	**1,644**	**1,687**	**1,745**	**1,815**
Reserve Increase / Decrease %			0%	0%	0%	0%	0%	0%
Reserve Increase / Decrease			0	0	0	0	0	0

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3. Projection of Company Financials
Parameterisation Trade-Offs

Overview

- The first thing is to build a model, the second is the parameterisation
- Gross and ceded reserve projections, gross and ceded UPR etc. speak for themselves however for other items it is not always straight forward
- Important as projected exposures are used in future capital projections

Premium Debtors

- One of the key trade-offs in these models is that between Net Cashflow and the change in Premium Debtors.
- An increase in the Gross Premium Receivable will increase the net cashflow but will decrease the premium debtors and vice versa.
- The level of premium debtors should be reasonable compared to a company's history, peers and knowledge of the business.
- A similar consideration arises on the reinsurance premium payable and reinsurance balances side

Net Cashflow

- Investments and Cash (YE x) = Investments and Cash (YE x-1) + Investment income/gains (CY x) + Net Cashflow (CY x)
- The growth in Investments and Cash needs to be reasonable from an investment management perspective
- Net Cashflow (x) as a percentage of the beginning of year Investments and Cash will be more significant for younger companies in a growth phase and/or writing longer-tail lines of business. Net Cashflow can therefore be key in this regards.

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4. Different Equity Valuation Approaches
Top Down vs Ground Up

Two key themes

- The Calculation Basis – e.g. Economic Value Added ("EVA"), Dividend Discount Model ("DDM"), Free Cash Flow to Equity ("FCFE").....etc..
- How have these been implemented – I decided to distinguish between what I have termed "Top Down" vs "Ground Up" approaches.

Top Down

- These are models where the **inputs** are variables such as the Return on Equity ("ROE") and Net Asset Value ("NAV") growth rates.
- The same values in perpetuity or values that vary over different projection periods e.g. two periods or more. There is an example below:
- The model origins are non-industry specific and so may not capture the nuances of Non-Life insurance companies.

ROE Basis	Period	ROE	Dividend %	Dividend	NAV Growth	ROE - k
1	1 - 5	18.0%	50.0%	9.0%	9.0%	7.0%
2	6 - 15	14.0%	50.0%	7.0%	7.0%	3.0%
3	TV (16+)	12.5%	50.0%	6.3%	6.3%	1.5%

Ground Up

- This is where the projected Net Income (after tax, but before dividend) are directly calculated from the constituent parts including:
    - GWP growth, Gross/ Net Earnings Patterns
    - Gross / Net Loss Ratios (or broken down by loss type – Attritional / Large / catastrophe)
    - Gross / Net Acquisition cost %, Administration expenses % and bases (one of three I use),
    - Investment return assumptions
    - Dividend is equal to the Net Income after tax times the Dividend payout ratio.
- This may or may not involve the projection of the associated balance sheets and cashflow statements.

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4. Different Equity Valuation Approaches
Top Down vs Ground Up

The different Models considered in the GIRO paper are

1. Dividend Discount Model
2. Economic Value Added
3. Free Cash Flow to Equity
4. Valuation Multiples
5. Appraisal Values

Within each of the methods the following style is adopted:

1. Methodology
2. How implemented
3. Advantages
4. Disadvantages

In this presentation I have focused on the **Dividend Discount Model** (Cashflow based) and **Economic Value Added** (Earnings based). A full discussion of all five methods along the lines of the four stye areas can be found in the appropriate sections of my paper.

Which Model to Use

My preference is Economic Value Added using a Ground Up Basis

1. EVA and DDM values are the same
2. Future Value < 100% of Total; (< 50% if Price / NAV < 2.0)
3. Identifies the sources of Economic Profit / Loss over time

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4. Different Equity Valuation Approaches
Top Down vs Ground Up – Modelling Summary

Method	Top Down	Ground Up	Basis
Dividend Discount Model	Yes	Yes	Cashflow
EVA	Yes	Yes	Earnings
Free Cashflow to Equity	No	Yes	Cashflow
Valuation Multiples	Yes	No	Earnings
Appraisal Values	No	Yes	Earnings

Notes

- The assessment is based on how individual years are modelled in the first N years e.g. N = 5
  - It can be argued that any Terminal Value calculation is in effect a Top Down approach

- Appraisal Values were often talked about in the 1990s with pivotal BAJ papers such as:
  - Ryan, J.P and Larner, W.P. (1990). The Valuation of General Insurance Companies. JIA, Vol 117, Part III
  - Bride, M.A. and Lomax, M.A. (1994). Valuation and Corporate Management in a Non-life Insurance Company. JIA, Vol 121, Part II

- As far as I can tell the Appraisal Value approach appears to be mathematically the same as EVA except for differences in
  - How presented, granularity and assumptions
  - Subject to confirmation when my GIRO 2024 paper is released
  - Any feedback on this point will be most welcome.

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4. Different Equity Valuation Approaches
Why Ground Up over Top Down ROE modelling

My Preference

- In terms of my preference for Ground Up over Top Down approaches my views are as follows:

Advantages

- Greater transparency
- More intuitive as the modelling reflects insurance risk drivers e.g.. GWP growth, earnings patterns, loss ratios etc.
- The future P&Ls are modelled – The Top Down approach doesn't tell you what the future P&Ls look like beyond t=1
- Balance sheets are projected– Needed for future capital needs
- More meaningful sensitivity tests as changes in insurance risk drivers are directly modelled e.g. net/gross premium ratios, reserve deterioration etc.
- Minimises the risk of unreasonable models – See "Top Down ROE Models – The Issues".

Disadvantages

- More data inputs as values are needed for future periods
- Translating the detailed modelling outputs into simple and understandable metrics e.g. ROE, NAV growth, Price / Book and P/E ratios.
- More time consuming
- Doesn't lend itself easily to a quarterly roll-forward where say the ROEs assumptions may be preserved.

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4. Different Equity Valuation Approaches

Dividend Discount Model

Methodology

- The value of a share is the present value of all expected future dividends.

$$Value = \sum_{t=1}^{\infty} \frac{Dividend_t}{(1+k)^t}$$

- $Dividend_t$ = Expected Dividend during the period (t-1,t)
- k = Cost of Equity i.e. discount rate

If one assumes, as is commonly the case, that dividends increase at an annual constant growth rate of g per annum in perpetuity then:

$$Value = \frac{Dividend_1}{k-g}$$

N stage growth model

It is possible to specify a two or three or more stage growth model where different starting dividends and/or dividend growth rates are specified in each of these periods. The valuation of these cashflows being represented by a series of simple annuity formulas.

Forecast Period and Terminal Value

An alternative representation is to consider two separate modelling periods, (i) Forecast Period and (ii) Terminal Value where different assumptions are assumed to hold for t = 1 to N and for t = N+1 onwards a Terminal Value ("TV"). The DDM formula then becomes:

$Value = \sum_{t=1}^{N} \frac{Dividend_t}{(1+k)^t} + \frac{TV}{(1+k)^N}$ where $TV = \frac{Dividend_{N+1}}{k-g}$ and

g = NAV growth rate in perpetuity

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4. Different Equity Valuation Approaches
Dividend Discount Model ("DDM")

How implemented
- The model can be implemented in one of two different ways, Top Down and Ground Up.

Top Down
- The initial dividend, or dividends (if an N stage model, N>1) are prescribed and annual growth rates thereafter. The formulae in Methodology is an example of the Top Down approach

Ground Up
- The ground up approach involves the projection of Net Income after Tax for each future year with the dividend being defined as

$$Dividend_t = Dividend\ \%_t \times Net\ Income_t$$

and where Dividend $\%_t$ = Dividend % payout ratio for period (t-1,t).

