A Theory of Stable Market Segmentations

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joint with Ron Siegel (Penn State)

August 29, 2024

Consumers interact with a seller as a group

- Homeowners associations
- Student groups
- Employer-based prices

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Leads to “market segmentation”

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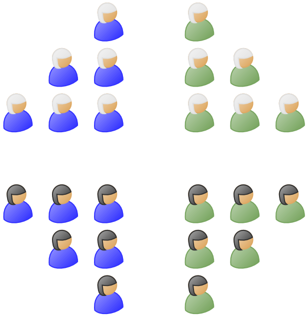

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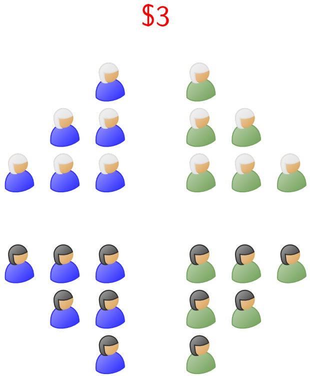

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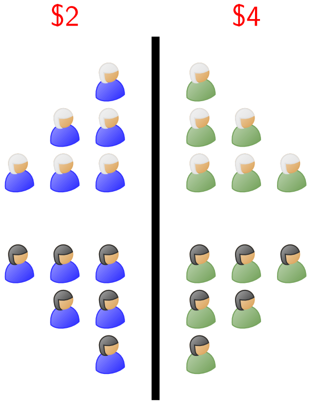

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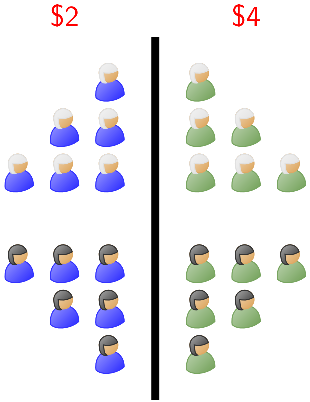
- segment = a coalition of consumers



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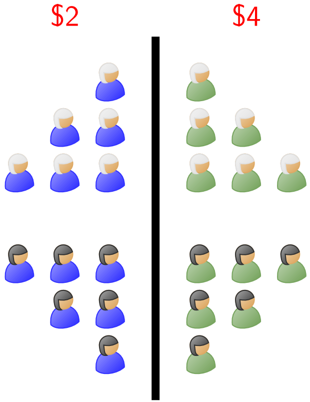

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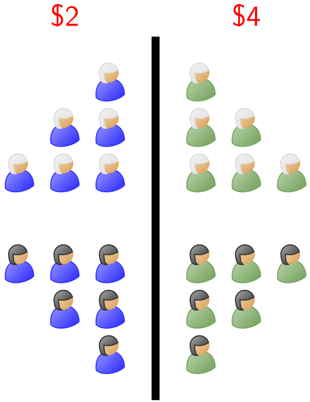
- have good welfare properties



Coalitions, segments, and segmentations

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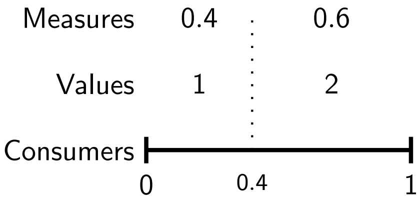

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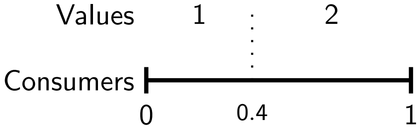

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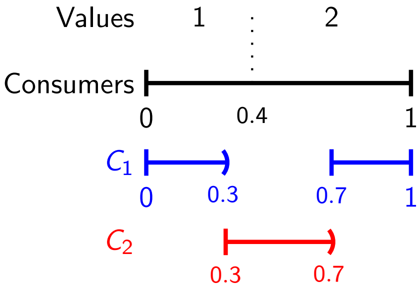

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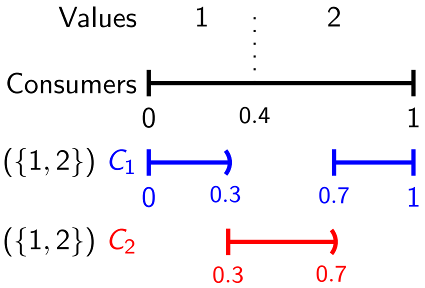

