REVIEWING TARGET BENEFIT PENSION PLANS

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Outline

1. What is a Target Benefit Plan?
2. Some Pension Benefit experiments
   i. The demographics and assumptions
   ii. Description of Benefit designs
   iii. Results
3. Future Work

What is a Target Benefit Plan?

A TB pension plan has fixed contributions, a target defined benefit formula and a benefits/funding policy that prescribes the methods for varying benefits based on affordability, with pre-set reserve levels and a pre-determined order of benefit adjustments.

UBC Pension Administration Office Publication

‘Under TBPs, benefit levels are “targeted” rather than “defined” or “guaranteed.”’
‘Employer contributions and employer liability are capped’
‘Members and retirees bear the cost of any funding shortfalls in the form of increased contributions or reduced pension benefits, but would also be entitled to any funding surpluses that may arise’

Excerpts from Canadian Federal Govt Consultation paper

What is a Target Benefit Plan?

For the plan sponsor, these will have the characteristics of a DC plan. Once the Defined Contribution is made, the responsibility of the plan sponsor ends.

For the worker/participant, actuarial projections will inform them of an "expected" target benefit. These projections will use mildly conservative assumptions and any positive variance from these assumptions will be used to adjust benefits upward both pre and post retirement. Prior to retirement, this will mean the plans will move toward a final average equivalent …. Post retirement, this will mean some level of indexation of benefits. However, neither is guaranteed.

Rob Brown on JGTBPP "Retirement 20/20 Innovation in Pension Design"

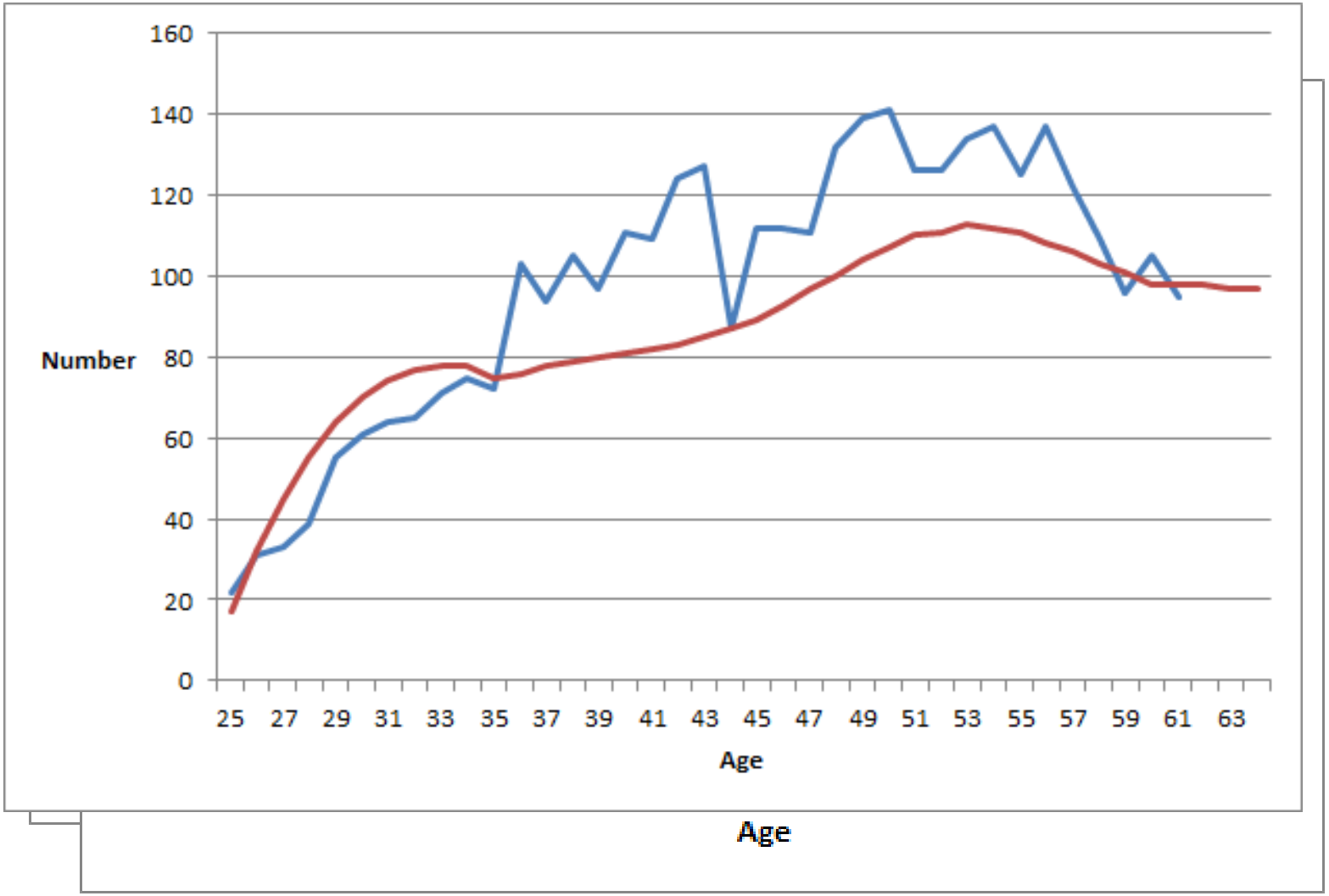
What is a Target Benefit Plan?

- Contributions are fixed (UBC, Aon Hewitt, RLB)
  - Or not fixed but capped (New Brunswick (NB) Shared Risk model)
  - Or employer fixed, employee variable (Canadian government proposal)
- Benefits are adjustable depending on affordability
  - How?
- Surplus is applied to increase benefits (Canadian Govt, RLB)
  - Or perhaps not.(New Brunswick)

Some Target Benefit Experiments

- Assume we have a DB pension plan with 4 options:
  - Remain DB
  - Convert to TB – Type 1
    - Flexible DB
  - Convert to TB – Type 2
    - Collective DC
  - Convert to DC
- We run the plan through 1000 simulations of economic variables to assess risks and benefits.

In Force Demographics



Simulation assumptions etc

- No demographic/ longevity risk
- Open group projections
- Wilkie ESG, fitted to US data, annual frequency
  - Equity returns: $\mu \approx 0.08$, $\sigma = 0.18$
  - long bond rates: $\mu \approx 0.06$, $\sigma = 0.025$
  - Inflation: $\mu \approx 0.03$, $\sigma = 0.025$
  - Salary growth = inflation
- Investments: 50% equity, 50% long bonds

Model DB Pension Plan

- DB Final 1-year Average plan; accrual rate 0.015
- Pre-retirement exits:
  - Lump sum = EPV Deferred Pension
- All lives retire at age 65 with whole life annuity
- Average service at retirement: 24.3 years
  - Replacement rate at retirement: 36.4 %
- Normal Contribution Rate: ~ 18.9%