Dividend Discount Model "Bad Press" Paradox
- The problem is the prediction of future dividends based off an initial dividend and assumed future growth rate say or differential growth rates in two or more stage Models. Then there are complications from Share Buy Backs etc.
- So Analysts seem to turn to more so-called sophisticated approaches e.g. Economic Value Added ("EVA"), Appraisal Values, Price / NAV ratios etc.
- But herein lies the Paradox. Each of these models relies on either explicit or implicit assumptions for future dividends
- So if the prediction of future dividends is flawed for the Dividend Discount Model it can't magically right itself when used in each of these other models
- The issue is not the DDM itself but how it is used. If a Ground Up approach is followed with projections of future Net Income after tax for each future year and assumed dividend payout ratios then the same level of sophistication exists with other models.

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4. Different Equity Valuation Approaches
Dividend Discount Model

Advantages

- Models widely used and understood
- Easy to communicate
- Dividends represent the only cash-flows that are meaningful and tangible to investors as opposed to cash flows relying on abstract reasoning as in the Free Cash Flow to Equity method
- One can derive valuations using pencil, paper and a calculator if the assumptions are the same for a number of years
- Benchmarking e.g. initial dividend yield, dividend growth rates.

Disadvantages (if a Top Down Model * is used)

- Doesn't tell you what the implied individual P&L components look like in future years, and whether these seem reasonable or not.
- In the Top Down approach the assumption of an initial dividend increasing at an annual growth rate is perhaps too simplistic
- Models are very sensitive to changes in the key assumptions, e.g. dividend growth rates and length of periods if more than one period is used
- Do not lend themselves to meaningful sensitivity tests specified in terms of changes to the key insurance drivers e.g. gross written premium growth, loss ratios etc.

- * if a Ground Up Model is used then the modelling is at the Net Income level already

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4. Different Equity Valuation Approaches

Economic Value Added ("EVA")

Methodology

- The method relies more directly on accounting measures of Net Income after Tax rather than cash flow methods as with the DDM and FCFE models
- In the EVA model we are interested in the sum of the present value of the Economic Profit ("EP") i.e. net income in excess of the cost of capital employed over each future time period (t-1,t).

$$Value = NAV_0 + \sum_{t=1}^{\infty} \frac{EP_t}{(1+k)^t}$$

- The EP_t is defined as:

$$EP_t = Net\ Income_t - (k \times NAV_{t-1})$$

- EP_t = Economic Profit during the period (t-1,t)
- NAV_{t-1} = Adjusted NAV beginning of the period (t-1,t)
- k = Cost of Equity ("COE") i.e. discount rate

- The formula suggests that positive or negative deviations from the NAV must be due to a company's ability to earn more or less than the "normal" rate demanded by shareholders. If a company can earn a return on capital equal to a "normal" return demanded by its shareholders then the market value of the company should equal its book value.

Adjusted NAV

- The NAV used is an Adjusted NAV which is derived from the IFRS NAV after various adjustments such as:
  - Goodwill and other intangibles
  - Unrealised Gains
  - Other

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4. Different Equity Valuation Approaches
Economic Value Added ("EVA")

How implemented

- The model can be implemented in one of two different ways, Top Down and Ground Up.

Top Down

•This uses an ROE_t as an input

$$EP_t = (ROE_t \times NAV_{t-1}) - (k \times NAV_{t-1}) = (ROE_t - k) \times NAV_{t-1}$$

$$NAV_t = (1 + g_t) \times NAV_{t-1}$$

where:

$$g_t = ROE_t \times (1 - Dividend\ \%_t)$$

The formula then becomes:

$$EVA\ Value = NAV_0 + \sum_{t=1}^{\infty} \frac{(ROE_t - k) \times NAV_{t-1}}{(1+k)^t}$$

- The definition of economic profits as (ROE – k) x NAV allows one to think of economic profits / losses in terms of an ROE > k / ROE < k

4. Different Equity Valuation Approaches

Economic Value Added ("EVA")

How implemented

Ground Up

- The EP_t is defined as:

$$EP_t = Net\ Income_t - (k \times NAV_{t-1})$$

$$Dividend_t = Dividend\ \%_t \times Net\ Profit_t$$

$$NAV_t = NAV_{t-1} + Net\ Profit_t - Dividend_t$$

Forecast Period and Terminal Value

- An alternative representation is to consider two separate modelling periods, (i) Forecast Period and (ii) Terminal Value where different assumptions are assumed to hold for t = 1 to N and for t = N+1 onwards a Terminal Value ("TV"). The EVA formula then becomes:

$$Value = NAV_0 + \sum_{t=1}^{N} \frac{EP_t}{(1+k)^t} + \frac{TV}{(1+k)^N} \text{ and } TV = \frac{EP_{N+1}}{k-g}$$

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4. Different Equity Valuation Approaches
Economic Value Added ("EVA")

Advantages

- Models widely used and understood
- Easy to communicate
- Identifies whether value above book value is being created and in which years according to whether ROE > k or ROE < k

Disadvantages (if a Top Down Model * is used)

- Doesn't tell you what the implied individual P&L looks like in future years, and whether these seem reasonable or not
- The NAV future growth assumption, either direct or via a dividend payout % determines the future gross written premium and hence NEP growth.
- EVA models that assume that the ROE equals the COE (Price / Book ratio = 1) in the steady state condition at some point in the future provide no information on the implied combined ratio and/or NEP growth rate. The same comment applies to any other ROE "steady state" assumptions
- Models are very sensitive to changes in the key assumptions, e.g. ROE, NAV growth rates and length of periods if more than one period is used
- Do not lend themselves to meaningful sensitivity tests specified in terms of changes to the key insurance drivers e.g. gross written premium growth.

- * if a Ground Up Model is used then the modelling is at the Net Income level already

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4. Different Equity Valuation Approaches
EVA vs DDM Numerical Example

How different are the EVA and DDM values

- How different are the answers from the models with consistent assumptions
- To answer this I built a simple model
- Values turned out to be the same even after extensive sensitivity testing

Input

ROE Basis	Period	ROE	Dividend %	Dividend	NAV Growth	ROE - k
1	1 - 5	18.0%	50.0%	9.0%	9.0%	7.0%
2	6 - 15	14.0%	50.0%	7.0%	7.0%	3.0%
3	TV (16+)	12.5%	50.0%	6.3%	6.3%	1.5%

1st Period	5
k initial	11.0%
k increment	0.00%
NAV_0	1,000

Output

Period	t = 0	1 - 5	6 - 15	TV	Total	Price / NAV	PE
EVA	1,000	304	210	200	1,714	1.71	9.5
DDM	0	391	491	832	1,714	1.71	9.5
EVA %	58%	18%	12%	12%	100%		
DDM %	0%	23%	29%	49%	100%		

Value Distribution (and uncertainty)

- EVA - If Price / NAV < 2.0 then < 50% of total value is for periods t > 0
- e.g. 42% (= 100 - 58%) = 1 - 1/1.71
- DDM – 100% from future periods

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4. Different Equity Valuation Approaches

EVA vs DDM Numerical Example

Model comparison

- Detail Model Outputs
- Notice dividend discontinuity for t = 6 from innocent looking assumptions

	NAV	ROE	Dividend %	Net Income	Dividend	NAV Change	k COE	EP	EVA	DDM	Discount	Discount
	Undisc			Undisc	Undisc	Undisc		Undisc	Disc	Disc	Rate	Factor
Period t									**1,714**	**1,714**		
0	1,000								1,000	0		
1	1,090	18.0%	50%	180	90	90	11.0%	70	63	81	111.0%	111.0%
2	1,188	18.0%	50%	196	98	98	11.0%	76	62	80	111.0%	123.2%
3	1,295	18.0%	50%	214	107	107	11.0%	83	61	78	111.0%	136.8%
4	1,412	18.0%	50%	233	117	117	11.0%	91	60	77	111.0%	151.8%
5	1,539	18.0%	50%	254	127	127	11.0%	99	59	75	111.0%	168.5%
6	1,646	14.0%	50%	215	108	108	11.0%	46	25	58	111.0%	187.0%
7	1,762	14.0%	50%	230	115	115	11.0%	49	24	56	111.0%	207.6%
8	1,885	14.0%	50%	247	123	123	11.0%	53	23	54	111.0%	230.5%
9	2,017	14.0%	50%	264	132	132	11.0%	57	22	52	111.0%	255.8%
10	2,158	14.0%	50%	282	141	141	11.0%	61	21	50	111.0%	283.9%
11	2,309	14.0%	50%	302	151	151	11.0%	65	21	48	111.0%	315.2%
12	2,471	14.0%	50%	323	162	162	11.0%	69	20	46	111.0%	349.8%
13	2,644	14.0%	50%	346	173	173	11.0%	74	19	45	111.0%	388.3%
14	2,829	14.0%	50%	370	185	185	11.0%	79	18	43	111.0%	431.0%
15	3,027	14.0%	50%	396	198	198	11.0%	85	18	41	111.0%	478.5%
TV = 16+		12.5%	50%		3,983		11.0%	956	200	832		

