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Cost of Debt Modelling under Ofgem's RIIO-ED1 Method

A Preliminary Assessment for WPD

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Insight in Economics™

London, 14 August 2012

Terms of Reference

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- Ofgem's framework determines the allowed cost of debt over RIIO-ED1 based on a 10Y trailing index of historical benchmark yields (debt indexation)
- A firm's actual financing cost is determined by its embedded debt costs (which are the result of past financing decisions) and the future coupon cost of raising new debt
- In this presentation we assess the risk for WPD to under-/ over-recover its actual debt costs over RIIO-ED1 under Ofgem's debt indexation method

Ofgem's debt indexation exposes the company's shareholders to the risk of under-/over-recovering actual debt costs

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- A company's potential for out-/under-performance over RIIO-ED1 is determined by
  - The company's *embedded* debt costs relative to Ofgem's 10Y trailing index
  - The company's *new* debt issuance programme and the future coupon costs relative to Ofgem's 10Y trailing index
- A company's embedded debt costs are determined by past financing decisions, which may result in out-/under-performance relative to the starting value of Ofgem's 10Y trailing index
  - We analyse WPD's embedded debt costs and compare it to Ofgem's 10Y trailing index over RIIO-ED1
- Debt issues are lumpy - WPD is projected to have significant new debt over RIIO-ED1 of 4.7bn v's current debt of £2.34bn
  - the coupon cost of new issues relative to Ofgem's 10Y *average* trailing index could have a significant impact on out-/under-performance

Key Modelling Assumptions

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	Revenue and cost component	Description	Details
Actual CoD	Embedded Debt	WPD's actual debt portfolio as of Jun-2012	▪ 2 index bonds (£150 mln each, coupon of 1.541%) ▪ 6 nominal bonds with different maturities, sizes and coupon costs (see appendix)
Actual CoD	Total New Issues	All new debt issued as nominal coupon bonds	▪ Total of £4.7 billion over RIIO-ED1 ▪ £518 million p.a. during RIIO-ED1
Actual CoD	Nominal Coupon Costs for New Debt	Real risk free spot rate + Debt spread + Inflation expectations	▪ Real yields of IL gov't bonds (10Y maturity) ▪ Spread based on average of A/BBB iBoxx non-financials (10Y+ maturity) ▪ Real yields converted into nominal yields using 10 year breakeven inflation (Bank of England)
Allowed CoD	Real cost of debt for indexation allowance	10 year trailing Index of historical benchmark yields	▪ Nominal iBoxx benchmark yields (10Y+ maturity) ▪ Average of A/BBB yields of non-financials ▪ Nominal yield converted into real using 10 year breakeven inflation (Bank of England)
Allowed CoD	Retail Price Inflation (RPI) indexation	Ofgem uses a real CoD and indexes allowed revenues by RPI	▪ Ofgem applies actual outturn RPI to index allowed revenues ▪ We forecast future outturn RPI using current (May-2012) forecasts by HM Treasury

We calculate the NPV of the difference between **allowed** and **actual** CoD based on a simulation of coupon costs over RIIO-ED1

We forecast future coupon costs at which WPD will issue new debt

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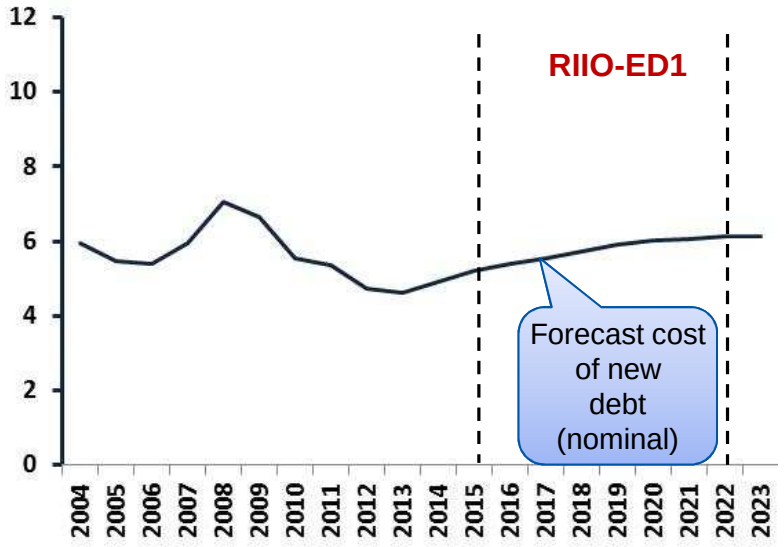
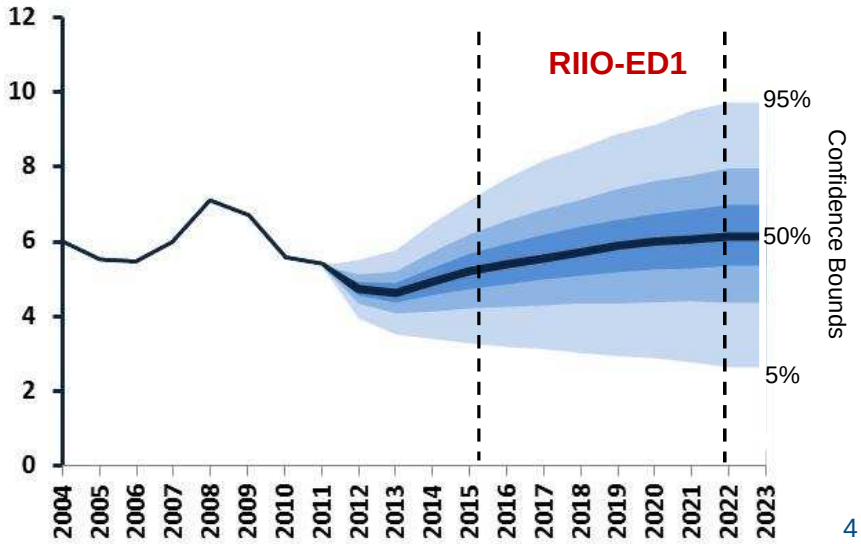
- Based on the current yield curve we calculate underlying forward rates, and expected future coupon costs for 10Y maturity issues (see slide 16 in the Appendix)
- Our forecast of coupon costs is based on
  - Real yields of IL gov't bonds (10Y maturity)
  - Spread based on average of A/BBB iBoxx non-financials (10Y+ maturity)
  - 10 year breakeven inflation (Bank of England)
- We take a risk-based approach and simulate future nominal coupon costs around our central case
- This fan chart illustrates the 4000 simulations of the future coupon costs we calculated and which are used in our risk based approach