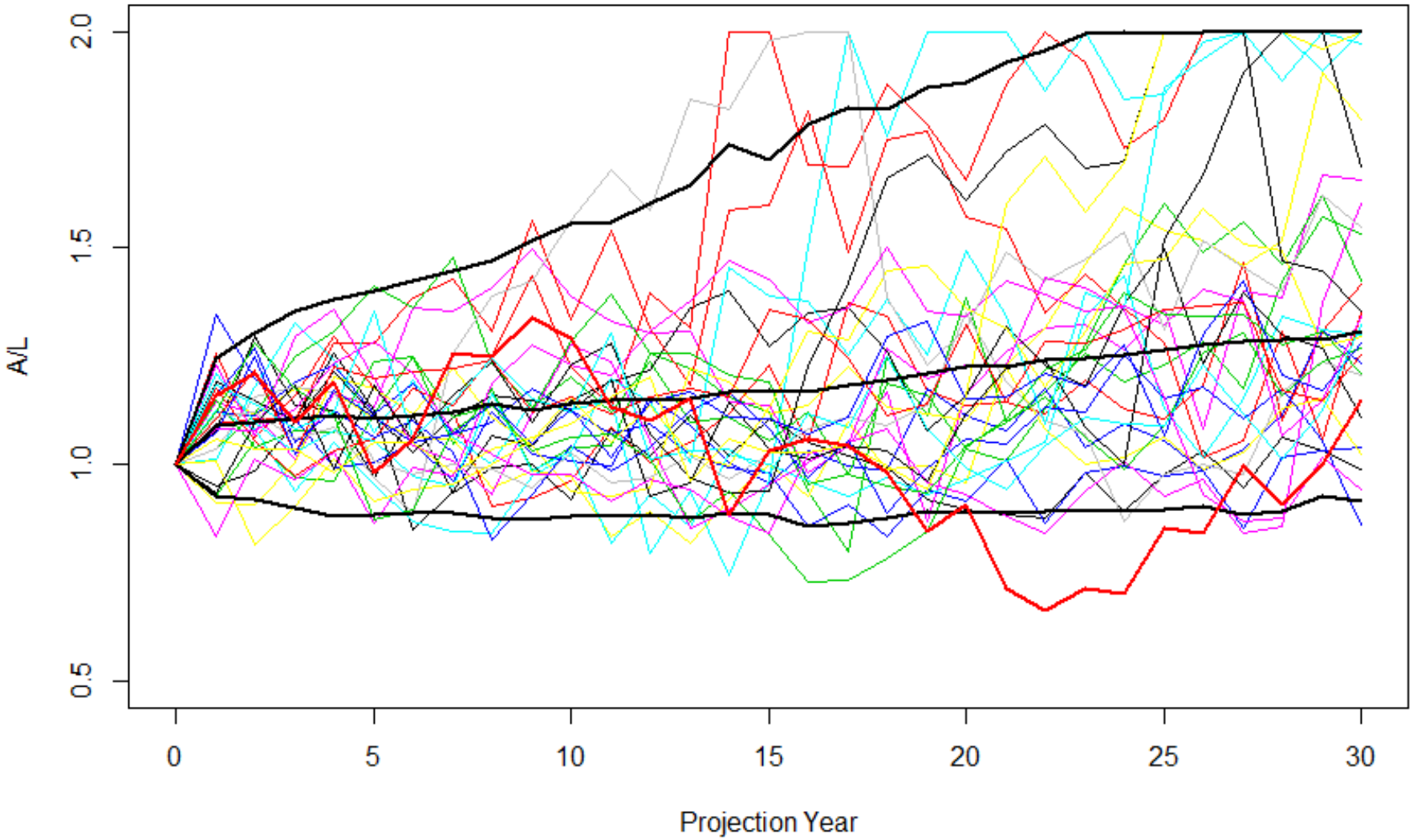
DB Valuation method/assumptions

- Traditional Unit Credit Valuation
- Valuation rate of interest, *i* :
  - long term bond yield +100bp
- Valuation salary increase assumption:
  - *i*-0.015, min 2%
- Valuation indexation assumption
  - i-0.035, min 1%, max 3%
- Ignore exits in valuation

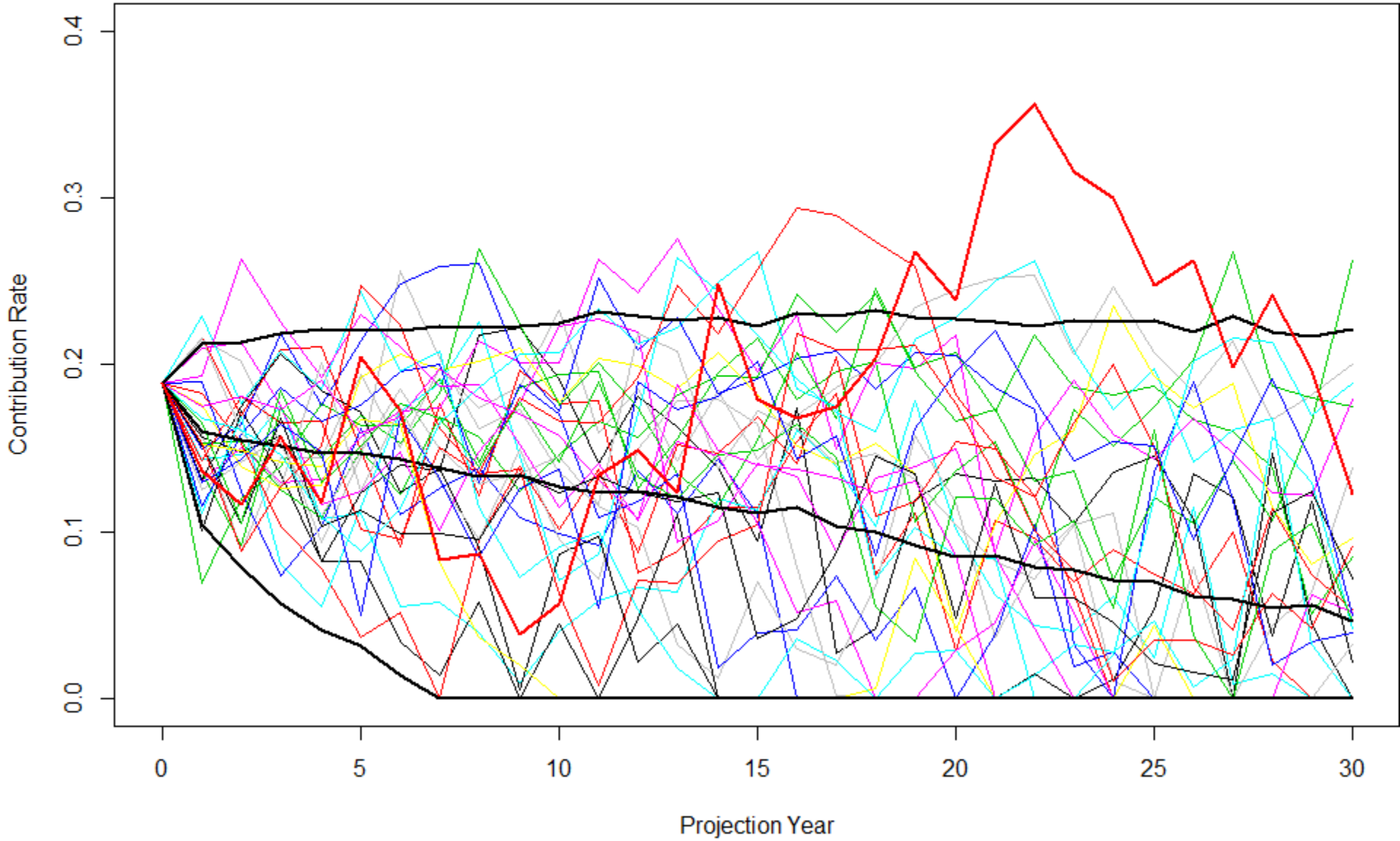
DB assumptions etc

- Fund is 100% funded (TUC basis) at t=0
- Surplus/Deficit spread over 5-years (no interest)
- Minimum total contribution: 0% -- but...
  - A/L >200% $\Rightarrow$ excess returned to sponsor (or tax)

DB A/L: 5%, 50% and 95% Quantiles



DB Contributions: 5%, 50% and 95% Quantiles



DB - Summary

- Replacement rate 36.45% for 24.3 year service is guaranteed
- Potential spikes in contributions
  - Prob [contribution rate >24%] ~ 0.04 per year
- Potential contribution holidays
  - For t >10, prob of 0% contribution ~ 0.2 $\rightarrow$ 0.35
- Potential for periods of low A/L, high contributions
- Large swings in contribution rates
  - 700bp increase with ~ 5% probability