Discounted Value to t = 15

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4. Different Equity Valuation Approaches

EVA vs DDM Theoretical Proof of Equivalence

Mathematical Proof

$$EVA\ Value = NAV_0 + \sum_{t=1}^{\infty} \frac{EP_t}{(1+k)^t}$$

$$\mathrm{EP}_t = \mathrm{NI}_t - k \times NAV_{t-1}$$

$$\mathrm{NI}_t = \mathrm{D}_t + NAV_t - NAV_{t-1}$$

i.e. Net Income = Dividend + Change in NAV

$$\mathrm{EP}_t = \mathrm{D}_t + NAV_t - (1+k) \times NAV_{t-1}$$

$$\sum_{t=1}^{\infty} \frac{EP_t}{(1+k)^t} = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t} + \sum_{t=1}^{\infty} \frac{NAV_t}{(1+k)^t} - (1+k) \times \sum_{t=1}^{\infty} \frac{NAV_{t-1}}{(1+k)^t}$$

$$\sum_{t=1}^{\infty} \frac{EP_t}{(1+k)^t} = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t} + \sum_{t=1}^{\infty} \frac{NAV_t}{(1+k)^t} - \sum_{t=1}^{\infty} \frac{NAV_{t-1}}{(1+k)^{t-1}}$$

$$\sum_{t=1}^{\infty} \frac{EP_t}{(1+k)^t} = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t} - \mathrm{NAV}_0$$

$$\mathrm{NAV}_0 + \sum_{t=1}^{\infty} \frac{EP_t}{(1+k)^t} = \sum_{t=1}^{\infty} \frac{D_t}{(1+k)^t}$$

i.e. EVA = DDM

Functional Form

The proof is independent of how the Dividend and NAV are defined, whether Top Down or Ground Up

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5. Top Down ROE Models – The Issues
What are they

No	Description
1	A level ROE does not mean a level Combined Ratio “through the cycle”
2	No information on the Combined Ratio and NEP growth after the initial period N_1
3	Difficult to tell whether future P&Ls are reasonable for t > 1
4	Dividend payout ratio determines the following year’s Net Income (= ROE x NAV) and NEP
5	Not possible to project future capital needs and hence future Solvency Ratios
6	Models are very sensitive to a limited number of key assumptions e.g. ROE, length of initial period etc.
7	Valuation Multiples – Dividend % inconsistencies
8	Top Down ROE Model and Ground Up Model – Contradictory Dividend Sensitivity Results

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5. Top Down ROE Models – The Issues

1. A level ROE does not mean a level Combined Ratio "through the cycle"

The starting position for t =1

- The standard approach is to derive a "through the cycle" ROE based on a "through the cycle" Combined Ratio
- This can be seen in the following figure with an assumed "through the cycle" combined ratio of 85% ----- > ROE 15.8%
- **But what is the future NEP growth ? Which never appears to be explained.**

Simple Model - Top Down

Time t	**1**
NAV (Beginning year)	1,000
NEP	1,000
Combined Ratio	85%
UW Profit	150
Average Investments	2,400
Investment return	48
Other	0
Finance Costs	0
Profit Before Tax	198
Tax	-40
Profit After Tax	158
ROE	15.8%
Dividend	95
Retained Profit	63
Dividend Growth p.a.	

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5. Top Down ROE Models – The Issues

1. A level ROE does not mean a level Combined Ratio "through the cycle"

For t > 1

- In a simplified P&L model for a company in a "Steady State" condition where the Net Reserves are a function of NEP and Investments a function of Net Reserves and the NAV (i.e. NEP in this case) this can only happen if the following condition holds true:
- **NEP Growth = NAV Growth = ROE * (1 – Dividend Payout %)**
- But companies won't necessarily be in a "Steady State" as Net Reserves / NEP might not be constant.

Simple Model - Top Down								
	NEP = NAV Growth (t=0)							
Time t	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**TV**
NAV (Beginning year)	1,000	1,063	1,131	1,202	1,279	1,360	1,446	
NEP	1,000	1,063	1,131	1,202	1,279	1,360	1,446	
Combined Ratio	85%	85%	85%	85%	85%	85%	85%	
UW Profit	150	160	170	180	192	204	217	
Average Investments	2,400	2,552	2,714	2,886	3,069	3,263	3,470	
Investment return	48	51	54	58	61	65	69	
Other	0	0	0	0	0	0	0	
Finance Costs	0	0	0	0	0	0	0	
Profit Before Tax	198	211	224	238	253	269	286	
Tax	-40	-42	-45	-48	-51	-54	-57	
Profit After Tax	158	168	179	190	203	215	229	
ROE	15.8%	15.8%	15.8%	15.8%	15.8%	15.8%	15.8%	11.0%
Dividend	95	101	107	114	122	129	137	
Retained Profit	63	67	72	76	81	86	92	
Dividend Growth p.a.		6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	
NAV Growth	6.3%	= 0.1584 x (1 - 0.6)						
NEP Growth	6.3%							
Average investment return	2.0%							
Tax Rate	20%							
Dividend	60%							
Cost of Equity	9.5%							

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5. Top Down ROE Models – The Issues

1. A level ROE does not mean a level Combined Ratio "through the cycle"

When NEP Growth < NAV Growth

- A level combined ratio of 85% leads to a lower ROE over time
- Using a **level ROE will overstate the value** as the implied Combined Ratio < 85%
- When the NEP Growth > NAV Growth. A level combined ratio of 85% leads to a higher ROE over time. (**level ROE will understate the value)**
- The **Combined Ratio** needs to be set in the **context of NEP growth** as high NEP growth is often at the expense of profit.

Simple Model - Top Down							
	NEP < NAV Growth (t=0)						
Time t	**1**	**2**	**3**	**4**	**5**	**6**	**7**
NAV	1,000	1,063	1,130	1,200	1,273	1,350	1,430
NEP	1,000	1,045	1,092	1,141	1,193	1,246	1,302
Combined Ratio	85%	85%	85%	85%	85%	85%	85%
UW Profit	150	157	164	171	179	187	195
Average Investments	2,400	2,552	2,712	2,879	3,055	3,239	3,432
Investment return	48	51	54	58	61	65	69
Other	0	0	0	0	0	0	0
Finance Costs	0	0	0	0	0	0	0
Profit Before Tax	198	208	218	229	240	252	264
Tax	-40	-42	-44	-46	-48	-50	-53
Profit After Tax	158	166	174	183	192	201	211
ROE	15.8%	15.6%	15.4%	15.3%	15.1%	14.9%	14.8%
Dividend	95	100	105	110	115	121	127
Retained Profit	63	66	70	73	77	81	84
Dividend Growth p.a.		4.9%	4.9%	4.9%	4.9%	4.9%	4.9%

NAV Growth	6.3%	= 0.1584 x (1 - 0.6)
NEP Growth	4.5%	
Average investment return	2.0%	
Tax Rate	20%	
Dividend	60%	

5. Top Down ROE Models – The Issues

2. No information on the Combined Ratio and NEP growth after the initial period N_1

The Issue with Two or Three Period Top Down Models

- The ROE reduces from 15.0% to 12.0%. At the point of transition the NEP growth = -27.7% p.a (from year 4 to 5).
- The issue is the unchanged combined ratio which would likely be higher than 85.0%
- **There are many permutations of Combined Ratio and NEP growth numbers. What are they ? Are they reasonable together ?**