Central Case Forecast of Nominal Coupon Costs



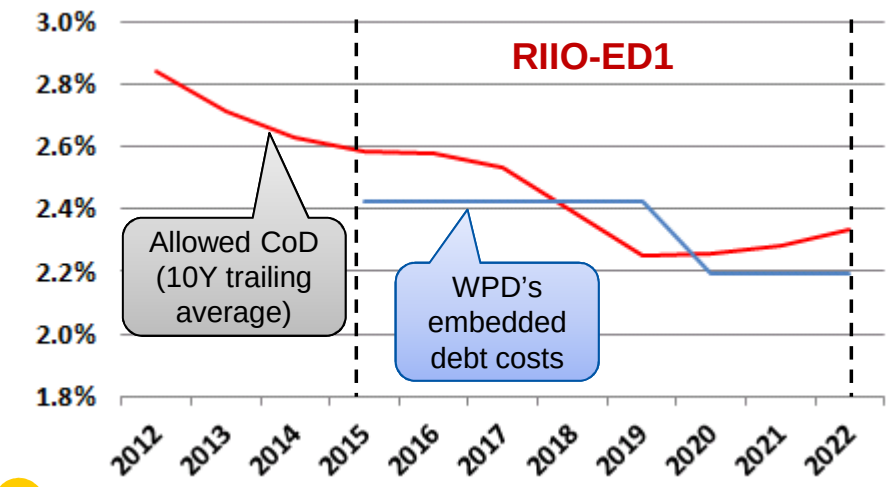
Simulated Nominal Coupon Costs



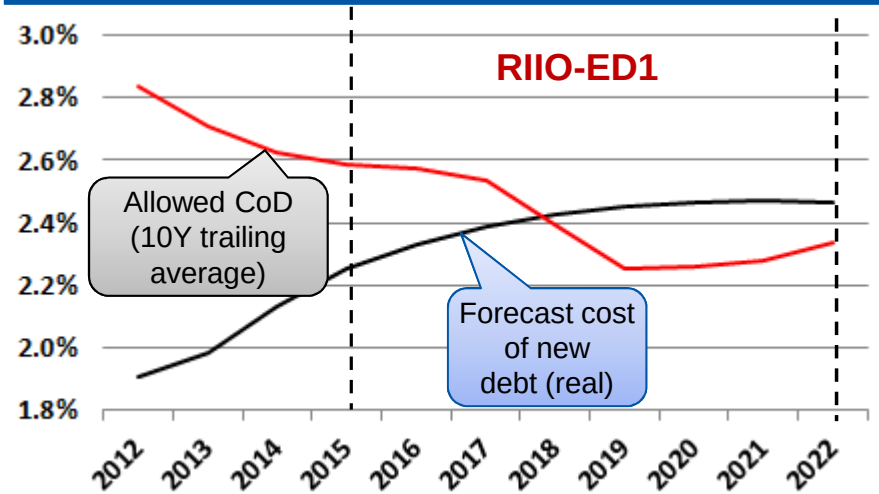
We assess outperformance separately for embedded and new debt

- Based on forecasts of new debt costs, we can forecast Ofgem's trailing 10Y trailing average index
- WPD's *embedded* debt cost (in real terms) lie below our forecast of Ofgem's 10Y trailing index (with the exception in 2019)
  - If WPD were to issue no new debt, we forecast Ofgem's debt allowance to exceed WPD's actual debt costs (in real terms)
- We forecast WPD's *new* debt cost (in real terms) to lie below Ofgem's index during the 1st half and above the index in the 2nd half of RIIO-ED1
  - The net effect of this is about zero in NPV-terms (slightly positive)

1 Real Allowed CoD vs. WPD's Embedded Debt Cost



2 Real Allowed CoD vs. Cost of New Debt



WPD's debt outperformance in real terms is mainly due to its lower embedded debt costs relative to our forecast of Ofgem's 10Y trailing index

Respective Weight of Embedded and New Debt in the Total Cost of Debt

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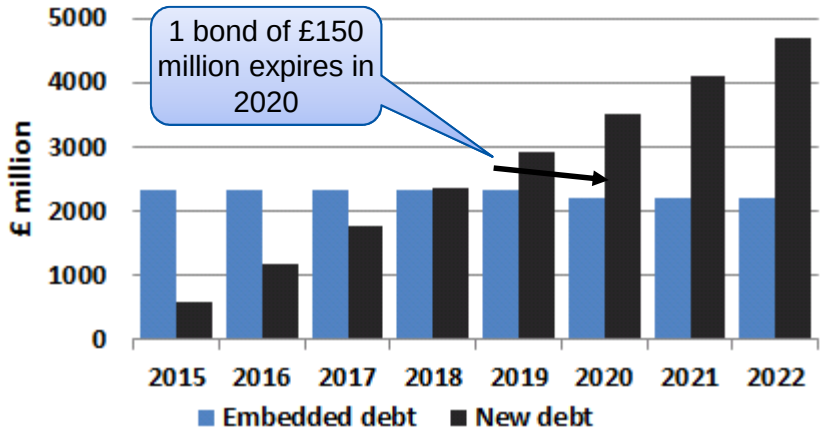
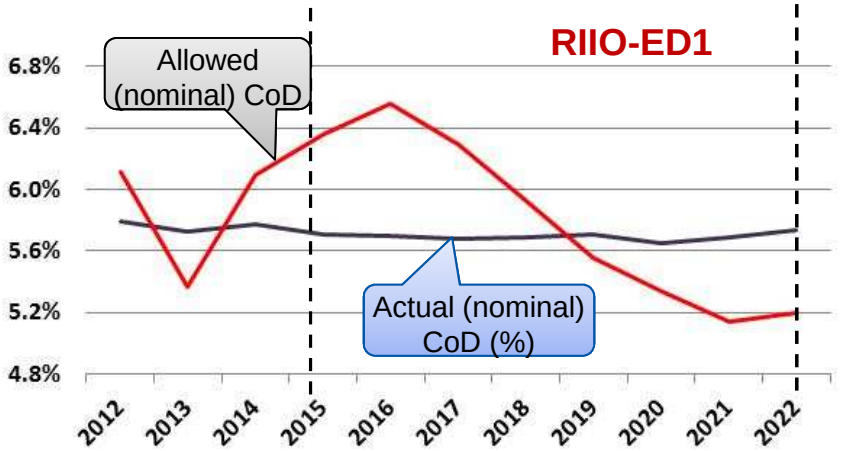
- Total (nominal) cost of debt (total debt cost in £ million divided by total debt outstanding) is the weighted average of embedded debt cost and new debt cost
  - Embedded debt has a bigger weight in the weighted average from 2015 to 2018
  - New debt has a bigger weight from 2019 to 2022

Actual (nominal) Embedded Debt vs. New Debt (£ million)



- In the central case our analysis shows
  - Over-recovery: 2015 to 2018
  - Under-recovery: post-2018

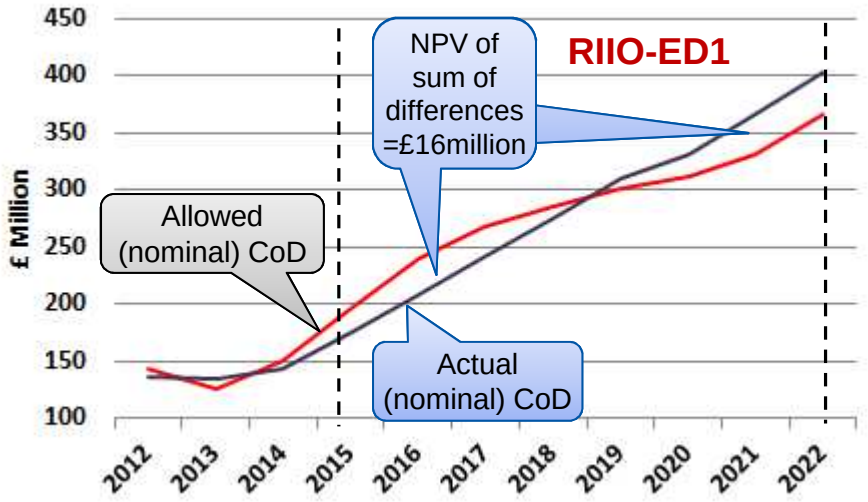
WPD's Weighted Average (Nominal) Cost of Debt (%)