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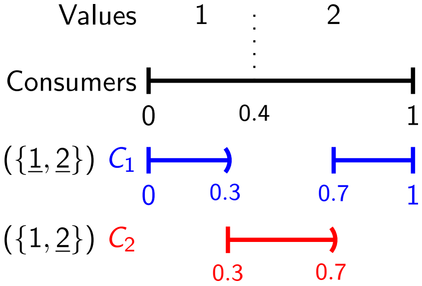

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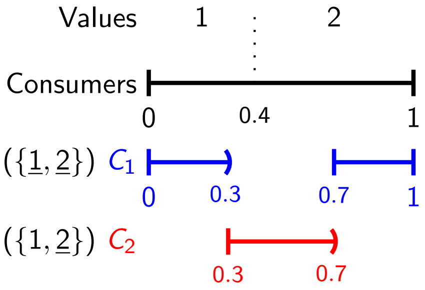

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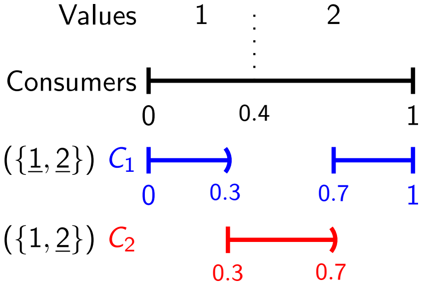
Segmentation $S = \{(C_1, 1), (C_2, 2)\}$ s.t. coalitions partition $[0, 1]$



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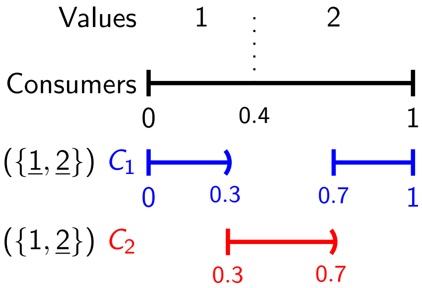
$$CS(c, S) = \begin{cases} \max\{v(c) - 1, 0\} & \text{if } c \in C_1, \\ \max\{v(c) - 2, 0\} & \text{if } c \in C_2. \end{cases}$$



Outline

1. Core
2. Stability

The core

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Definition (Objection)

A segment (C, p) objects to segmentation S if

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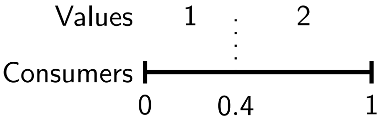
Definition (Core)

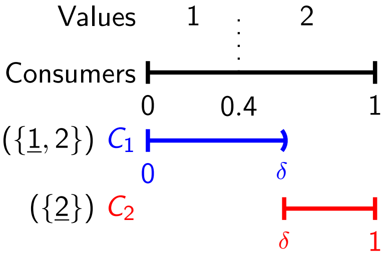
S is in the core if $\nexists$ segment (C, p) that objects to S

Two type illustration: Core may be empty



Two type illustration: Core may be empty

If $\delta < 0.8$: $S = \{(C_1, 1), (C_2, 2)\}$ not in core



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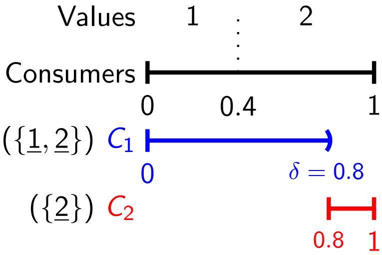

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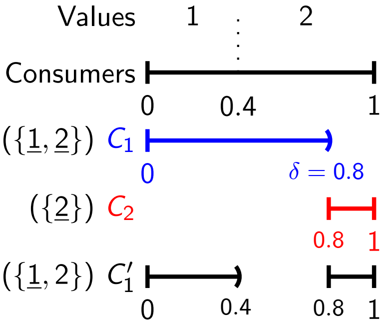
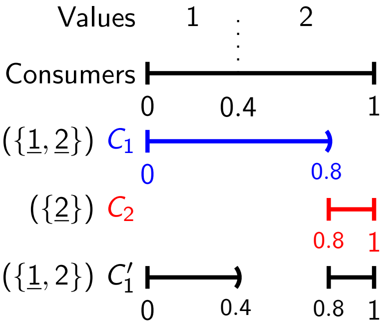
- Segment $(C_1', 1)$ objects