Simple Model - Top Down

Time t	**1**	**2**	**3**	**4**	**5**	**6**	**7**
NAV (Beginning year)	1,000	1,063	1,131	1,202	1,279	1,340	1,404
NEP	1,000	1,063	1,131	1,202	869	911	955
Combined Ratio	85%	85%	85%	85%	85%	85%	85%
UW Profit	150	160	170	180	130	137	143
Average Investments	2,400	2,552	2,714	2,886	3,069	3,216	3,370
Investment return	48	51	54	58	61	64	67
Other	0	0	0	0	0	0	0
Finance Costs	0	0	0	0	0	0	0
Profit Before Tax	198	211	224	238	192	201	211
Tax	-40	-42	-45	-48	-38	-40	-42
Profit After Tax	158	168	179	190	153	161	169
Assumed ROE	15.8%	15.8%	15.8%	15.8%	12.0%	12.0%	12.0%
Dividend	95	101	107	114	92	96	101
Retained Profit	63	67	72	76	61	64	67
Dividend Growth p.a.		6.3%	6.3%	6.3%	-19.4%	4.8%	4.8%
Calculated ROE		15.8%	15.8%	15.8%	12.0%	12.0%	12.0%
NEP Growth		6.3%	6.3%	6.3%	-27.7%	4.8%	4.8%
Average investment return	2.0%						
Tax Rate	20%						
Dividend	60%						

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5. Top Down ROE Models – The Issues

3. P&L reasonableness / 4. Dividend payout / 5. Future Solvency Ratios

3. Difficult to tell whether future P&Ls are reasonable for t > 1

- With just an ROE input how does one gain comfort that in each future year the premium, losses, expenses and investment return etc are sensible
- One cannot interpret what say a move from an ROE of 11.0% to 14.0% actually means
- If the COE changes, e.g. risk-free rate if CAPM, changing the ROE is more difficult to challenge cf changing plan numbers (I need to explain this better)

4. Dividend payout ratio determines the following year's Net Income (=ROE x NAV) and NEP

- With a Ground Up approach we start off with an NEP, derive the Net Income after Tax and use the dividend payout ratio to determine the Dividend and Retained Profit
- In the Top Down Approach a level Combined Ratio = level ROE means next years' NEP is a function of the assumed Dividend payout ratio.

5. Not possible to project future capital needs and hence future Solvency Ratios

- There is a need to project future Capital and Solvency Ratios over the valuation time horizon
- This will avoid situations of a favourable recommendation, "Buy", say whilst at the same time the Solvency ratio falls off a cliff, maybe Insolvency at t = M
- Many valuation assumptions assume higher ROEs in the earlier years and lower ROEs in later years so a real risk.
    - This will put Solvency Ratios under pressure - The impact being worse for those writing a significant proportion of Long Tail classes.

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5. Top Down ROE Models – The Issues
6. Sensitivity Tests

Based on the EVA vs DDM Model we saw in Section 4

Price / NAV COE / ROE 1	14.0%	15.0%	16.0%	17.0%	18.0%
8.0%	4.02	4.13	4.25	4.36	4.48
9.0%	2.57	2.65	2.73	2.81	2.89
10.0%	1.89	1.96	2.02	2.08	2.15
11.0%	1.50	1.55	1.61	1.66	1.71
12.0%	1.24	1.29	1.33	1.38	1.43

Price / NAV Dividend 3 % / ROE 3	9.0%	10.0%	11.0%	12.0%	12.5%
30.0%	1.25	1.36	1.51	1.76	1.94
40.0%	1.29	1.39	1.51	1.68	1.79
50.0%	1.32	1.41	1.51	1.64	1.71
60.0%	1.34	1.42	1.51	1.62	1.67
70.0%	1.36	1.44	1.51	1.60	1.65

Price / NAV Dividend 1 % / ROE 1	14.0%	15.0%	16.0%	17.0%	18.0%
30.0%	1.56	1.62	1.68	1.74	1.81
40.0%	1.53	1.58	1.64	1.70	1.76
50.0%	1.50	1.55	1.61	1.66	1.71
60.0%	1.47	1.52	1.57	1.62	1.67
70.0%	1.45	1.49	1.54	1.58	1.63

Price / NAV 1st Period / ROE 1	14.0%	15.0%	16.0%	17.0%	18.0%
4	1.50	1.54	1.59	1.63	1.67
5	1.50	1.55	1.61	1.66	1.71
6	1.50	1.56	1.62	1.69	1.75
7	1.50	1.57	1.64	1.72	1.79
8	1.50	1.58	1.66	1.75	1.83

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5. Top Down ROE Models – The Issues

7. Valuation Multiples – Dividend % inconsistencies

Price / NAV Formula:

- Sometimes one comes across valuations which involve the application of a Price / NAV multiple, e.g. 1.5x say
- An ROE, COE (i.e. k here) and g are assumed. The formula then becomes (simple derivation from the one period DDM):

$$\frac{Price}{NAV} = \frac{(ROE - g)}{(k - g)}$$

The Problem – Potential inconsistent Dividend Payout ratios:

- If a High ROE is assumed say circa 14%+, the Price / NAV ratio **may** become unrealistically high if a reasonable Dividend payout % ratio is used
- The problem is that a High ROE is assumed in perpetuity and doesn't reduce after N years say allowing for the affect of competition etc.
- To compensate an unrealistically low value of "g" may have been selected (i.e. high Dividend payout %)

Price / NAV					
g / ROE					
	14.0%	15.0%	16.0%	17.0%	18.0%
1.0%	1.44	1.56	1.67	1.78	1.89
2.0%	1.50	1.63	1.75	1.88	2.00
3.0%	1.57	1.71	1.86	2.00	2.14
4.0%	1.67	1.83	2.00	2.17	2.33
5.0%	1.80	2.00	2.20	2.40	2.60
k (= COE)	10.0%				
Price / NAV <= 2					

Note: 1.0 < Price / NAV < 2.0 not unusual

Dividend Payout %					
g / ROE					
	14.0%	15.0%	16.0%	17.0%	18.0%
1.0%	93%	93%	94%	94%	94%
2.0%	86%	87%	88%	88%	89%
3.0%	79%	80%	81%	82%	83%
4.0%	71%	73%	75%	76%	78%
5.0%	64%	67%	69%	71%	72%
Dividend % > 0.8					
Dividend % > 0.7					

The Investor Checks

- Calculate $Dividend\ \% = 1 - \frac{g}{ROE}$ then perform the following checks:
- Compare Dividend % vs (i) Company's historical record and (ii) Peer companies
- Project Solvency Ratios (or think about it); a Low Retained profits % contribution to NAV might not be high enough to offset the increase in required capital leading to a deteriorating Solvency Ratio over time, especially for longer tail risks.

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5. Top Down ROE Models – The Issues

7. Valuation Multiples – Dividend % inconsistencies

Variation with k (= COE) = 9%, 10% and 11%:

Price / NAV g / ROE	14.0%	15.0%	16.0%	17.0%	18.0%
1.0%	1.63	1.75	1.88	2.00	2.13
2.0%	1.71	1.86	2.00	2.14	2.29
3.0%	1.83	2.00	2.17	2.33	2.50
4.0%	2.00	2.20	2.40	2.60	2.80
5.0%	2.25	2.50	2.75	3.00	3.25
k (= COE)	9.0%				
Price / NAV <= 2					

Price / NAV g / ROE	14.0%	15.0%	16.0%	17.0%	18.0%
1.0%	1.44	1.56	1.67	1.78	1.89
2.0%	1.50	1.63	1.75	1.88	2.00
3.0%	1.57	1.71	1.86	2.00	2.14
4.0%	1.67	1.83	2.00	2.17	2.33
5.0%	1.80	2.00	2.20	2.40	2.60
k (= COE)	10.0%				
Price / NAV <= 2					

Price / NAV g / ROE	14.0%	15.0%	16.0%	17.0%	18.0%
1.0%	1.30	1.40	1.50	1.60	1.70
2.0%	1.33	1.44	1.56	1.67	1.78
3.0%	1.38	1.50	1.63	1.75	1.88
4.0%	1.43	1.57	1.71	1.86	2.00
5.0%	1.50	1.67	1.83	2.00	2.17
k (= COE)	11.0%				
Price / NAV <= 2					

Dividend Payout % g / ROE	14.0%	15.0%	16.0%	17.0%	18.0%
1.0%	93%	93%	94%	94%	94%
2.0%	86%	87%	88%	88%	89%
3.0%	79%	80%	81%	82%	83%
4.0%	71%	73%	75%	76%	78%
5.0%	64%	67%	69%	71%	72%
Dividend % > 0.8					
Dividend % > 0.7					

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5. Top Down ROE Models – The Issues

8. Dividends – How Top Down and Ground Up Models contradict themselves

Reduction in the Dividend % Payout Ratio – What happens to the value ?