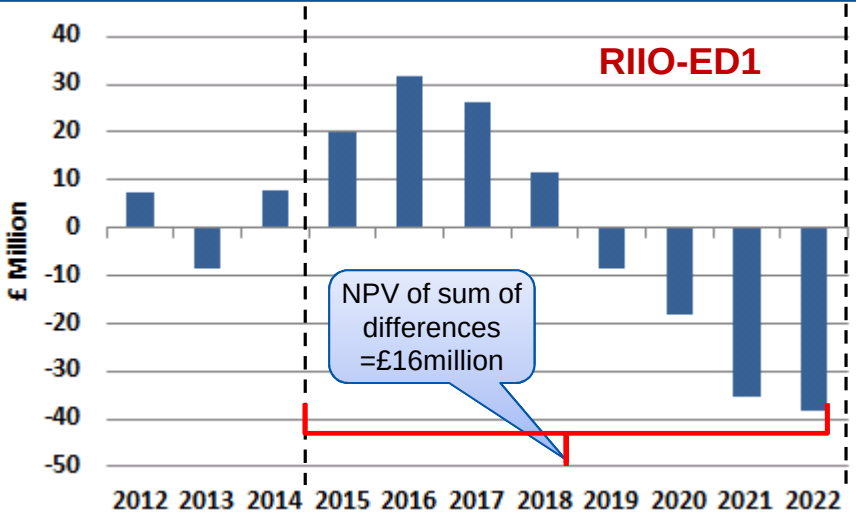
In the central case WPD is expected to outperform by £16m in NPV-terms

- Over the RIIO-ED1 period (04/15-03/23), we calculate *out-recovery* of £16 million in NPV-terms
- See slides 18 and 19 in Appendix for the derivation of the allowed (nominal) CoD

Allowed versus Actual Nominal CoD (£ million)



Difference Allowed minus Actual Nominal CoD (£Mn)



Our simulation results show that WPD faces some downside risk of underrecovery

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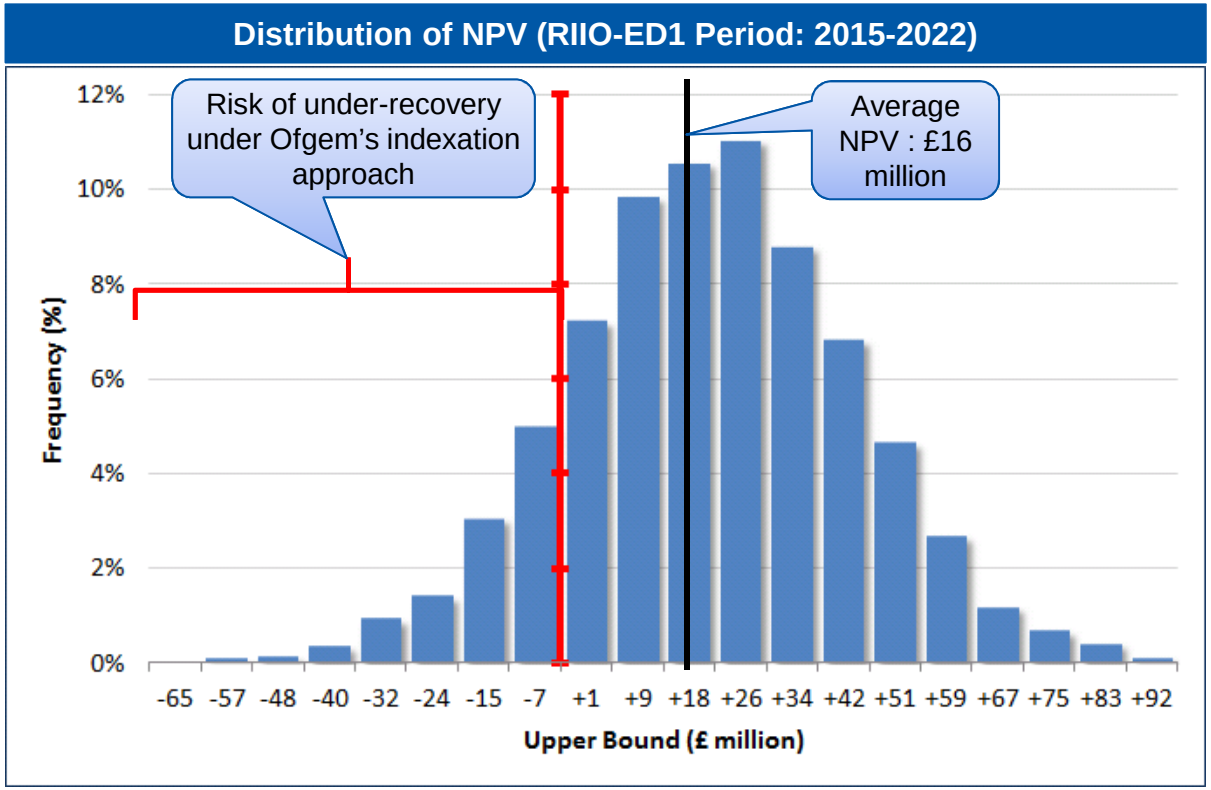
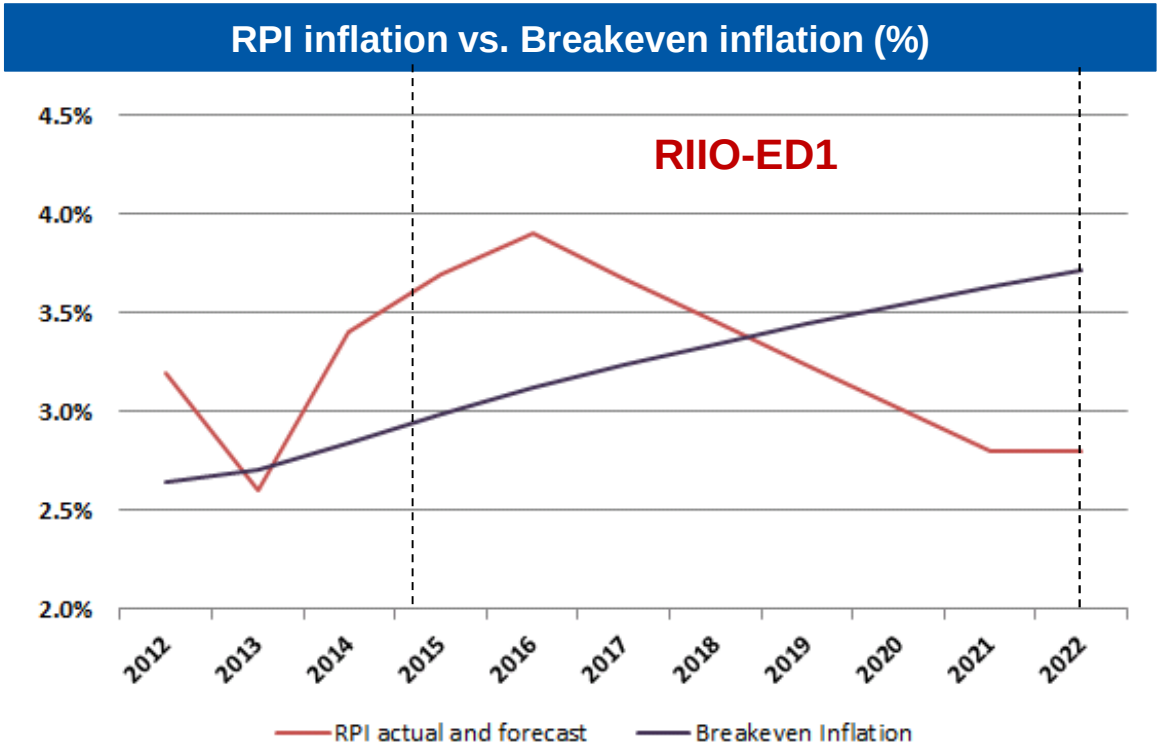
- Our simulation confirms the central case that on average WPD is expected to over-recover actual debt costs of £16 million over RIIO-ED1 in NPV-terms
- However there is a 12% probability that WPD under-recovers its actual costs in NPV-terms
- With 95% confidence, under-recovery is less than £17 million in NPV-terms
- The maximum loss (under 4000 simulations) is limited at £65 million in NPV-terms



Difference in RPI and breakeven inflation may lead to under-/ over-recovery of (nominal) debt cost



- Ofgem uses actual **RPI** to escalate allowed revenues to compensate for inflation. BUT
- Ofgem uses "breakeven inflation[1]" for calculating real debt costs in its trailing average index.
  - If breakeven inflation higher than RPI, then DNOs not fully compensated for inflation and vice-versa.
- RPI forecast higher than the breakeven inflation for the first half of RIIO-ED1(2015-2018) and lower for the second half. Over the whole period RPI slightly lower than the breakeven inflation (by 0.5%)

=> WPD not fully compensated for nominal debt costs due to (on average) lower expected RPI

=> If new debt is issued as index-linked debt (indexed to RPI), the spread risk of RPI and breakeven inflation could be fully hedged

- Our analysis shows that if all new debt was issued as index-linked debt, the outperformance will increase from £16 million to £21 million in NPV-terms

1) Defined as the difference between nominal government bond yields and index-linked gov't bond yields

Summary

- In the central case over RIIO-ED1 we forecast WPD to outperform allowed debt costs by c.£16 million in NPV-terms
  - WPD's embedded debt costs lie below Ofgem's 10Y trailing index for all but one year during the RIIO-ED1 period, which predominately explains the outperformance
  - We forecast new debt to be issued below Ofgem's index during the 1st half and above the index during the 2nd half of RIIO-ED1. The net effect of this is broadly NPV-neutral
- Our simulation shows that over the RIIO-ED1 period there is a 12% probability of under-recovery in NPV-terms
  - With 95% confidence, under-recovery is less than £17 million in NPV-terms
  - The maximum loss is limited at £65 million in NPV-terms

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Appendix

Allowed Cost of Debt under the RIIO-ED1 Framework

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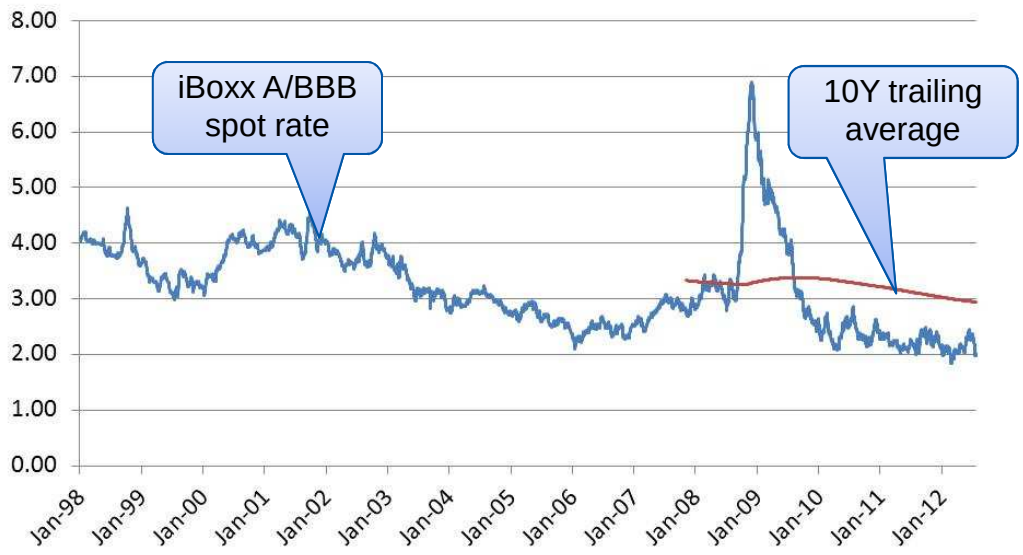
Allowed Cost of Debt (%)



Commentary

- Ofgem uses a 10 year trailing average of benchmark yields to set the allowed cost of debt over RIIO-ED1 (04/2015-03/2023)
  - Data provider iBoxx
  - Average of A and BBB rating of 10Y+ yields of Non-financials
  - Nominal yields converted to real yields using 10Y maturity breakeven inflation from the Bank of England
- As of Jul-12, the 10 year trailing average lies c.0.4% above spot-rates
  - New debt issues likely to lie below Ofgem's 10 year trailing average
  - But companies' actual cost of debt is determined by embedded debt costs, which may be higher or lower than the 10 year trailing average
- Future spot-rates likely to increase above 10 year trailing average

Forecast of Allowed cost of debt under the RIIO-ED1 framework

- We forecast the Real iBoxx A/BBB CoD as the sum of
  1. Real government bond yield; plus
  2. Spread (average of A and BBB)
- We forecast each component in turn

1 Allowed Real CoD for Indexation

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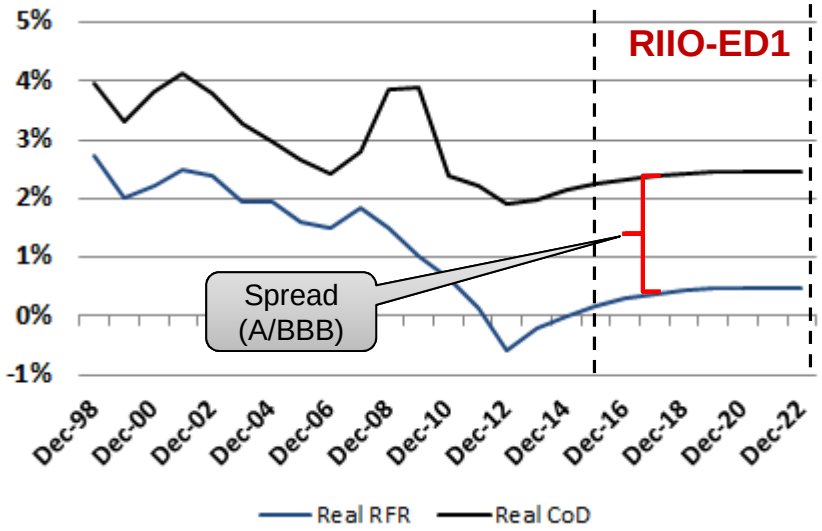
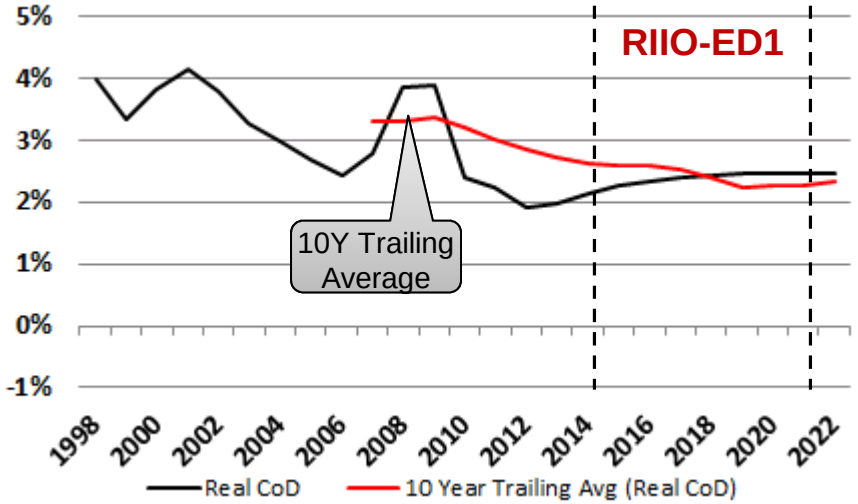
Real iBoxx A/BBB CoD (1998-2022)



