Reading: Klann.ReinsComm (Klann - 2016.Spring Q27) a-Question
Model: 2016.Spring #27
Problem Type: mutually beneficial commutation price

Given

gross paid loss	4.0	
gross reserves (case + IBNR)	5.0	
gross discounted reserves (case + IBNR)	3.5	<== *economic discount*
ceded paid loss	0.5	
ceded reserves (case + IBNR)	3.0	
ceded discounted reserves (case + IBNR)	2.0	<== *economic discount*

The following discount factors are for **tax purposes**:

	primary insurer	reinsurer	
average discount factor	0.850	0.800	<== *for statutory discounting*
tax rate	35%	20%	

The reinsurer's assumed losses equal the primary insurer's ceded losses

Calculate range of the mutually beneficial commutation price (if possible)

We need to solve these 2 inequalities for 'price' and HOPE that the solution ranges overlap.
(If the solution ranges do NOT overlap then there is no MUTUALLY beneficial commutation price)

(A)	price	-	$_pR^-_c$	+	$_pT$	>	0	<== *for primary insurer*
(B)	- price	+	$_{re}R^-_g$	+	$_{re}T$	>	0	<== *for reinsurer*

Now:

$_pR^-_c$ = 2.0 <== *use company discounted reserves (economic value)*
$_{re}R^-_g$ = 2.0 <== *use company discounted reserves (economic value)*

For the primary insurer:

$_pT$ = tax rate x (decrease in taxable income for primary insurer)
= tax rate x (reserves commuted - price)
= 35% x (2.550 - price)

where: reserves commuted
= undiscounted ceded reserves x discount factor <== *tax discounting*
= 3.0 x 0.850
= 2.550

Using these values to solve inequality **(A)** gives: price > 1.704 <== for *insurer's benefit*

And a similar calculation for the reinsurer is as follows:

$_{re}T$ = tax rate x (decrease in taxable income for primary insurer)
= tax rate x (-reserves commuted + price)
= 20% x (-2.400 + price)

where: -reserves commuted
= - undiscounted ceded reserves x discount factor <== *tax discounting*
= -3.0 x 0.800
= -2.400

Using these values to solve inequality **(B)** gives: price < 1.900 <== for re*insurer's benefit*

Final price range: (1.704 , 1.900)