Approach	DDM / EVA	Future NAVs	DDM Why	EVA Why	Observations	Future Solvency Ratios
Top Down	**Increase**	Higher	In earlier years future dividends are lower however at some future time point N the higher future NAV will dominate, despite a lower payout ratio, resulting in higher dividends. A NPV impact. See Mathematical proof (Next Slide)	Economic Profits are higher as a fixed (ROE – COE) is applied to higher projected future NAVs	The Net Income will automatically be higher Cannot test the dividend payout ratio in isolation It implicitly assumes that excess writing will earn the same ROE. This may not be true.	Future Solvency ratios may be broadly unchanged as a higher NAV is offset by higher required capital needs, e.g. higher premium, reserve and asset exposures The increase in the Ground Up solvency ratios will be higher than the Top Down change.
Ground Up	**Decrease**	Higher	In earlier years smaller dividend payments cf before as Net Income is assumed to be unchanged. A NPV impact.	Economic Profits = Net Income – COE x NAV are lower as Net Income is unchanged but the COE x NAV is higher with a fixed COE	One can test in isolation the impact of dividend payout ratio The opposite happens if the dividend payout ratio is increased i.e. future solvency ratios decrease. But is future solvency ever an issue ?	Higher future Solvency ratios than before the change.

5. Top Down ROE Models – The Issues

8. Dividend Discount Model

Proof that a reduction in Dividend % increases Top Down Model value – using One Period Model

$$Value\ Before\ = \frac{ROE \times NAV_o \times Dividend\ \%_{Before}}{\left(k - ROE \times \left(1 - Dividend\ \%_{Before}\right)\right)}$$

$$Value\ After\ = \frac{ROE \times NAV_o \times Dividend\ \%_{After}}{\left(k - ROE \times \left(1 - Dividend\ \%_{After}\right)\right)}$$

$$\boldsymbol{Value\ After > \ Value\ Before}$$

If: $\frac{ROE \times NAV_o \times Dividend\ \%_{After}}{\left(k - ROE \times \left(1 - Dividend\ \%_{After}\right)\right)} > \frac{ROE \times NAV_o \times Dividend\ \%_{Before}}{\left(k - ROE \times \left(1 - Dividend\ \%_{Before}\right)\right)}$

If: $\frac{Dividend\ \%_{After}}{\left(k - ROE \times \left(1 - Dividend\ \%_{After}\right)\right)} > \frac{Dividend\ \%_{Before}}{\left(k - ROE \times \left(1 - Dividend\ \%_{Before}\right)\right)}$

If: $Dividend\ \%_{After} \times \left(k - ROE \times \left(1 - Dividend\ \%_{Before}\right)\right) > Dividend\ \%_{Before} \times \left(k - ROE \times \left(1 - Dividend\ \%_{After}\right)\right)$

If: $Dividend\ \%_{After} \times (k - ROE) > Dividend\ \%_{Before} \times (k - ROE)$

If: $\boldsymbol{Dividend\ \%_{After} < Dividend\ \%_{Before}}$

As: $(k - ROE) < 0$

6. Projecting future Solvency Ratios

The Need and Approaches

The Need

- There is a need to project future Capital and Solvency Ratios over the valuation time horizon
- This will avoid situations of a favourable recommendation, “Buy”, say whilst at the same time the Solvency ratio falls off a cliff, maybe Insolvency at t = M

The Approaches

Approach	
Formula based Models e.g. Turkey, Brazil, Hong Kong, Singapore	• Project Exposures for t = n from P&L / BS / CFS outputs • Use projected Exposures in prescribed formula • Aggregate capital amounts using given correlation matrices or formula rules • Might be used in conjunction with Factor based Models
Factor based Models e.g. SF SCR, BMA BSCR,US RBC	• Calculate a Risk Factor based on Capital Amounts and Exposure at t = 0 • Project Exposures for t = n from P&L / BS / CFS outputs • Derive capital amounts at t = n by applying Risk Factors to projected Exposures • Sub Risk Modules (e.g. Premium and Reserve risk in SF SCR) might use Formula based Models with business to SII class mappings • Aggregate capital amounts using given correlation matrices
Standalone Risk Capital Output from Internal Models (“IM”)	• Similar to the above except that Diversification between Risks is taken into account i.e. if the exposure doubles between t = 0 and t = 1 the increase in capital will be less than 100% • Will likely need a “Power“ Function e.g. 0.5 or 0.75 say, or similar • Need to work out the implied Diversification between risks based on the Capital Amounts at t = 0.
IM Simulation Scaling	• Calculate future capital numbers by scaling the underlying simulations for exposure changes • The Scaling Factors will need to allow for diversification between risks • Standalone capital / Risk aggregation at t= n – summation of scaled simulations.

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6. Projecting future Solvency Ratios
SF SCR Example

Solvency Ratio Summary

Solvency

Entity	**Foxes Capital**					
BS Date	**31/12/2021**					
First AY	**2022**					
Currency / Units	**£ m**					
	YE	**2021**	**2022**	**2023**	**2024**	**2025**
	AY	**2022**	**2023**	**2024**	**2025**	**2026**
Solvency Ratio						
Available Capital (SII Own Funds)		914	994	1,077	1,163	1,252
SF SCR		760	757	779	807	841
Excess over SF SCR		154	237	298	355	411
Economic Capital (SCR x 1.2)		913	909	935	969	1,009
Excess over Economic Capital		1	85	142	194	243
Solvency Ratio		**120%**	**131%**	**138%**	**144%**	**149%**
SF SCR Summary						
Undiversified BSCR		923	920	946	980	1,020
Diversification Credit		-199	-200	-206	-213	-222
Basic SCR		724	720	741	767	798
Operational Risk		37	37	39	41	43
Loss absorbing capacity of TPs / Def Tax		0	0	0	0	0
Final SF SCR		**760**	**757**	**779**	**807**	**841**

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6. Projecting future Solvency Ratios

SF SCR Example

Initial Capital and future Capital Projections

		YE	2021	2022	2023	2024	2025
		AY	2022	2023	2024	2025	2026
Capital BY Risk Category							
Non-Life Underwritng Risk	Premium and Reserve Risk		529	524	537	555	577
	Catastrophe Risk		0	0	0	0	0
	Lapse Risk		0	0	0	0	0
	Premium Risk		200	210	221	232	243
	Reserve Risk		400	386	392	402	416
	SCR_{nl} Pre-Div		529	524	537	555	577
	SCR_{nl} Div Credit		0	0	0	0	0
	SCR_{nl} Post Div		**529**	**524**	**537**	**555**	**577**
Market Risk	Interest Rate Risk		60	60	62	63	66
	Equity Risk		80	81	84	88	92
	Property Risk		50	51	52	55	57
	Spread Risk		125	125	128	132	137
	Concentration Risk		25	25	25	25	25
	Currency Risk		120	121	126	132	138
	SCR_{mkt} Pre-Div		460	463	477	495	515
	SCR_{mkt} Div Credit		-137	-138	-142	-146	-152
	SCR_{mkt} Post Div		**323**	**325**	**336**	**349**	**364**
Counterparty Default Risk	Type 1 Risk		50	49	50	51	53
	Type 2 Risk		25	26	28	29	30
	SCR_{def} Pre-Div		75	75	78	80	84
	SCR_{def} Div Credit		-4	-4	-5	-5	-5
	SCR_{def} Post Div		**71**	**71**	**73**	**76**	**79**
Operational Risk	GEP year previous		1,220	1,233	1,295	1,359	1,427
	GEP 2 years previous		1,050	1,220	1,233	1,295	1,359
	Operational Risk		**37**	**37**	**39**	**41**	**43**