Commentary

- The forecast of the real iBoxx A/BBB CoD is the sum of
  - Real government bond yield; and
  - Forecast spread of A/BBB

Real Allowed CoD (10Y Trailing Average)



Commentary

- The 10 year trailing average sets the basis for debt indexation
- The 10 year trailing average is forecast to fall from current levels of c.3% to 2.2% by 2019 before it increases slightly

2 Forecast of A/BBB Spreads

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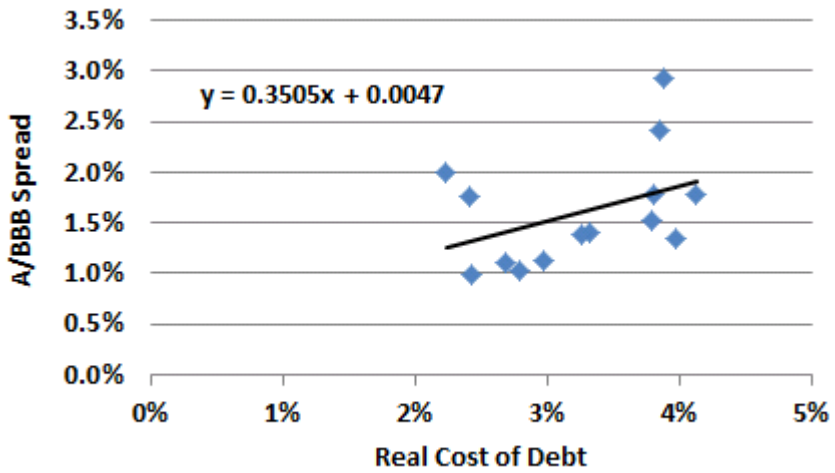
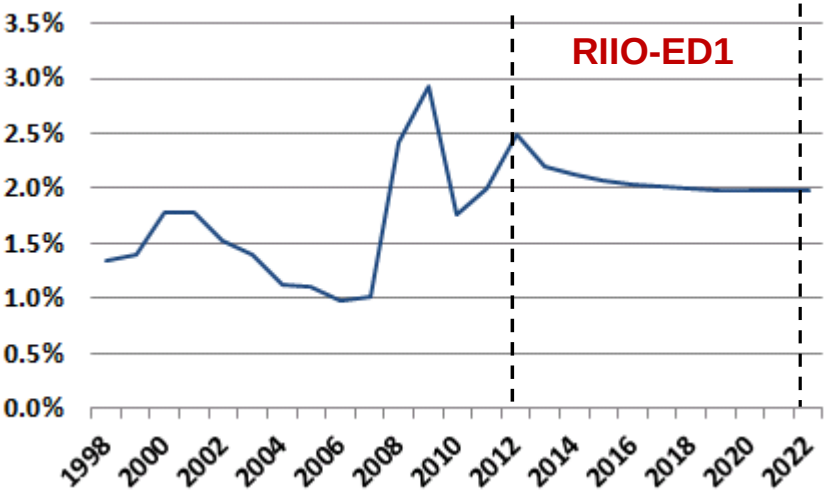
Spreads (A/BBB) versus Real CoD



Commentary

- Spreads are based on iBoxx data (average of A and BBB)
- We observe a linear relationship between spread and level of real cost of debt between 1998 and 2012
- Forecast spreads are derived by this linear relationship

Forecast Spreads (A/BBB) (1998-2022)

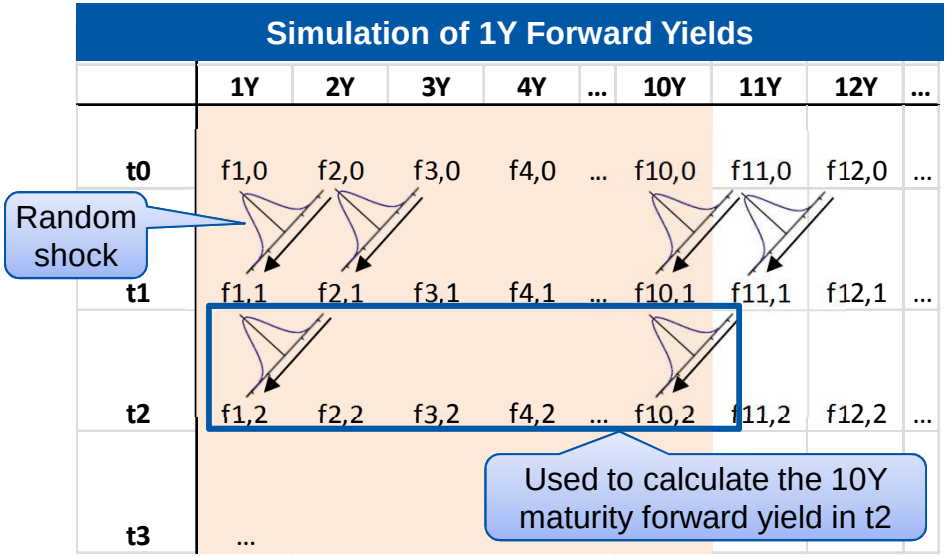


Commentary

- Forecast spreads are derived by linear relationship derived from historical data

We simulate future coupon costs

1. Based on the current real yield curve, we calculate 1Y maturity forward yields for t_0 ($f_{1,0}$, $f_{2,0}$, …)
2. We calculate future (t_1, t_2, …) 1Y maturity forward yields by adding a normally distributed random shock to the 1Y forward yields of the previous period (e.g. $f_{1,1} = f_{2,0}$ + random shock)
   - We calibrate the size of the normally distributed random shock using historical data over the past 5 years
3. Based on the 1Y maturity forward yields we calculate future 10Y maturity forward yields (e.g. t_2: $[f_{1,2}*f_{2,2}*….*f_{10,2}]^{(1/10)-1}$
4. We calculate the future real 10Y maturity cost of debt by adding A/BBB spread; for the nominal cost of debt we also add the future 10Y maturity breakeven inflation



Allowed Cost of Debt Calculation

- Ofgem allows a **real** CoD and allowed revenues are **indexed by Retail Price Inflation (RPI)**
- The allowed cost of debt (in £ million) is the sum of
  1. Real CoD (10Y trailing avg) x WPD's Debt Outstanding; and
  2. Inflation component associated with indexation
- We calculate both elements for WPD in turn