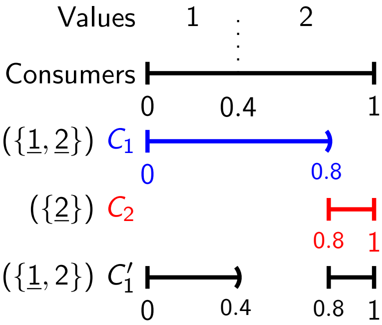




Values
1
2
Consumers
0
0.4
1
$(\{\underline{1}, \underline{2}\})$ C_1
0
0.8
$(\{\underline{2}\})$ C_2
0.8
1
$(\{\underline{1}, 2\})$ C_1'
0
0.4
0.8
1

Definition (Weakened Core)

S is in weakened core if $\nexists$ segment (C', p') that strictly objects to S:



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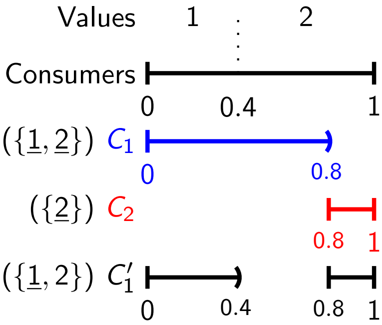

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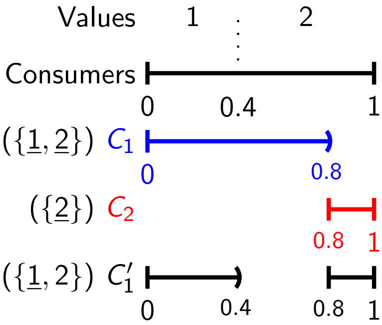
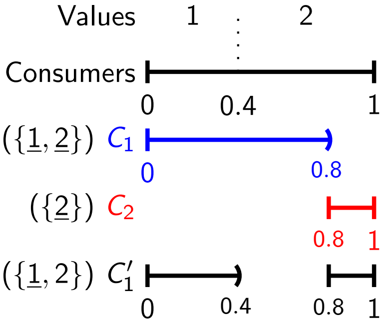
1. (C', p') objects to S
2. $\forall (C, p) \in S$ that is "broken apart" by C' ($C \cap C'$ and $C \setminus C'$ have positive measures), $\exists$ consumers in $C \cap C'$ who strictly benefit ($CS(c, p') > CS(c, S)$)

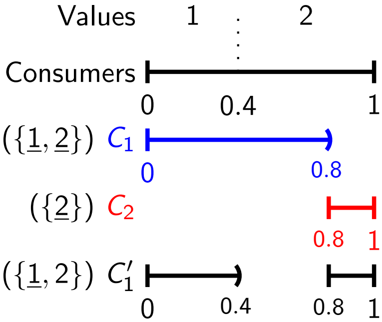


Cost-based justification



Cost-based justification

- Small fee to break up existing coalitions
- Must be paid by members who want to deviate (in $C_1 \cap C_1'$)
- If not paid, objection fails



Two type illustration and weakened core

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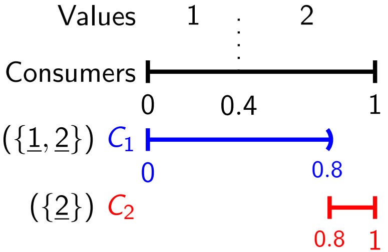

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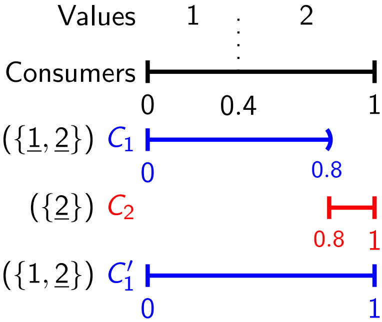
$S' = \{(C_1', 2)\}$ is not in the weakened core



Characterization

Proposition

For any segmentation S, the following are equivalent

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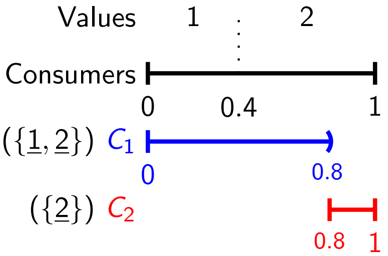

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For any segmentation S, the following are equivalent

1. *S is in the weakened core*
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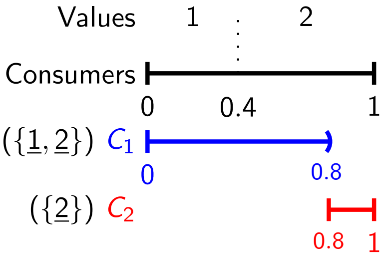