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6. Projecting future Solvency Ratios

SF SCR Example

Correlation Matrices

Basic BSCR

Parameters					
$Corr_{ij}$	SCR_{mkt}	SCR_{def}	SCR_{life}	SCR_{health}	SCR_{nl}
SCR_{mkt}	100%	25%	25%	25%	25%
SCR_{def}	25%	100%	25%	25%	50%
SCR_{life}	25%	25%	100%	25%	0%
SCR_{health}	25%	25%	25%	100%	0%
SCR_{nl}	25%	50%	0%	0%	100%

Non-Life Underwritng Risk

	NL Premium and Reserve	NL Catastrophe	NL Lapse
NL Premium and Reserve	100%	25%	0%
NL Catastrophe	25%	100%	0%
NL Lapse	0%	0%	100%

Market Risk

Parameters						
Corrij	Mktint	Mkteq	Mktprop	Mktsp	Mktconc	Mktfx
Mktint	100%	50%	50%	50%	0%	25%
Mkteq	50%	100%	75%	75%	0%	25%
Mktprop	50%	75%	100%	50%	0%	25%
Mktsp	50%	75%	50%	100%	0%	25%
Mktconc	0%	0%	0%	0%	100%	0%
Mktfx	25%	25%	25%	25%	0%	100%

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6. Projecting future Solvency Ratios

10% Gross and Net Reserve deterioration – CY 2023 (Year t = 2 as YE 2021)

Gross Reserves

			Projection					
Gross	AY	**Incurred**	**31/12/21**	**31/12/22**	**31/12/23**	**31/12/24**	**31/12/25**	**31/12/26**
	2007		0	0	0	0	0	0
	2008		0	0	0	0	0	0
	2009		0	0	0	0	0	0
	2010		23	0	0	0	0	0
	2011		23	0	0	0	0	0
	2012		46	0	0	0	0	0
	2013		46	18	0	0	0	0
	2014		69	38	16	0	0	0
	2015		92	55	33	13	0	0
	2016		138	98	65	36	14	0
	2017		230	156	122	73	40	16
	2018		253	187	139	99	59	33
	2019		345	268	218	147	105	63
	2020		460	360	308	227	153	109
	2021		575	472	406	316	233	158
	2022	666		559	505	359	279	206
	2023	699			645	482	377	293
	2024	734				616	506	396
	2025	771					647	531
	2026	809						679
	Total		**2,300**	**2,210**	**2,456**	**2,366**	**2,412**	**2,482**
Reserve Increase / Decrease %			0%	0%	10%	0%	0%	0%
Reserve Increase / Decrease			0	0	223	0	0	0

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6. Projecting future Solvency Ratios

10% Gross and Net Reserve deterioration – CY 2023 (Year t = 2 as YE 2021)

Net Reserves

			Projection					
Net	AY		31/12/21	31/12/22	31/12/23	31/12/24	31/12/25	31/12/26
	2007	Incurred	0	0	0	0	0	0
	2008		0	0	0	0	0	0
	2009		0	0	0	0	0	0
	2010		17	0	0	0	0	0
	2011		17	0	0	0	0	0
	2012		34	0	0	0	0	0
	2013		34	13	0	0	0	0
	2014		50	28	12	0	0	0
	2015		67	40	24	9	0	0
	2016		101	72	47	26	10	0
	2017		168	114	89	53	29	11
	2018		185	136	101	72	43	24
	2019		252	196	159	107	77	46
	2020		336	263	225	166	112	80
	2021		420	345	297	231	170	115
	2022	495		415	375	267	207	153
	2023	520			480	358	280	218
	2024	546				458	376	294
	2025	573					481	395
	2026	602						505
	Total		**1,679**	**1,621**	**1,809**	**1,747**	**1,785**	**1,840**
Reserve Increase / Decrease %			0%	0%	10%	0%	0%	0%
Reserve Increase / Decrease			0	0	164	0	0	0

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6. Projecting future Solvency Ratios

Analysis of Change: 10% Gross and Net Reserve deterioration – CY 2023

Solvency Ratio

	Difference				
	2021 2022	2022 2023	2023 2024	2024 2025	2025 2026
Solvency Ratio					
Available Capital (SII Own Funds)	0	0	-71	-70	-70
SF SCR	0	0	40	11	6
Excess over SF SCR	0	0	-111	-82	-76
Economic Capital (SCR x)	0	0	48	14	7
Excess over Economic Capital	0	0	-120	-84	-77
Solvency Ratio	**0%**	**0%**	**-15%**	**-11%**	**-9%**
SF SCR Summary					
Undiversified BSCR	0	0	49	13	6
Diversification Credit	0	0	-8	-1	0
Basic SCR	0	0	40	11	6
Operational Risk	0	0	0	0	0
Loss absorbing capacity of TPs / Def Tax	0	0	0	0	0
Final SF SCR	**0**	**0**	**40**	**11**	**6**

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6. Projecting future Solvency Ratios

Analysis of Change: 10% Gross and Net Reserve deterioration – CY 2023

Capital and future Capital Projections

		Difference				
		2021 2022	2022 2023	2023 2024	2024 2025	2025 2026
Capital BY Risk Category						
Non-Life Underwritng Risk	Premium and Reserve Risk	0	0	37	13	9
	Catastrophe Risk	0	0	0	0	0
	Lapse Risk	0	0	0	0	0
	Premium Risk	0	0	0	0	0
	Reserve Risk	0	0	39	14	10
	SCR_{nl} Pre-Div	0	0	37	13	9
	SCR_{nl} Div Credit	0	0	0	0	0
	SCR_{nl} Post Div	0	0	37	13	9
Market Risk	Interest Rate Risk	0	0	2	0	-1
	Equity Risk	0	0	2	0	-1
	Property Risk	0	0	1	0	-1
	Spread Risk	0	0	3	-1	-2
	Concentration Risk	0	0	0	0	0
	Currency Risk	0	0	3	-1	-2
	SCR_{mkt} Pre-Div	0	0	12	-3	-5
	SCR_{mkt} Div Credit	0	0	-3	1	1
	SCR_{mkt} Post Div	0	0	9	-2	-4
Counterparty Default Risk	Type 1 Risk	0	0	3	1	1
	Type 2 Risk	0	0	0	0	0
	SCR_{def} Pre-Div	0	0	3	1	1
	SCR_{def} Div Credit	0	0	0	0	0
	SCR_{def} Post Div	0	0	3	1	1
Operational Risk	GEP year previous	0	0	0	0	0
	GEP 2 years previous	0	0	0	0	0
	Operational Risk	0	0	0	0	0

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6. Projecting future Solvency Ratios

Analysis of Change: 10% Gross and Net Reserve deterioration – CY 2023

P&L

Difference

P&L	2022	2023	2024	2025	2026
Gross Written Premium	0	0	0	0	0
Ceded Written Premium	0	0	0	0	0
Net Written Premium	**0**	**0**	**0**	**0**	**0**
Gross Earned Premium	0	0	0	0	0
Ceded Earned Premium	0	0	0	0	0
Net Earned Premium	**0**	**0**	**0**	**0**	**0**
Gross Claims Incurred	0	-223	0	0	0
Ceded Claims Incurred	0	59	0	0	0
Net Claims Incurred	**0**	**-164**	**0**	**0**	**0**
Gross Acquisition Costs	0	0	0	0	0
Ceded Acquisition Costs	0	0	0	0	0
Net Acquisition Costs	**0**	**0**	**0**	**0**	**0**
Operational expenses	0	0	0	0	0
Other expenses (e.g. foreign exchange)	0	0	0	0	0
Total Expenses	**0**	**0**	**0**	**0**	**0**
Net UW Result	**0**	**-164**	**0**	**0**	**0**
Investment Income	0	0	2	0	-1
Realised Gains / Losses	0	0	0	0	0
Investment expenses	0	0	0	0	0
Net Investment Result	**0**	**0**	**2**	**0**	**-1**
Other Income (Ceding Coom, Broker Fee)	0	0	0	0	0
Operating Result	0	-164	2	0	-1
Finance costs	0	0	0	0	0
Other	0	0	0	0	0
Profit/(loss) before tax	**0**	**-164**	**2**	**0**	**-1**
Tax	0	33	0	0	0
Net Income after Tax	**0**	**-132**	**2**	**0**	**-1**
Net Income Attributed to non-controlling	0	0	0	0	0
Other Net Income	0	0	0	0	0
Net Income before Dividend	0	-132	2	0	-1
Dividend	0	53	-1	0	0
Retained Earnings Change	**0**	**-79**	**1**	**0**	**0**