1 Forecast of Real Cost of Debt Allowance

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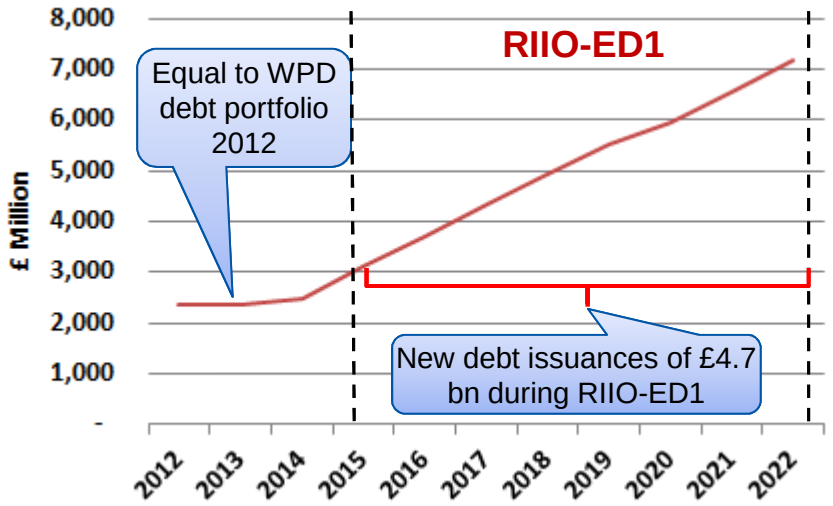
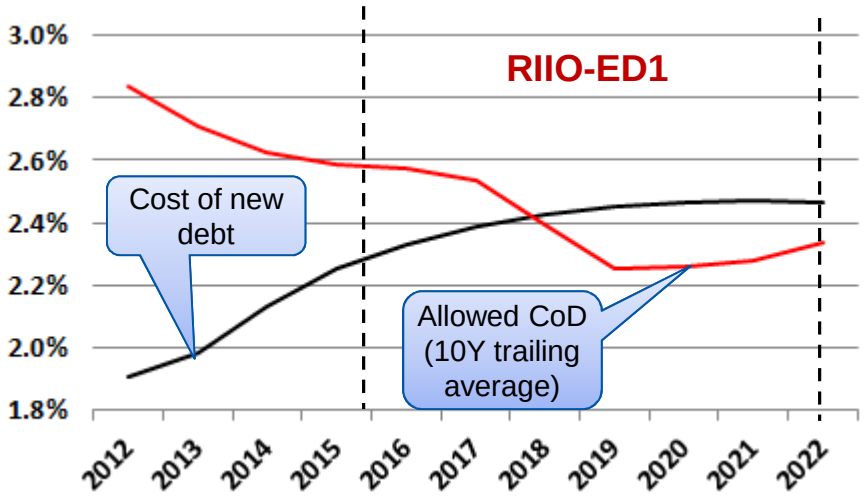
1 WPD Real Debt Portfolio (£ million)



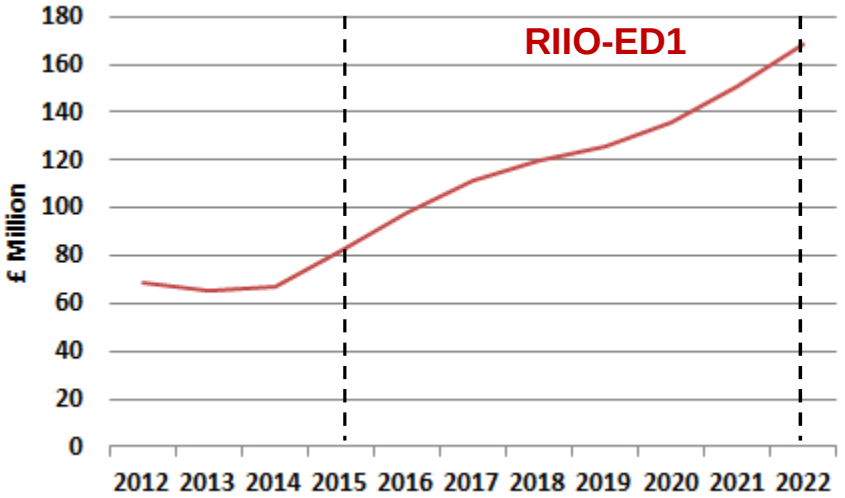
Commentary

- The real allowed CoD is the product of
  - WPD's outstanding debt (in £ million); and
  - Real Allowed CoD (in %) derived as the 10Y trailing rate of the Real iBoxx A/BBB spot rate.

2 Real Allowed CoD (10Y Trailing Average)



3 Forecast of Real Cost of Debt Allowance



2 Revenue allowance also needs to account for inflation indexation

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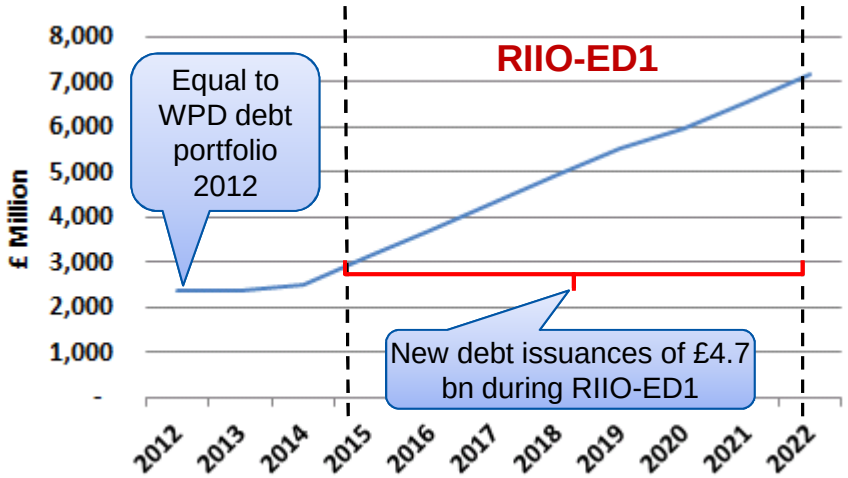
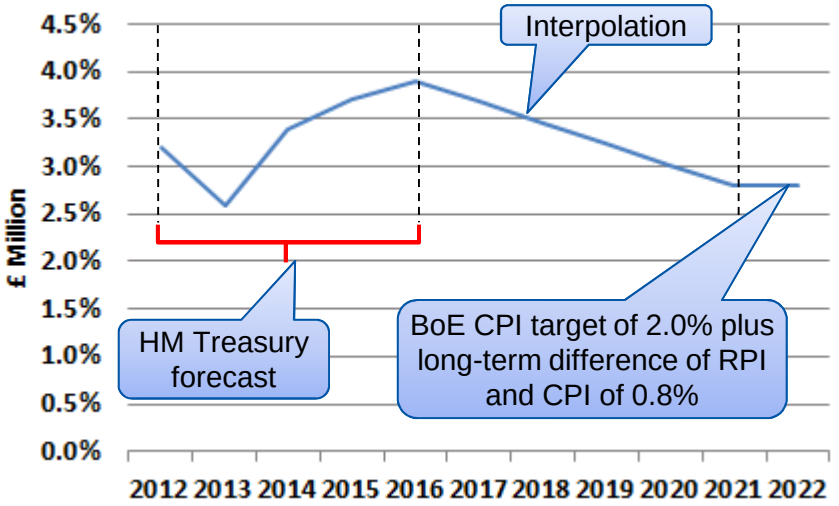
1 Forecast of WPD Outstanding Debt



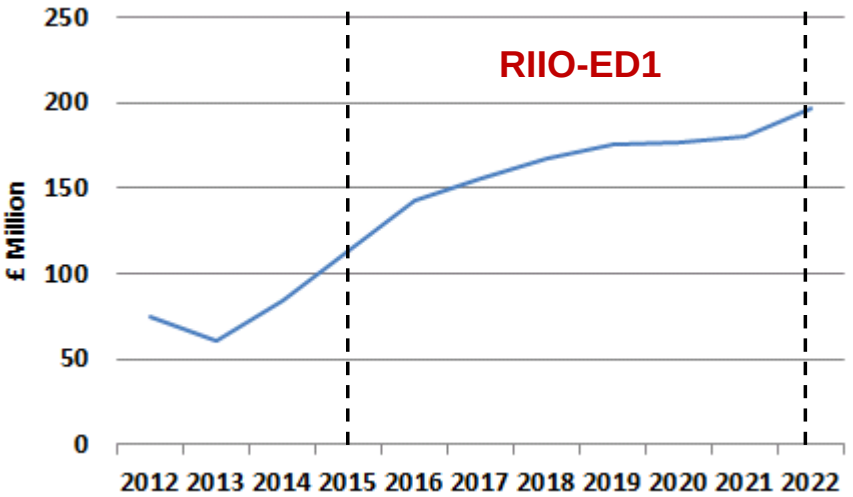
Commentary

- Revenue allowance includes an inflation component which is derived as the product of
  - WPD's outstanding debt (in £ million); and
  - Retail Price Inflation (RPI).

