



Talmud

🔗 Files	Game Theory September 2 2021.pdf
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☰ Status	Done
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Contested Garment

Basically if two people where fighting over a garment, you split the part that is contested between the two equally.

In the below image A claims full and B claims B.



This is called the **CG-principle**.

Coalitional Procedure

How to get a CG-principle consistent solution with more than 2 players?

(400 | 100, 160, 250, 300, 350)

1. In the first step we group claimants C_2, C_3, C_4 and C_5 to be one widow W_1 who claims $c_2 + c_3 + c_4 + c_5 = 160 + 250 + 300 + 350 = 1050$, while C_1 is still claiming $c_1 = 100$. When C_1 and W_1 share the estate $E = 400$ according to the CG-principle, then C_1 receives $x_1 = 50$ and W_1 gets $E_1 = 350$, because C_1 only claims 100 and W_1 claims the full estate.
2. Now we share 350 among widows C_2 , claiming $c_2 = 160$ and widow W_2 , claiming $c_3 + c_4 + c_5 = 250 + 300 + 350 = 900$. The CG-solution gives the amount $x_2 = 80$ for C_2 and 270 for W_2 .
3. The amount 270 is now to be shared among C_3 claiming $c_3 = 250$ and W_3 claiming $c_4 + c_5 = 300 + 350 = 650$. The CG-solution for this two-person problem would be to give 125 to C_3 and 145 to W_3 . This would imply that either C_4 or C_5 is getting less than C_3 , since C_4 and C_5 have to share 145. This would contradict the CG-principle. Therefore C_3, C_4 and C_5 should share the amount 270 equally, that is $x_3 = x_4 = x_5 = 90$.

At this point the procedure ends and the estate of 400 is shared among the widows as (50, 80, 90, 90, 90).

At each step, we check what is the average loss that will be incurred by the coalition, if the current claimant loses more than average, then we stop and we divide the rest of the estate equally.

Example: (200 | 100, 110, 120)

The claim is only 130 more than the estate so no one should lose more than

$130/3=43.33$ and since A will already lose 50, we split the 43.33 loss equally.

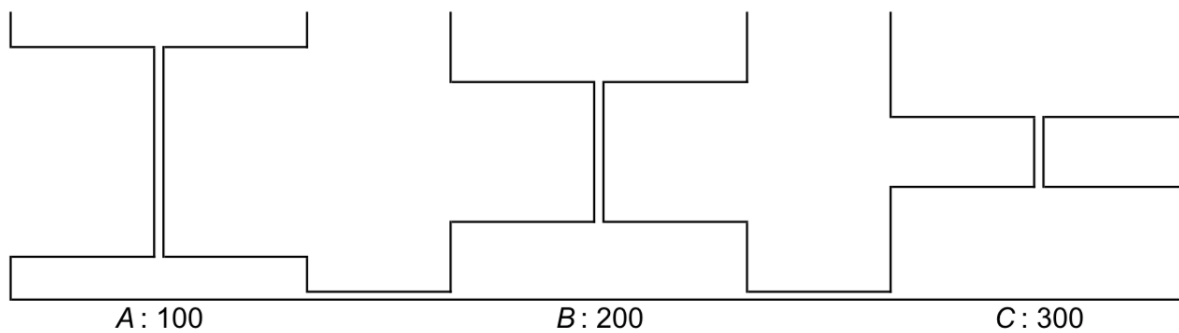
In words: small claimants get less than big claimants and small claimants lose less than big claimants.

Practice (Ex 16 & 17)

Problem 16 Use the coalitional procedure to find a solution for the five-person bankruptcy problem $(600 \mid 300, 350, 400, 450, 600)$.
Verify that the solution is CG-consistent.

Problem 17 Use the coalitional procedure to find a solution for the three-person bankruptcy problem $(550 \mid 100, 200, 300)$.
Verify that the solution is CG-consistent.

Hydraulic rationing (Visualisation)



A way to visualise CG-consistent solutions.