Impacts

- Gross and Net Incurred during 2023 reconcile with Gross and Net reserve changes
- Other main impacts are on Tax and Dividends (both reduced)

Validation

- Useful for explaining to the Board / Senior Management the reasons for the changes
- Solve model inconsistencies

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6. Projecting future Solvency Ratios

Analysis of Change: 10% Gross and Net Reserve deterioration – CY 2023

Balance Sheet

Difference

Balance Sheet	31/12/22	31/12/23	31/12/24	31/12/25	31/12/26
Assets					
Investments	0	79	-16	-35	-50
- Debt / Fixed Income	0	66	-13	-29	-40
- Equities / Investment Funds	0	11	-2	-5	-7
- Other	0	3	-1	-2	-3
Cash	0	6	-1	-3	-4
Investments and Cash	**0**	**85**	**-18**	**-38**	**-54**
Property, plant and equipment	0	0	0	0	0
Goodwill & Intangibles	0	0	0	0	0
DAC	0	0	0	0	0
Ceded UPR	0	0	0	0	0
Reinsurance recoveries	0	59	22	15	9
Receivables on insurance / reinsurance	0	0	0	0	0
Reinsurance recoveries	**0**	**59**	**22**	**15**	**9**
Deferred tax assets	0	0	0	0	0
Premium Debtors	0	0	0	0	0
Other Assets	0	0	0	0	0
Total Assets	**0**	**144**	**5**	**-23**	**-44**
Liabilities					
Share Capital & Premium	0	0	0	0	0
Retained Earnings	0	-79	-78	-78	-79
Other	0	0	0	0	0
Equity	0	-79	-78	-78	-79
Non-controlling interest	0	0	0	0	0
Total Equity	**0**	**-79**	**-78**	**-78**	**-79**
Gross UPR	0	0	0	0	0
Gross Claims Reserves	0	223	83	55	34
Ceded DAC	0	0	0	0	0
Creditors insurance / reinsurance	0	0	0	0	0
Financial Liabilities	0	0	0	0	0
Deferred tax liabilities	0	0	0	0	0
Other Liabilities	0	0	0	0	0
Liabilities	**0**	**223**	**83**	**55**	**34**
Equity and Liabilities	**0**	**144**	**5**	**-23**	**-44**
Difference: Total Assets - Liabilities	**0**	**0**	**0**	**0**	**0**
Net Cashflow	**0**	**85**	**-103**	**-20**	**-15**

Impacts

- A reserve deterioration during CY 2023 first manifests itself in reserve exposures at YE 2023
- Gross and Ceded (=Gross – Net) reserve movements reconcile with Gross and Net reserve changes
- Investment movements reflect changes in Net Reserves.
- Investments +ve change for YE 2023 reflects +ve Cashflow
- Investments -ve change for YE 2024+ reflects -ve Cashflow

Validation

- Useful for explaining to the Board / Senior Management the reasons for the changes
- Solve model inconsistencies

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6. Projecting future Solvency Ratios

Analysis of Change: 10% Gross and Net Reserve deterioration – CY 2023

Cashflow

Difference

Cashflow	2022	2023	2024	2025	2026
Gross Premium Received	0	0	0	0	0
Gross Paid Acquisition costs	0	0	0	0	0
Ceded Premium Paid	0	0	0	0	0
Ceded Acquisition costs	0	0	0	0	0
Gross Losses paid	0	0	-141	-28	-21
Ceded Losses received	0	0	37	8	6
Receivables on insurance / reinsurance	0	0	0	0	0
Operational expenses	0	0	0	0	0
Other expenses (e.g. foreign exchange)	0	0	0	0	0
Investment Income Received	0	0	2	0	-1
Other Income (Ceding Coom, Broker Fee)	0	0	0	0	0
Finance costs	0	0	0	0	0
Other	0	0	0	0	0
Tax Paid	0	33	0	0	0
Dividend Paid	0	53	-1	0	0
Increase in Deferred Tax Assets	0	0	0	0	0
Other Cashflows	0	0	0	0	0
Net Cashflow	**0**	**85**	**-103**	**-20**	**-15**

Impacts

- During 2023 the only impact will a reduction in both Tax and Dividend paid. This results in a +ve cashflow change
- For 2024 and later impact is driven by increase gross and ceded paid claims off higher YE 2023 and later gross and net reserves.

Validation

- Useful for explaining to the Board / Senior Management the reasons for the changes
- Solve model inconsistencies

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7. SEVA – Reconciling Ground Up and Top Down ROE Models

The Idea

Objective

- The idea is to link the Ground Up and Top Down ROE modelling approaches

- Modelling is at the Ground Up level using common insurance risk drivers:
  - GWP growth rates, gross and net earnings patterns, GLRs, Net / Gross ratios, Acquisition cost %, Administration expenses % (and basis, one of three), investment assumptions etc……..

- Challenge = How to translate outputs from the Ground Up approach into Top Down Outputs

Considerations

- Modelling Time Horizon = 20 years + TV for years 21+
  - After 20 years TV will be very small
  - Nothing special with 20 years – it could be fewer e.g. 10 years or 15 years but then TV % higher

- First 5 years – individual years as per earlier exhibits in presentation

- Years (6 – 20) - not individual years but distinct periods where assumptions the same for each year of the period

- I have chosen three distinct periods – 5 / 5 / 5 years
  - One could choose one, two or four or more periods

- The Town Down Model outputs e.g. ROE, NAV growth etc are derived for the same period lengths

- The length of the three periods is a model variable:
  - They could be 8 / 4 / 3
  - The Top Down Model outputs averaging would reflect the length of the periods.

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7. SEVA – Reconciling Ground Up and Top Down ROE Models

Valuation Summary

Valuation Summary

SEVA Model

Entity	**Foxes Capital**
BS Date	**31/12/2021**
First AY	**2022**
Currency / Units	**£ m**

Valuation Summary

	Total Value £ m	per Share £
Equity Value	1,395	279.02
NAV	805	161.02
Price / NAV Ratio	**1.73**	**1.73**
Earnings per Share £	89.25	17.85
Price Earnings Ratio		**15.63**
Dividend per Share £	49.17	9.83
Dividend Yield		3.5%

Period		**1**	**2**	**3**	**TV**	**Total**
No. of years		5	5	5		
Period Start - CY	**2022**	**2027**	**2032**	**2037**	**2042**	
Period End - CY	**2026**	**2031**	**2036**	**2041**		
EVA - Undiscounted	305	276	259	233	749	
EVA - Discounted	220	129	79	47	115	
% of Equity Value £ 1395 m in each period	16%	9%	6%	3%	8%	42%

Number of Shares YE 2021	5	m

Notes

- Key Price Information:
  - Price per Share
  - Price / NAV (or Price / Book)
  - Price Earnings Ratio
  - Dividend per share
  - Dividend Yield
- Summary EVA information:
  - EVA – Undiscounted / Discounted
  - EVA % in each of the periods
- EVA as % of Total Value :
  - NAV = 58%
  - CY 2022 - 26 = 16%
  - Period 1 / 2 / 3 = 9% / 6% / 3%
  - If only CY 2022 – 26 in detail then EVA = 76% of Total Value (TV = 24%)