2 RPI Forecast



3 Allowed Inflation Component (£ million)



Summary of Allowed Cost of Debt

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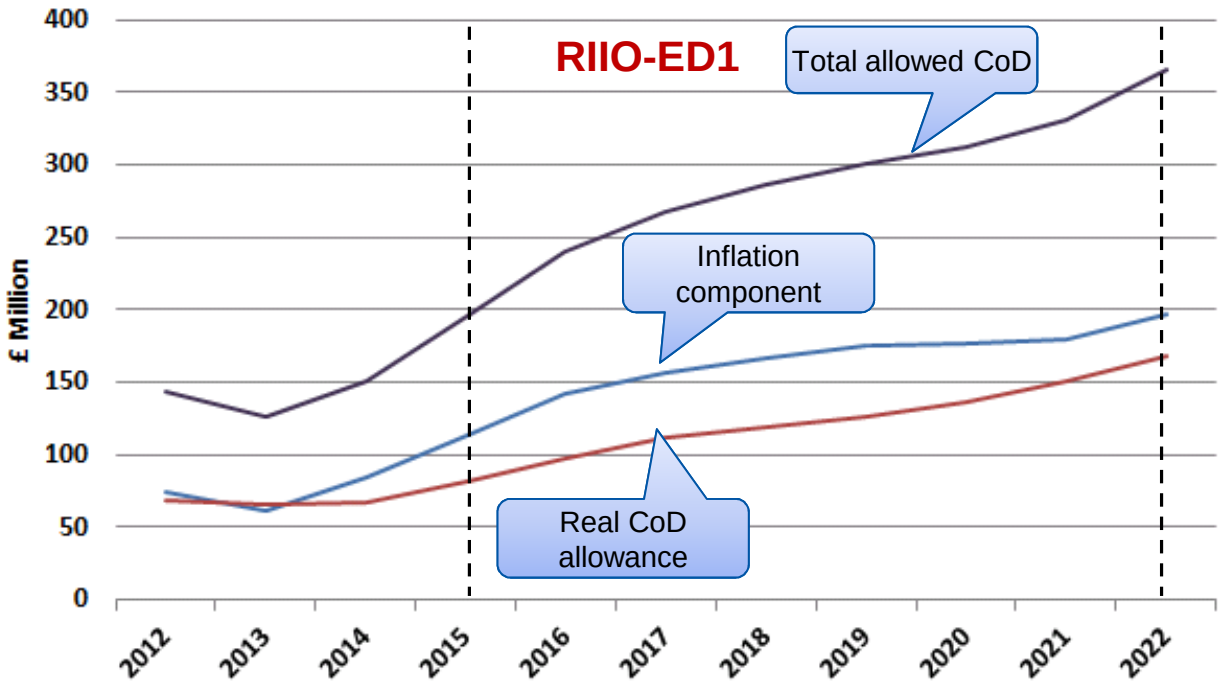
Allowed Cost of Debt (£ million)



Commentary

- Allowed cost of debt (in £ million) is the sum of
  - Real CoD x Debt Outstanding; and
  - Inflation component associated with indexation.

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WPD's Actual Cost of Debt

WPD's Embedded Debt

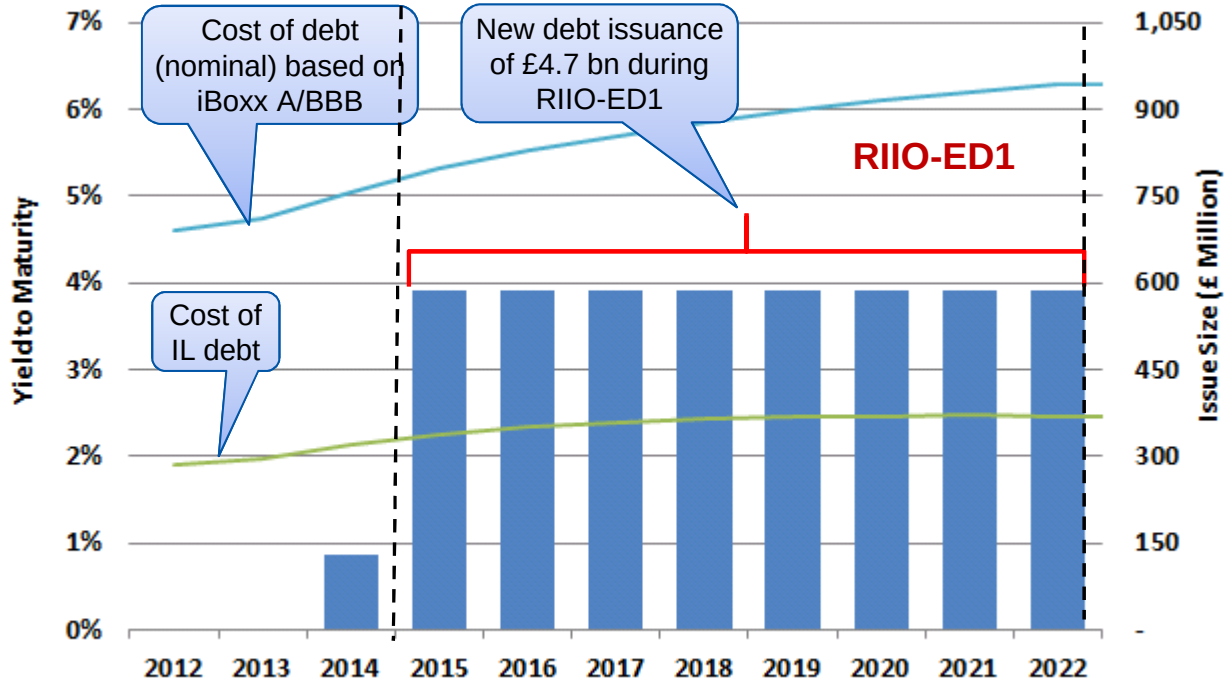
Entity	IL/Nom	Issue Date	Tenor	Amount	2015-2019 Coupon	2020-23 Coupon
Wales	Nom	1995	25	150	9.250%	matured
SW	Nom	2003	24	250	5.875%	5.875%
Wales	Nom	2006	31	225	4.804%	4.804%
Mid	Nom	2010	14	250	6.000%	6.000%
SW	Nom	2010	30	200	5.750%	5.750%
Wales	Nom	2010	30	200	5.750%	5.750%
Mid	Nom	2011	21	800	5.750%	5.750%
Weighted Average (nominal)					5.946%	5.688%
RPI forecast					3.33%	3.33%
Weighted Average (real from nominal)					2.54%	2.29%
SW	IL	2006	47	126	1.541%	1.541%
SW	IL	2006	50	144	1.541%	1.541%
Weighted Average (real)					**2.42%**	**2.20%**