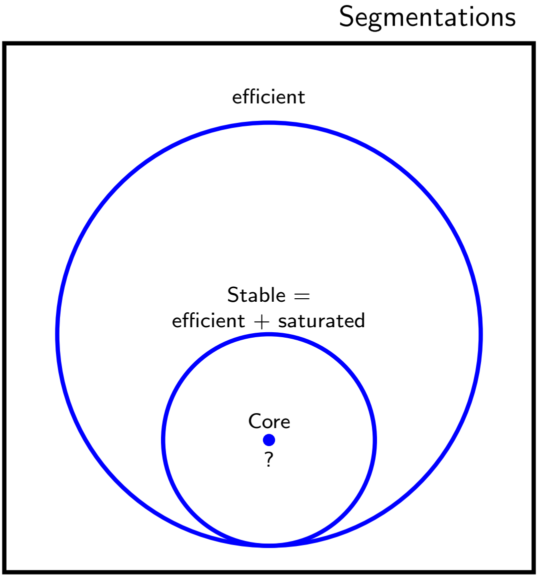
Segmentations
efficient
Stable =
efficient + saturated
Core
?

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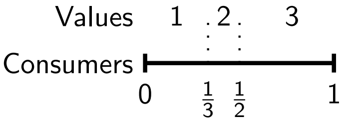

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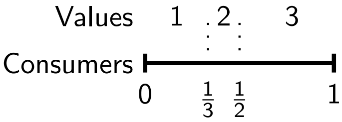

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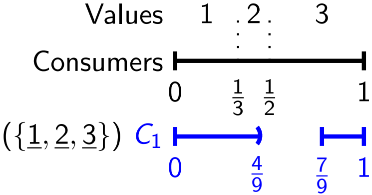

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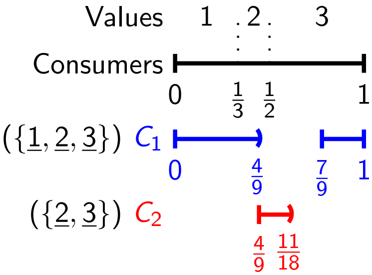

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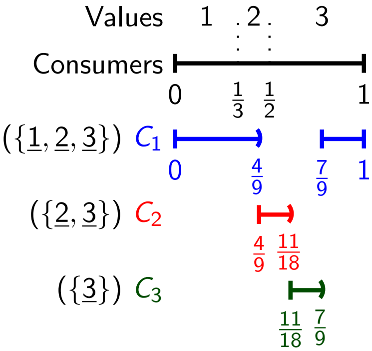

Maximal equal-revenue (MER) segmentation

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Is defined recursively. Let $\bar{C} = [0, 1]$, $S = \emptyset$

1. $C :=$ largest coalition where all prices (among remaining values in $\bar{C}$) are revenue-maximizing
2. Add $(C, \underline{v}(C))$ to S
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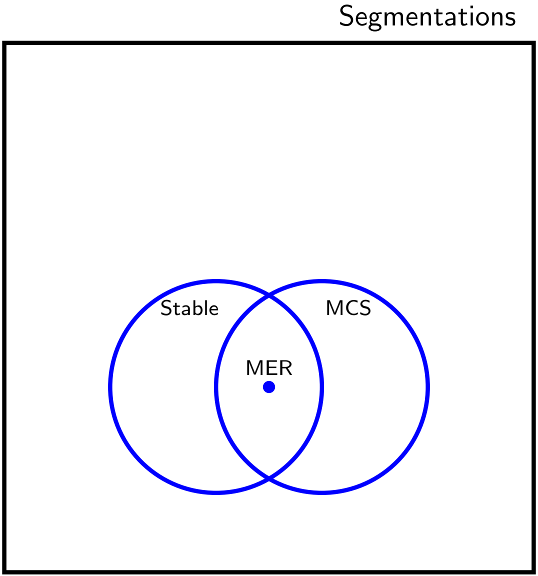
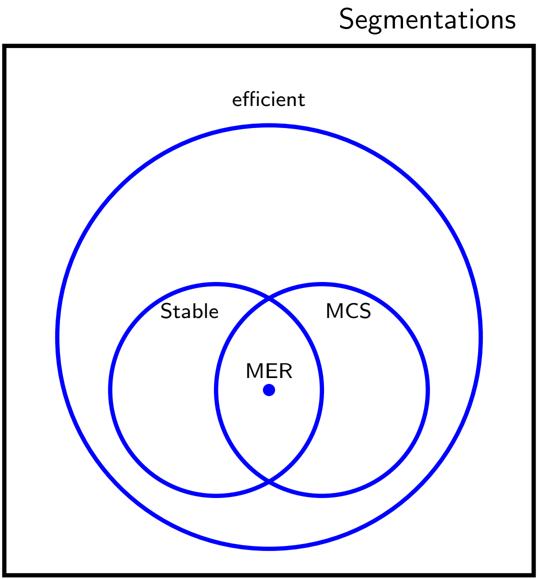
Bergemann, Brooks, Morris (2015):