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7. SEVA – Reconciling Ground Up and Top Down ROE Models

Investor Outputs

Investor Outputs

Investor Outputs

Period Start - CY		**2022**	**2027**	**2032**	**2037**	**2042**	
Period End - CY		**2026**	**2031**	**2036**	**2041**	**TV**	**Averages**
ROE		13.5%	11.5%	10.6%	9.9%	9.5%	Weighted
NAV Growth p.a.		9.8%	8.0%	7.1%	6.5%	6.0%	Compound
NEP Growth pa		4.6%	5.0%	5.0%	5.0%		Compound
Combined Ratio		90.7%	90.7%	90.7%	90.7%		Weighted
Dividends		267	349	460	600		Sum
Dividend Growth pa		5.3%	5.9%	5.6%	5.4%		Weighted

Assumptions

Cost of Capital	8.9%
Riskfree rate	2.3%
Equity Risk Premium	6.0%
Beta	1.10

Notes

- The Averages for each of the metrics shown are calculated using different bases:
  - Weighted
  - Compound
  - Sum (not really an average

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7. SEVA – Reconciling Ground Up and Top Down ROE Models

EVA Outputs

EVA (Years CY 2022 – 2026 and CY 2027 – 2031)

Economic Value Added						
	YE	31/12/21	31/12/22	31/12/23	31/12/24	31/12/25
	CY	2022	2023	2024	2025	2026
NAV		805	894	986	1,081	1,180
ROE - Calculated		17.2%	15.9%	15.0%	14.3%	13.7%
NAV Growth p.a.		11.1%	10.3%	9.6%	9.1%	8.7%
EVA - Undiscounted		67	63	60	58	56
EVA - Discounted		56	49	43	38	34
NEP growth p.a.		2.9%	5.0%	5.0%	5.0%	5.0%

Economic Value Added						
	YE	31/12/26	31/12/27	31/12/28	31/12/29	31/12/30
	CY	2027	2028	2029	2030	2031
NAV		1,283	1,391	1,505	1,625	1,751
ROE - Calculated		13.2%	13.0%	12.6%	12.3%	12.0%
NAV Growth p.a.		8.4%	8.2%	8.0%	7.8%	7.5%
EVA - Undiscounted		55	57	56	55	54
EVA - Discounted		30	29	26	23	21
NEP growth p.a.		5.0%	5.0%	5.0%	5.0%	5.0%

Notes

- For a constant Net Loss Ratio:
  - NAV growth p.a. > NEP growth p.a. then ROE reduces over time
  - If the NAV growth p.a. < NEP growth p.a. then ROE increases over time
  - See Section 5
- The NAV here is the Adjusted NAV after deducting Goodwill & Intangibles

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7. SEVA – Reconciling Ground Up and Top Down ROE Models

P&L

Net Income (Years CY 2022 – 2026)

Profit & Loss						
	CY	2022	2023	2024	2025	2026
GWP		1,260.0	1,323.0	1,389.2	1,458.6	1,531.5
NWP		919.8	965.8	1,014.1	1,064.8	1,118.0
NEP		900.1	945.1	992.3	1,042.0	1,094.1
Net Claims Incurred		-495.0	-519.8	-545.8	-573.1	-601.7
Net Acquisition Costs		-162.0	-170.1	-178.6	-187.6	-196.9
Operational / Other expenses		-159.3	-167.3	-175.6	-184.4	-193.6
Net UW Result		**83.72**	**87.91**	**92.30**	**96.92**	**101.77**
Investment return		66.5	67.3	69.8	72.9	76.5
Other Income		28.4	29.8	31.3	32.9	34.5
Operating Result		**178.6**	**185.0**	**193.5**	**202.7**	**212.8**
Finance Costs		-25.0	-26.3	-27.6	-28.9	-30.4
Profit Before Tax		**153.6**	**158.7**	**165.9**	**173.8**	**182.4**
Tax		-30.7	-31.7	-33.2	-34.8	-36.5
Net Income after Tax		**122.9**	**127.0**	**132.7**	**139.0**	**145.9**
Other Net Income		15.5	15.5	15.5	15.5	15.5
Net Income before Dividend		**138.4**	**142.5**	**148.2**	**154.5**	**161.4**
Dividend		-49.2	-50.8	-53.1	-55.6	-58.4
Retained Earnings		**89.2**	**91.7**	**95.1**	**98.9**	**103.0**

Notes

- For these years insurance modelling is Gross, Ceded and Net

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7. SEVA – Reconciling Ground Up and Top Down ROE Models

P&L

Net Income (Years CY 2027 – 2031)

Profit & Loss						
	CY	2027	2028	2029	2030	2031
GWP		1,608.1	1,688.5	1,772.9	1,861.6	1,954.7
NWP		1,173.9	1,232.6	1,294.3	1,359.0	1,426.9
NEP		1,148.8	1,206.2	1,266.5	1,329.8	1,396.3
Net Claims Incurred		-631.8	-663.4	-696.6	-731.4	-768.0
Net Acquisition Costs		-206.8	-217.1	-228.0	-239.4	-251.3
Operational / Other expenses		-203.3	-213.5	-224.2	-235.4	-247.1
Net UW Result		**106.85**	**112.20**	**117.81**	**123.70**	**129.88**
Investment return		80.4	89.4	94.9	100.8	107.0
Other Income		37.5	40.7	44.0	47.5	51.2
Operating Result		**224.7**	**242.2**	**256.7**	**272.0**	**288.1**
Finance Costs		-33.0	-35.8	-38.8	-41.9	-45.1
Profit Before Tax		**191.7**	**206.4**	**218.0**	**230.2**	**243.0**
Tax		-38.3	-41.3	-43.6	-46.0	-48.6
Net Income after Tax		**153.4**	**165.1**	**174.4**	**184.1**	**194.4**
Other Net Income		15.5	15.5	15.5	15.5	15.5
Net Income before Dividend		**168.9**	**180.6**	**189.9**	**199.6**	**209.9**
Dividend		-61.3	-66.1	-69.8	-73.6	-77.8
Retained Earnings		**107.5**	**114.6**	**120.1**	**126.0**	**132.1**

Notes

- For these and later years, apart from GWP, insurance modelling is Net only
- Net Reserves are only projected

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7. SEVA – Reconciling Ground Up and Top Down ROE Models

Modelling Bases

Modelling Granularity

Period CYs	Gross	Net	Gross AY Reserves	Net AY Reserves	Net Reserves Approximation	Balance Sheet / CS Modelling	Investments Approximation
2022 - 2026	Yes	Yes	Yes	Yes	No	Yes	No
2027 - 2031	No	Yes	No	Yes	No	No	Yes
2032 - 2036	No	Yes	No	Yes	No	No	Yes
2037 - 2041	No	Yes	No	No	Yes	No	Yes
TV (CY 2042)	No	Yes	No	No	Yes	No	Yes

- It would have been easier to model all 20 years using the detailed basis as per CYs 2022 – 2026
- However, I though it a good idea to demonstrate two other P&L bases with everything Net (apart from GWP)
  - AY projection of Net Reserves only (not Gross Reserves)
  - Approximation to Net Reserves
- For each of the latter two methods the Investments and Cash for each YE is approximated rather than calculated

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8. Conclusions

GIRO 2024 paper

- Finalise my GIRO paper of the same title - Currently sitting at 80 pages in draft

EVA based Share Price Models are Useful

1. Determining sources of Economic / Profit over time and how they respond to scenarios

2. Determining potential investment targets

3. Making sense of Market Valuations e.g. IPOs

Questions for Equity Analysts

1. Justification for the selection of the chosen methods
   - Not just we have used this

2. Methodology and Assumptions used for the following Projections
   - Gross and Net reserves
   - Future Required Capital, Target Capital and Solvency Ratios

3. Top Down ROE Models
   - All key assumptions
   - Consider some of the points raised in “5. Top Down ROE Models – The Issues”

4. Results of Sensitivity Tests

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9. Questions and Answers

Questions

Comments

- Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.
- The views expressed in this presentation are those of the presenter.

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Thank you