For new debt we assume £4.7 bn raised in equal installments over RIIO-ED1

WPD's Actual Cost of Debt

- WPD's actual debt costs (£million) is determined by WPD's existing debt portfolio and the rates ('spot-rates') at the time of new debt issues (refin & new capex)

Forecast: WPD's New Issuance & CoD for New Issues



Commentary

- Base Case: All new debt fixed nominal coupon bonds
- WPD's new debt issues are priced equal to forecast yields of iBoxx £-index
  - Average of A and BBB
  - Non-financials (10Y+)
- Breakeven inflation based on Bank of England forecast

WPD's Actual Cost of Debt

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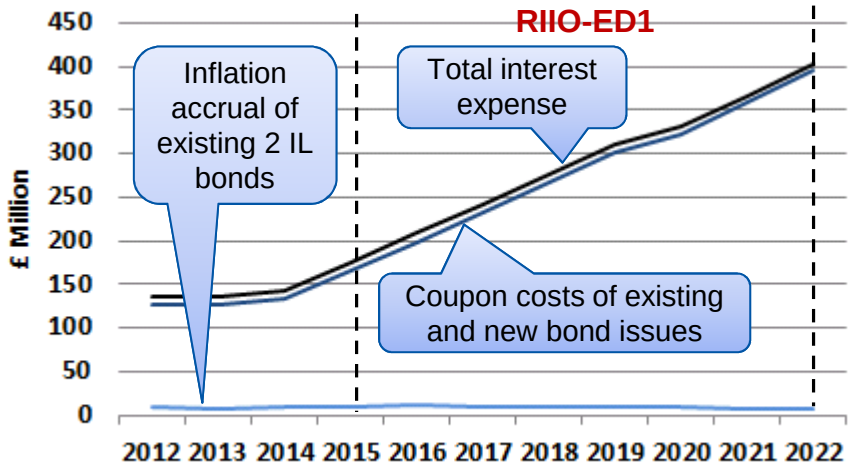
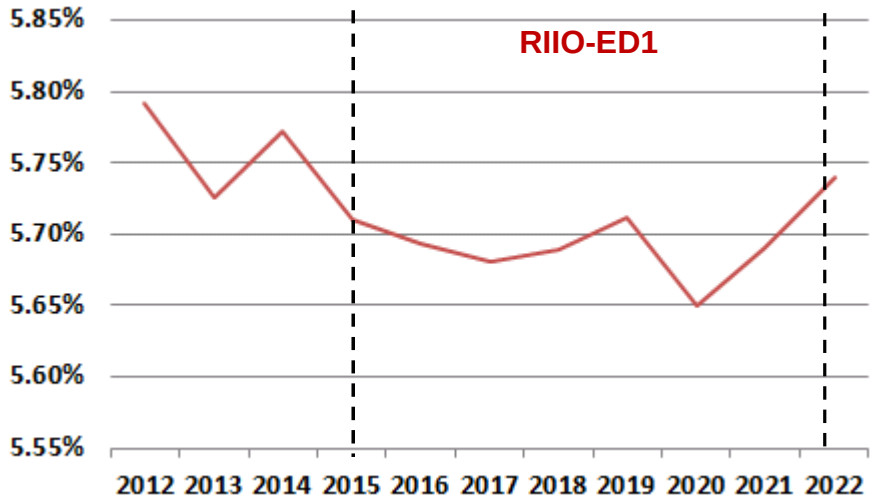
Forecast: WPD's Nominal Cost of Debt (£ million)



Commentary

- WPD has 2 IL bonds in issue (see slide 22)
- Interest cost of index-linked bonds is calculated based on accrual inflation accounting (i.e. interest accretion in each period is included in interest expense)
- Interest cost (in £ million) increases as the total amount of debt increases

Forecast: WPD's Average (Nominal) Cost of Debt (%)



Commentary

- The average cost of debt (in % of the total debt) decreases slightly during the first 5 years of RIIO-ED1 (2015 to 2020) as new debt issuances of £518 million p.a. are financed at a lower cost
- Post-2020, the average cost of debt increases as new debt is issued at raising nominal coupon costs

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WPD's Actual vs. Allowed Cost of Debt

In the short-term we forecast CoD out-recovery followed by under-recovery

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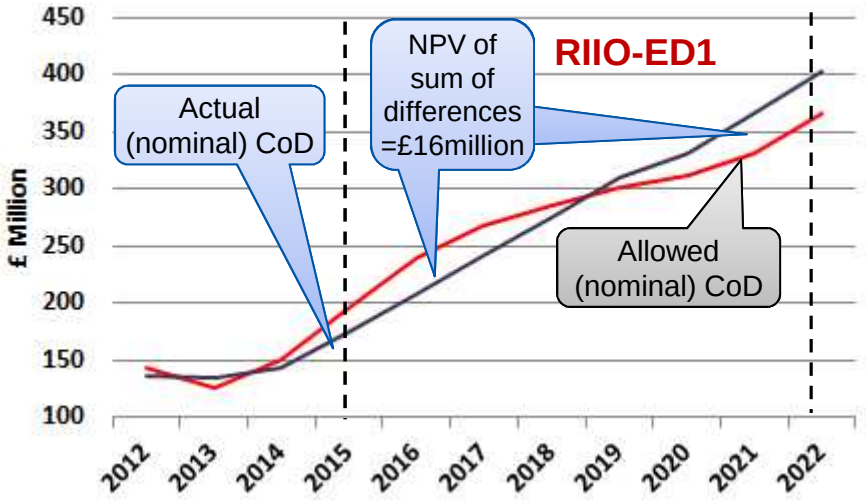
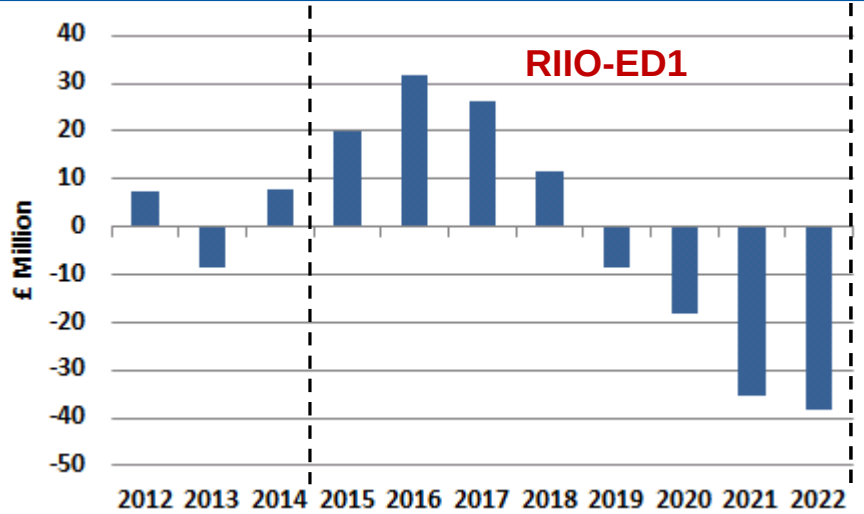
Allowed versus Actual Nominal CoD (£ million)



Difference Allowed and Actual Nominal CoD (£Mn)



Commentary

- In the central case our analysis shows
  - Out-recovery: 2015 to 2018
  - Under-recovery: post-2018
- Over the RIIO-ED1 period (04/15-03/23), we calculate *out-recovery* of £16 million in NPV-terms

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