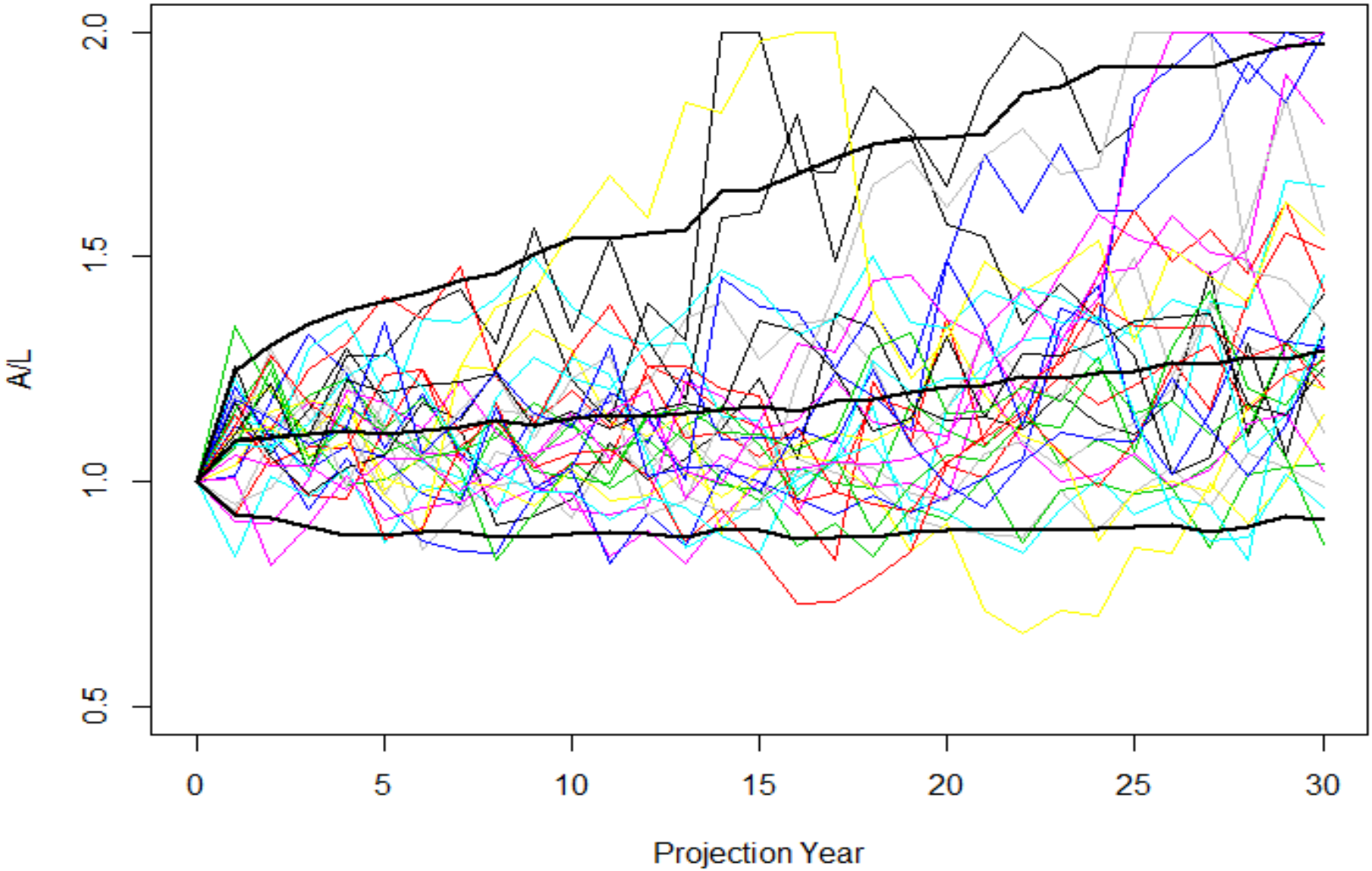
Option 2: Flexible DB

- Target benefit (actives) – as DB
- Base benefit (actives) – as DB but no (future) COLA
- Target Benefits (in Payment)
  - Base at retirement + all plan COLA
- Base Benefits (in Payment)
  - max(Base at retirement, previous years benefit)
- Maximum contribution rate: 21.5%
- Minimum contribution rate: 7%
- Additional Contribution Rate: 1.5%

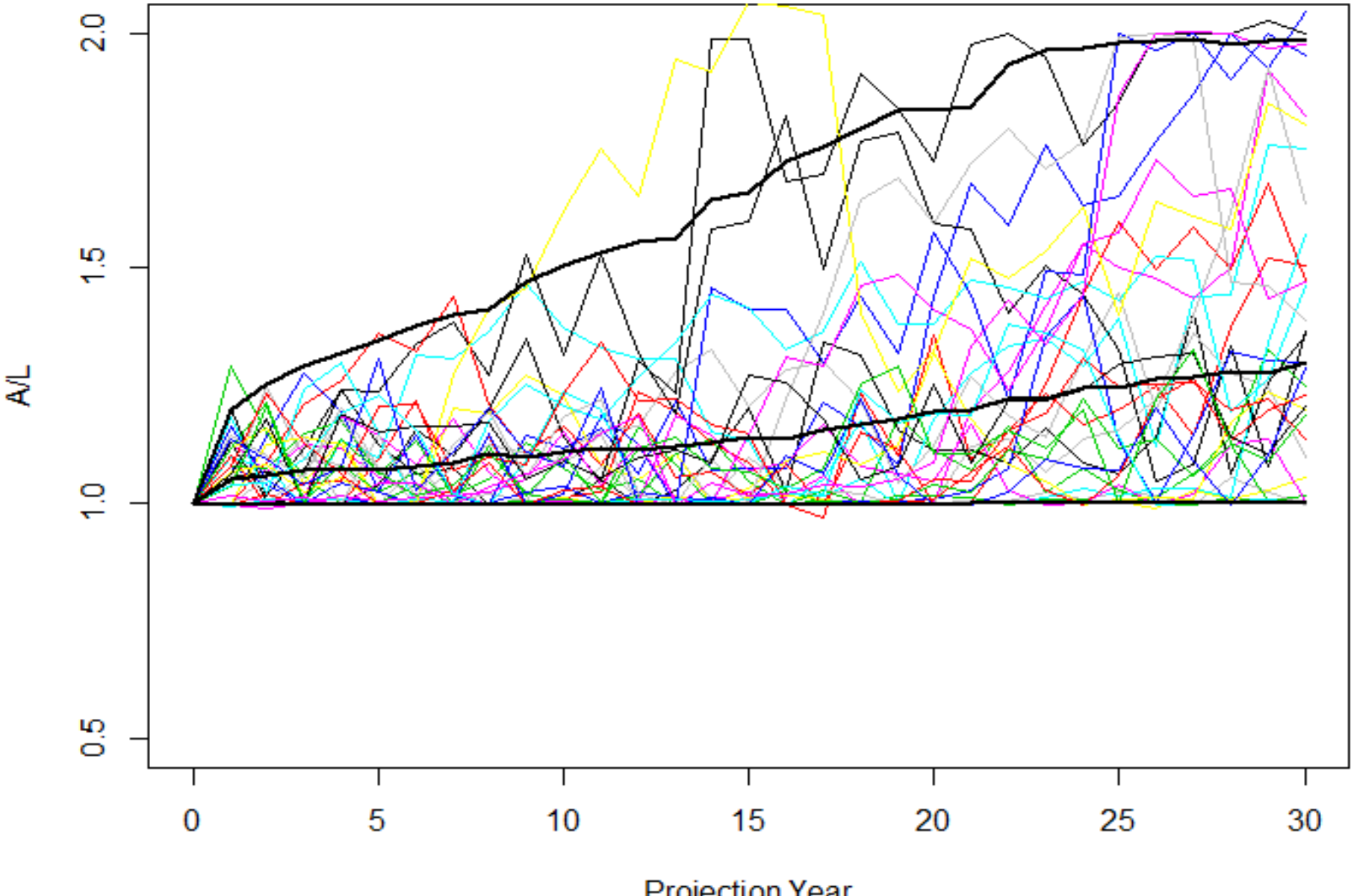
Flexible DB Benefit Adjustments

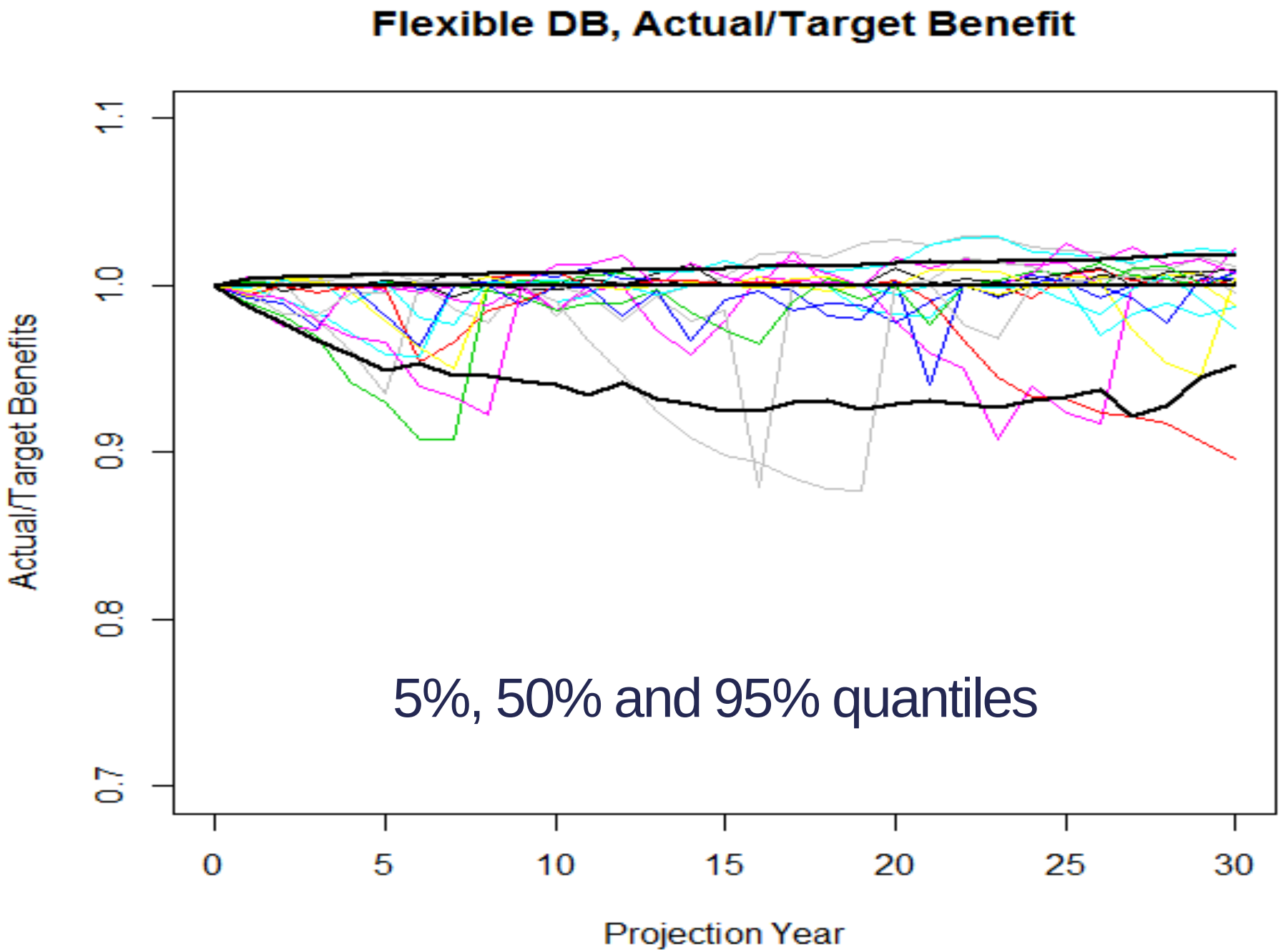
- $A/L^T > 1.0$
  - Use excess to increase COLA up to inflation
  - Surplus returned if $A/L^T > 2.0$
- $A/L^T < 1.0$ and $A/L^B > 0.97$
  - Reduce COLA payments and valuation rates
  - No reduction in Base Benefits
- $A/L^B < 0.97$
  - Reduce all accrued benefits by reduction factor A/L^B

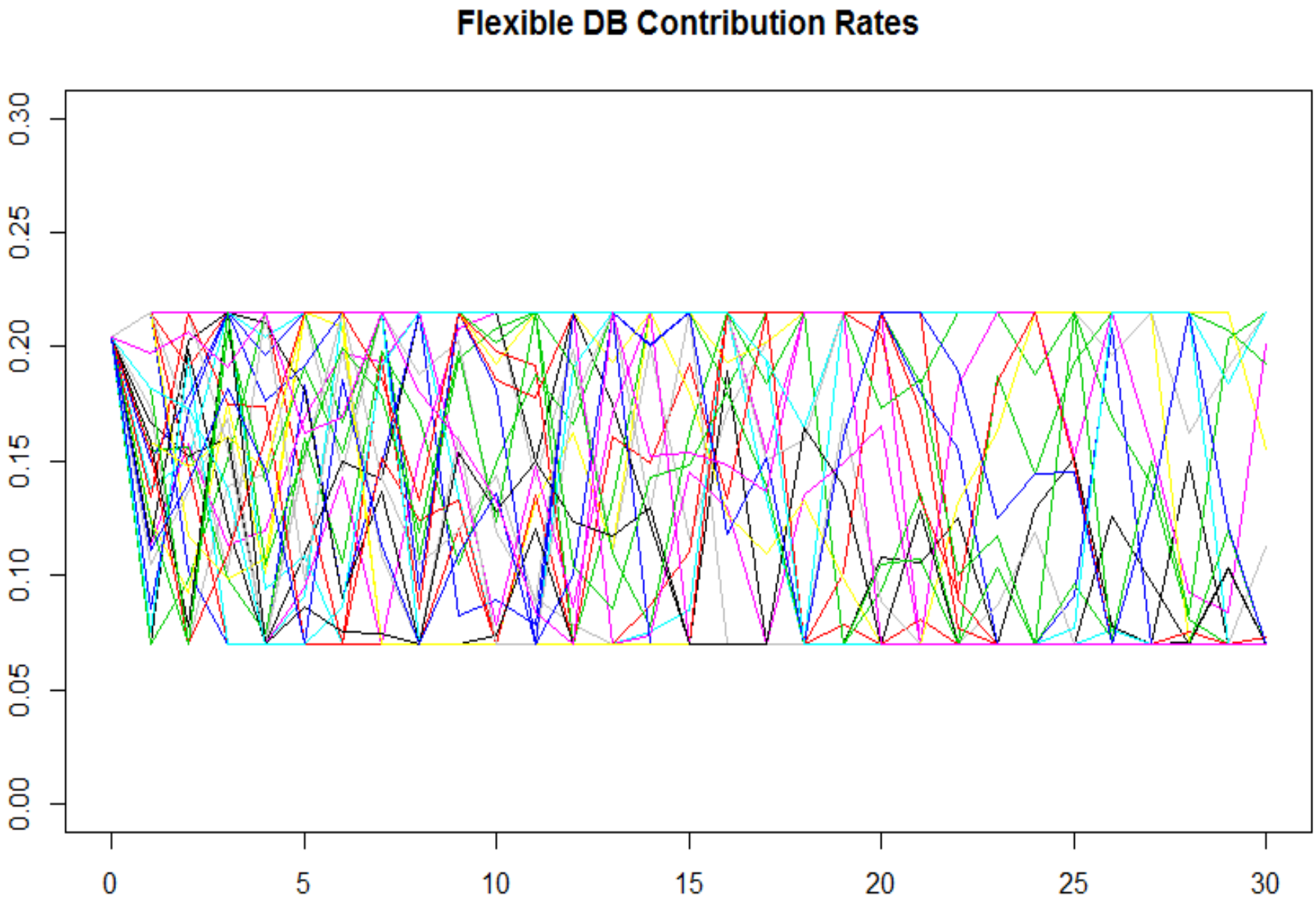
Flexible DB A/Target L : 5%, 50% and 95% quantiles

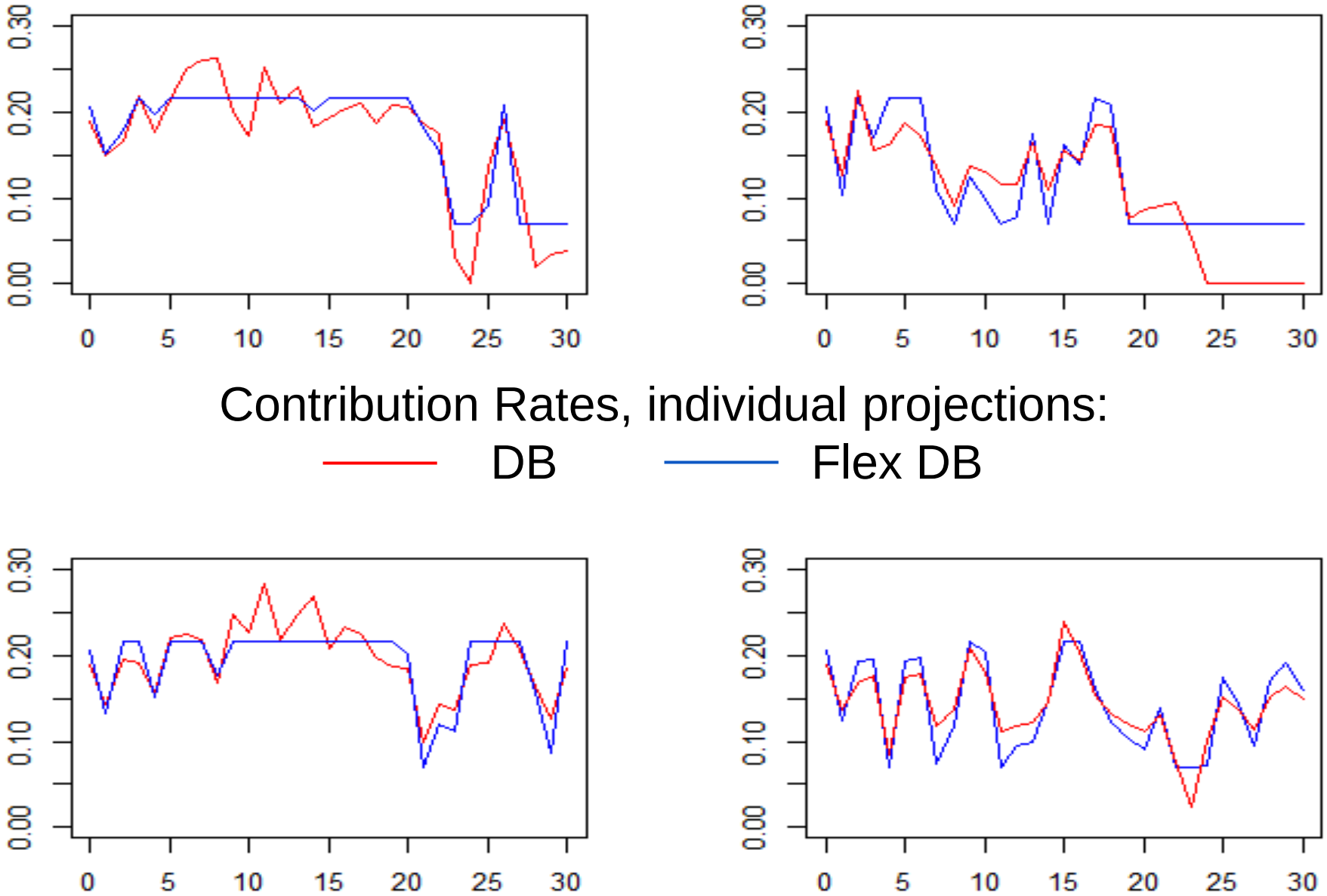


Flex DB A/Adjusted L : 5%, 50% and 95% quantiles



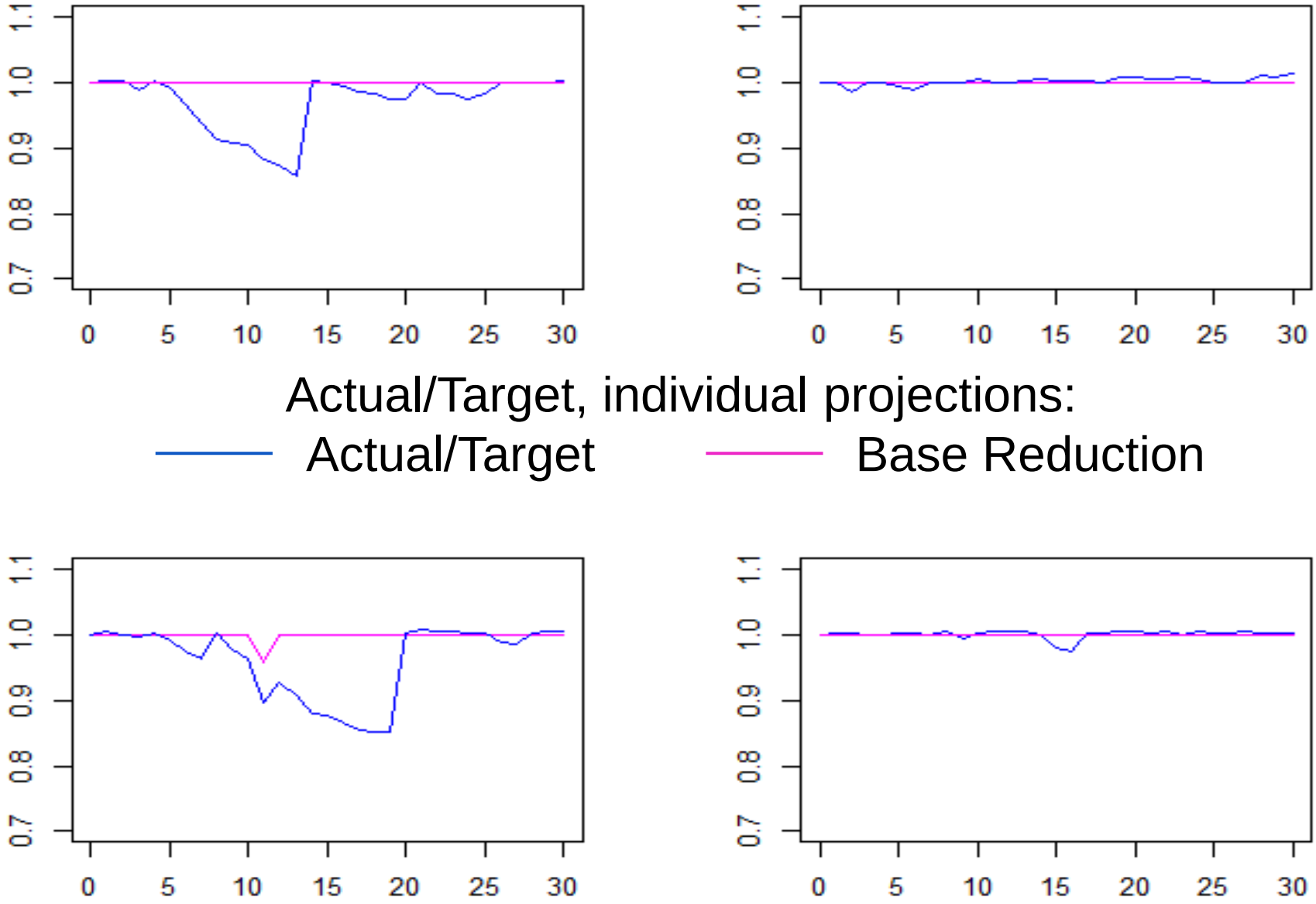

Flexible DB, Actual/Target Benefit
Actual/Target Benefits
1.1
1.0
0.9
0.8
0.7
0
5
10
15
20
25
30
Projection Year
5%, 50% and 95% quantiles


Flexible DB Contribution Rates
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0
5
10
15
20
25
30



Contribution Rates, individual projections:

DB Flex DB



Actual/Target, individual projections:

Actual/Target Base Reduction

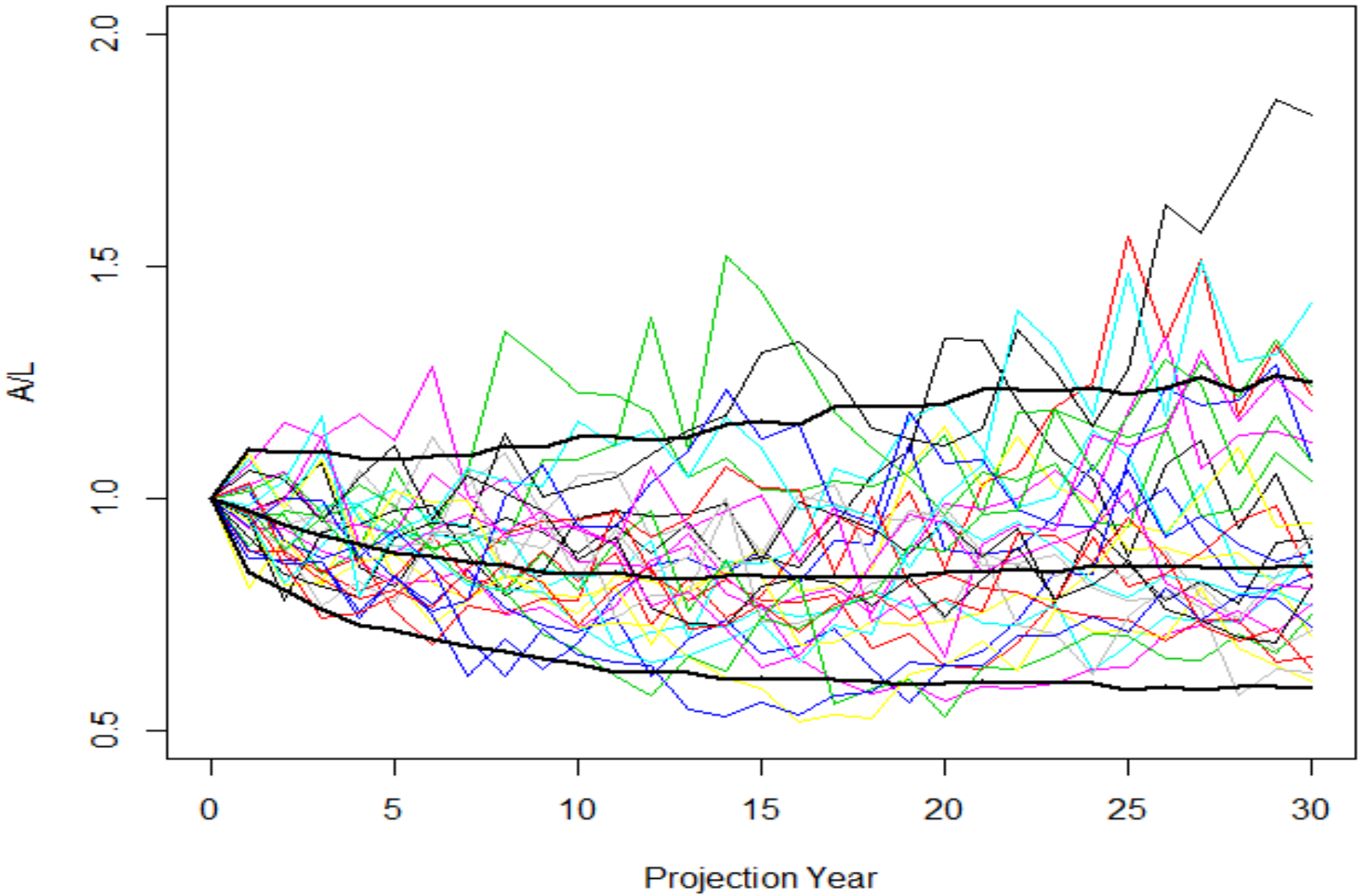
Flex-DB Summary

- A/L is constructed to be $\geq$ 1.0 (approx)
- Total Contributions are bounded
- Benefits are variable:
  - Probability of no base benefit reduction in a 30-year projection: ~ 80%
  - Probability of single year reduction: ~ 10%
- Probability of full COLA in a single year ~ 80%
- Retirees bear the main impact of benefit reductions.
- But usually reductions are small and transitory.

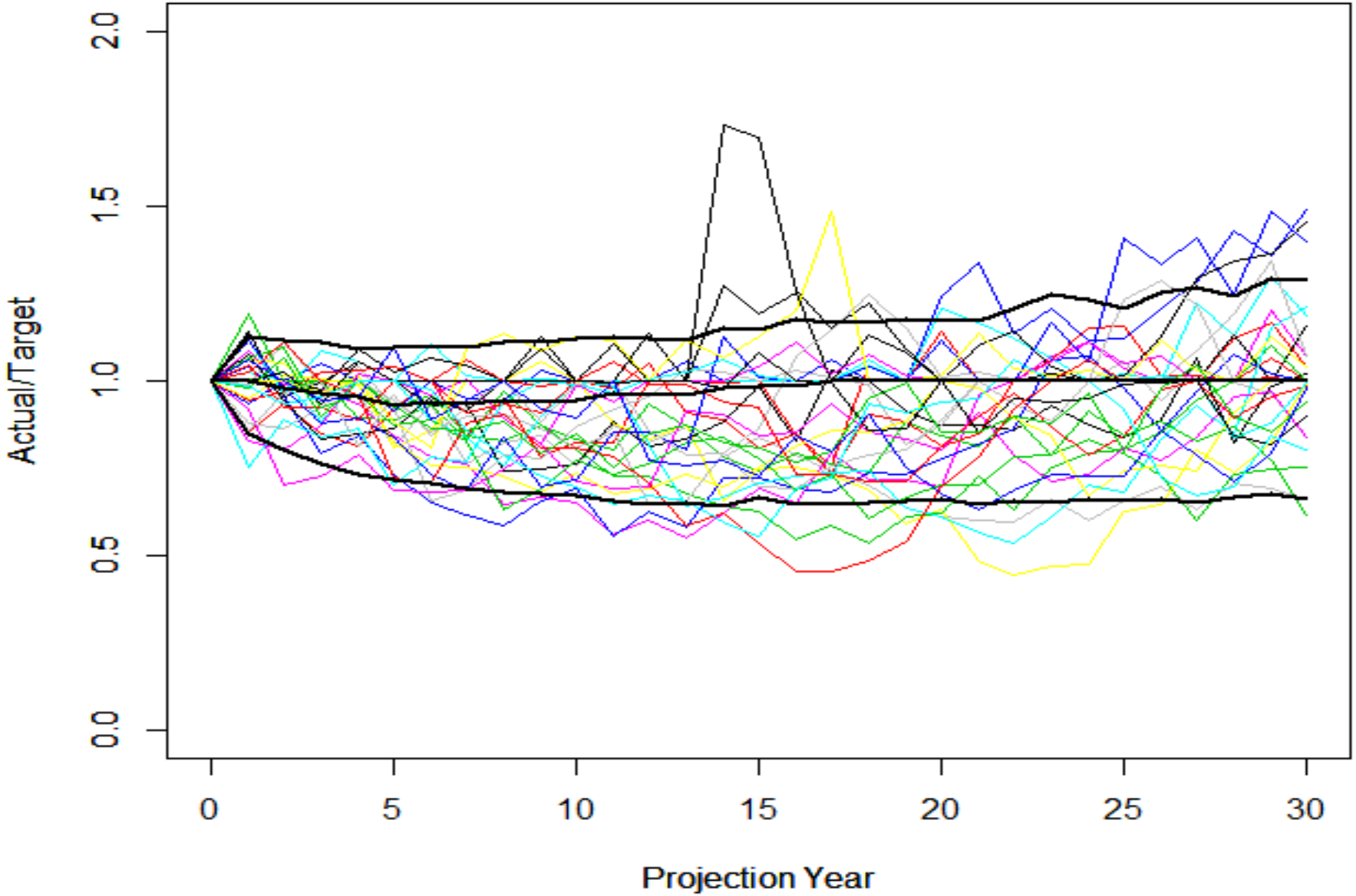
TB -- Collective DC Model

- Assume starting employee fund
  - F_x = value of DB benefit V_x
- Fixed 14% contribution rate to employee funds
  - + 2% to *Equalization Reserve (ER)*
- Subsequently:
  - If $F_x > V_x$ then 20% of excess paid to ER
  - If $F_x < V_x$ then shortfall is made up from ER (afap)
  - No payment to ER if ER is large (> 50% $\sum V_x$)
- All benefits paid as lump sum
- Target is static

Collective DC A/L



Collective DC Paid/Target Lump Sum at age 65

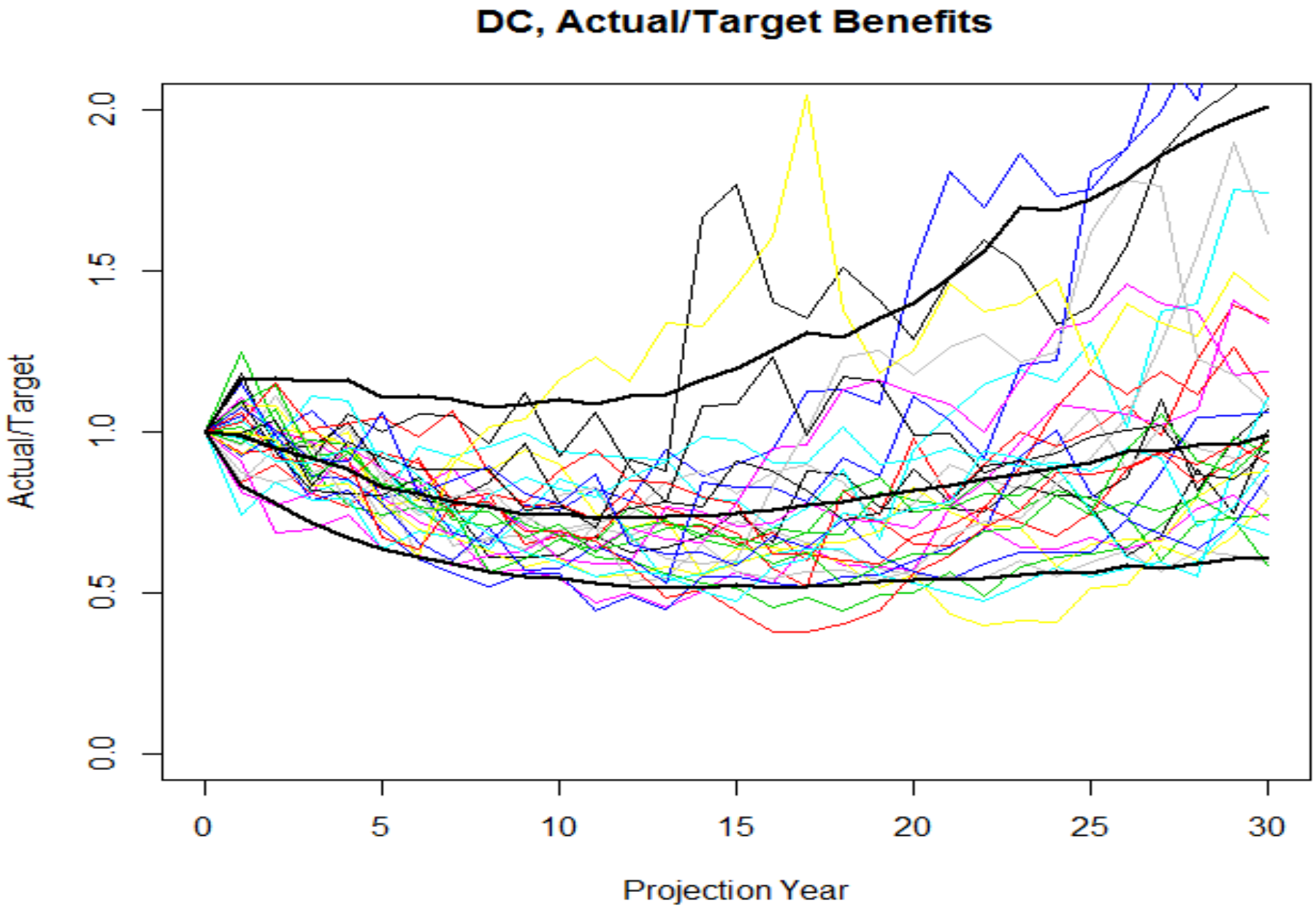


Collective DC summary

- Fixed Contribution Rate – 16%
- Median Benefit/Target benefit is close to 50%
- Risk of very low benefit
  - Lump sum payout means low benefit has longer effect than for Flex DB plan
- Opportunity for very high benefit
- Compare with Flex DB and pure DC?

DC Model

- Assume starting employee fund
  - F_x = value of DB benefit V_x
- Fixed 16% contribution rate to employee funds
- All benefits paid as lump sum
- Target is DB benefit


DC, Actual/Target Benefits
Actual/Target
0.0
0.5
1.0
1.5
2.0
0
5
10
15
20
25
30
Projection Year

DC Summary

- Contributions are fixed at 16%
- A/L is 1.0 by design
- But benefit amount is highly variable.

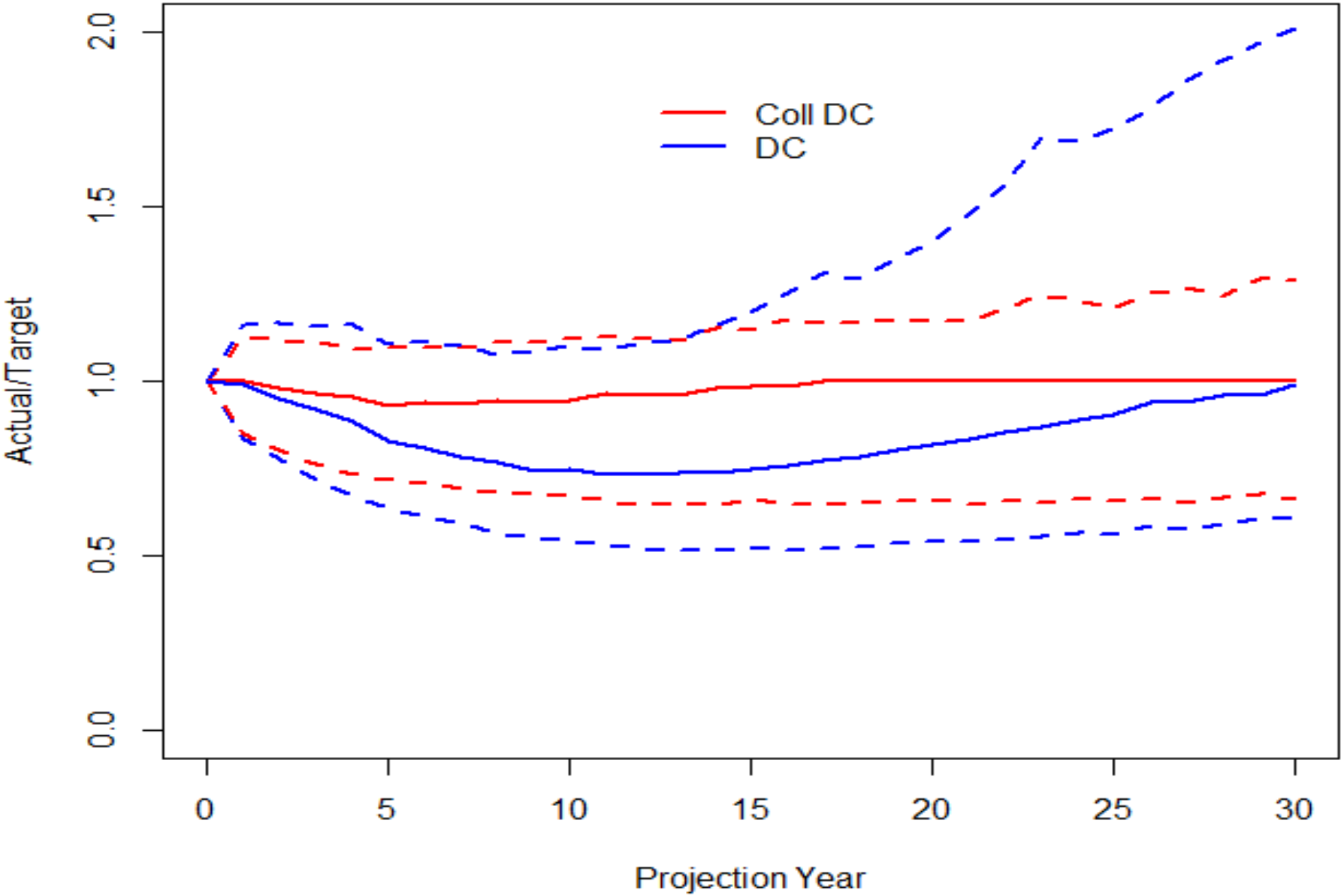
Comparisons: Contributions

- DB highly variable
  - Mean trending to ~ 8%
- Flex-DB volatile but constrained
  - Mean trending to ~ 10%
- Collective DC
  - Fixed at 16%
    - 14% to individual funds, 2% to equalisation reserve
- DC
  - Fixed at 16%

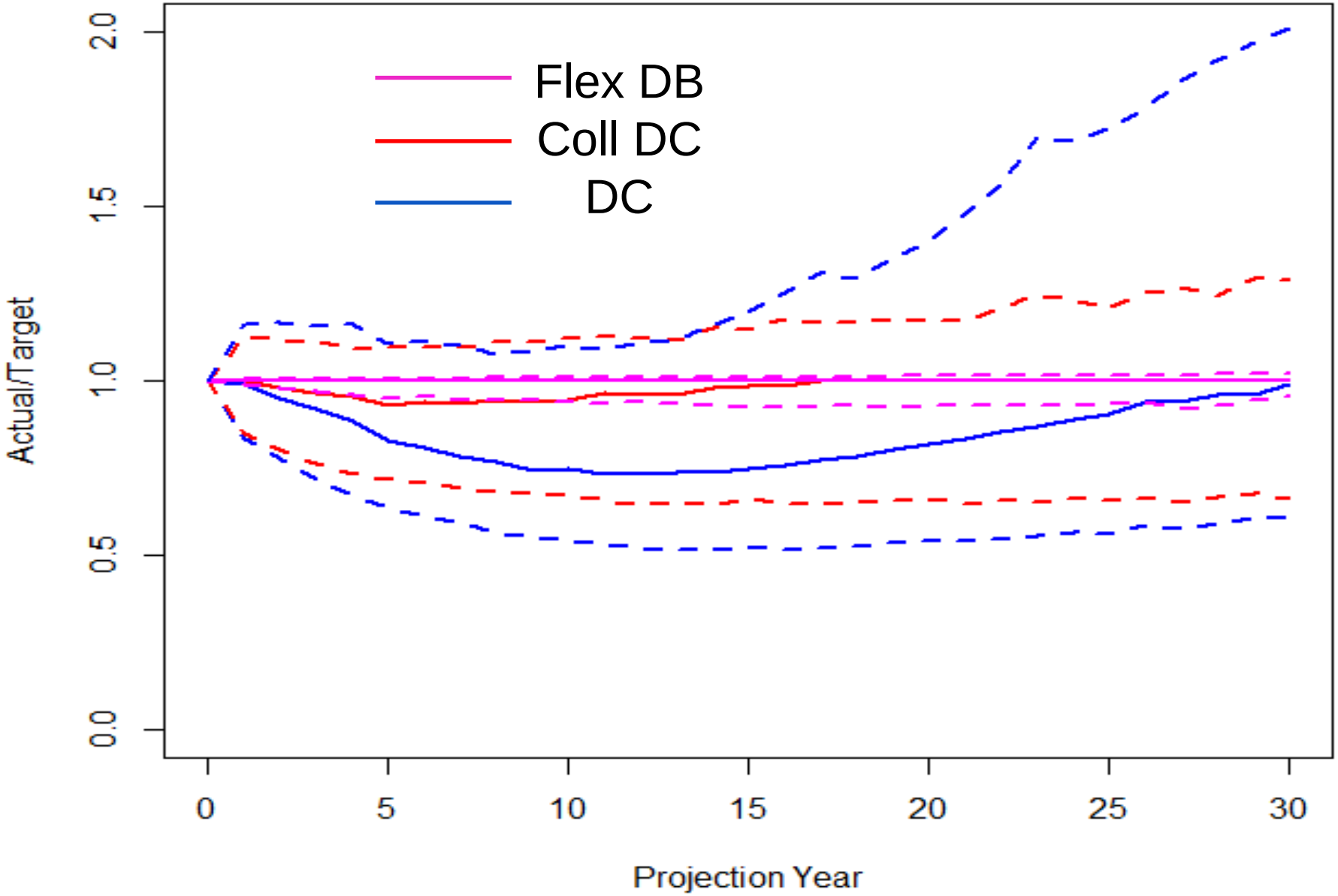
Paid/Target benefit at 10-years

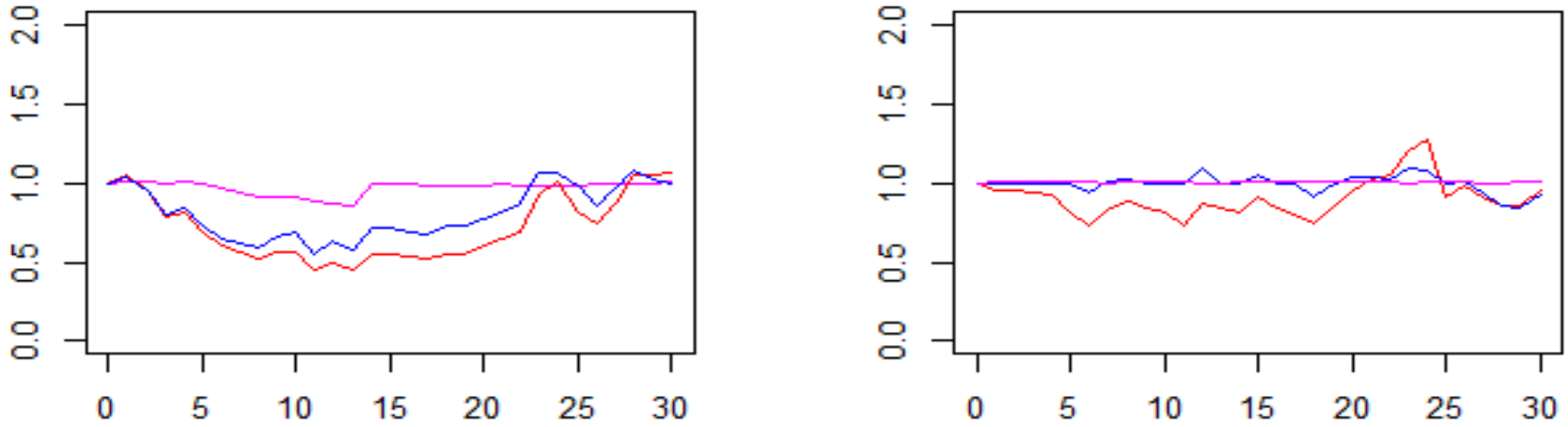
- DB
  - Paid : Target =1
- Flex-DB
  - Median ~1.0, 25% quantile ~ 1.0, 5% quantile ~ 0.94
- Collective DC
  - Median ~ 0.95, 25% quantile ~ 0.8, 5% quantile ~ 0.67
- DC
  - Median ~ 0.75, 25% quantile ~ 0.65, 5% quantile ~0.55
- Note: Flex DB may recover, DC will not...

Actual/Target 5%, 50% 95% quantiles



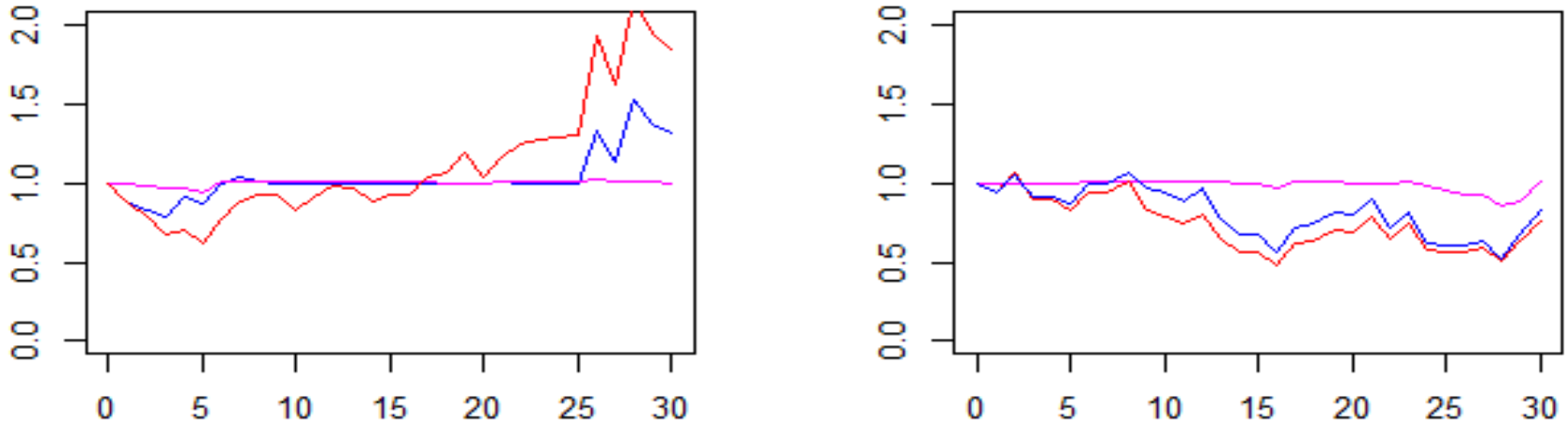
Actual/Target 5%, 50% 95% quantiles





Paid/Target, individual projections:

Flex DB Coll DC DC



Comments and Questions

- Collective DC improves on DC wrt low benefit risk
  - but much risk remains
  - Lump sum benefits are risk-inefficient
- Flex DB offsets downside risk
  - With additional contributions
  - And no upside potential
    - Is this a reasonable trade-off?
    - Why is upside potential important?
    - What about early leavers?
- Trend is to Collective DC

Future Work

- Refine Flexible DB and Collective DC designs
- Test sensitivity to ESG
- Consider role of early leavers
- Other Suggestions?

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