- The MER segmentation maximizes consumer surplus
- But is not the only one


Segmentations
Stable
MCS
MER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efficient
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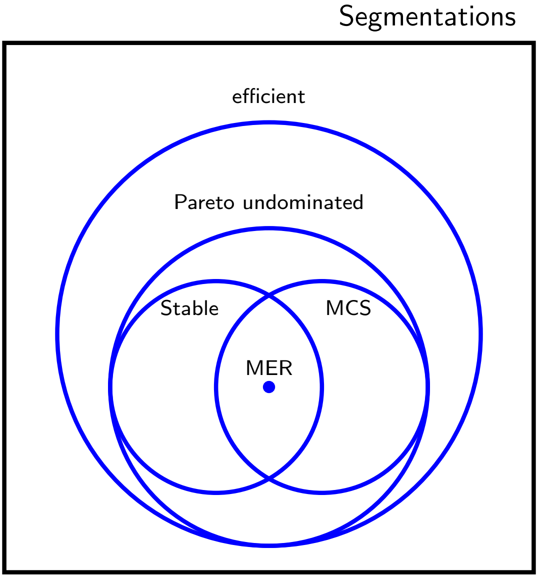
Segmentations
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Pareto undominated
Stable
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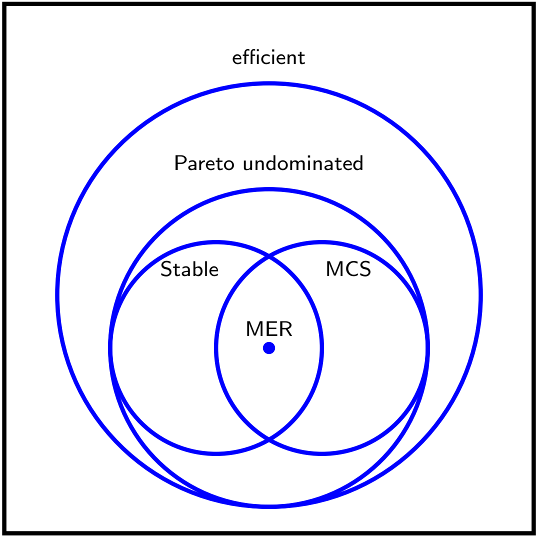
Segmentations



Thanks!

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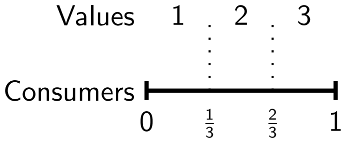
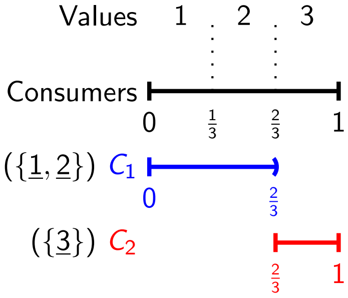


Stability $\not\Rightarrow$ maximizing consumer surplus

$S = \{(C_1, 1), (C_2, 3)\}$ is efficient and saturated $\Rightarrow$ stable



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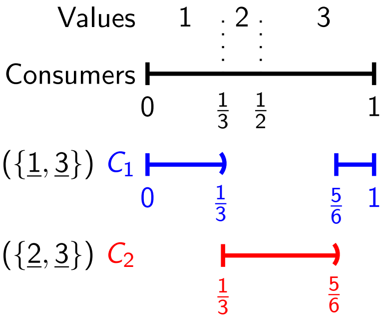

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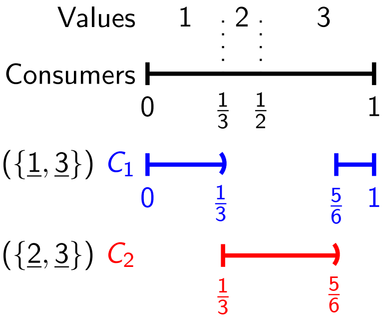
- price 3 is revenue-maximizing for $C_1, C_2, [0, 1]$



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S is not saturated and so not stable: