Persistently Inefficient? The Common-Agency Problem and Organizational Fragmentation in the US Healthcare System

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The Problem

The US healthcare system is famously inefficient. Analysts highlight the role of inefficient incentives and organizational forms.

But why have inefficient incentives and organizational forms persisted?

Our paper focuses specifically on organizational fragmentation.

Organizational Fragmentation

Inefficiencies result from care delivery spread across many, poorly coordinated, independent providers

Inefficiencies are worse when providers are working as independent owners of small practices

Inefficiencies especially severe for patients with chronic conditions who account for the bulk of healthcare expenditures

The Organizational Fragmentation Puzzle

Fragmentation is a decades-old problem, so competition ought to have forced inefficient organizational forms out of the market.

Why didn't this happen?

- Maybe fragmentation isn't so inefficient
- Maybe there are factors inhibiting the operation of market forces

Our Argument in Three Steps:

1. Moving from fragmented to integrated care delivery involves large investments by providers in new HIT and management processes

2. Physicians realize a return on these investments when payers write contracts that share cost-savings with providers

3. Payers' willingness to write such efficient incentive contracts are inhibited by "common-agency" problems

Lumpy Investments Required

Health IT: electronic medical records, clinical decision support

Managerial processes: payment methods, prospective budgets and resource planning, performance measurement systems, methods to disburse shared savings

Under common agency, lumpiness creates "sticking points" that can lead to multiple Pareto-ranked equilibria

What is the Common-Agency Problem?

When multiple principals influence actions of a common agent

Common agent is a provider; the principals are insurance companies (Aetna, etc.) and other payers (including, especially, Medicare)

Each payer would like the provider to invest in integrated care

Provider incentives depend on the contracts they have with *all* their payers, and payers simultaneously & noncooperatively offer contracts

Why Introduce a Common-Agency Model?

The framework fits the institutional setting and has rarely been applied to health care (for a notable exception, see Glazer and McGuire)

Common-agency models have distinctive implications for:

- The severity and nature of the market failure leading to inefficient incentives and organizations
- Policy initiatives aimed at overcoming these market failures

Results 1: The Nature of Market Failures

Distortions are more severe than in standard agency models

Two types of distortions: free-rider problems and coordination failures

Coordination failures may occur when payers seek to elicit “lumpy” investments (such as new technology and management processes)

Results 2: Healthcare Policy

Medicare is now mandated to write cost-sharing incentive contracts with Accountable Care Organizations (ACOs). Two goals:

1. Subsidize investments in integrated care

2. Jump-start private sector cost-sharing contracts

Results 2: Healthcare Policy

Our model generates both “subsidy” and “jump-start” effects. We find:

1. ACOs serve to subsidize invest but crowd out private contracts

2. If payers are stuck in inefficient eqbm, sufficiently large interventions can trigger positive changes in private contracts

3. But weak interventions will have no effect.

Agenda

- The Model
- Single-Payer Problem
- Multiple-Payer Problem
- ACO Interventions
- General Results
- Conclusion

Model Ingredients

N symmetric risk-neutral Payers, single risk-neutral Provider

Binary public outcome: “success” or “failure”

Payers simultaneously offer bonus payments to be paid if “success”

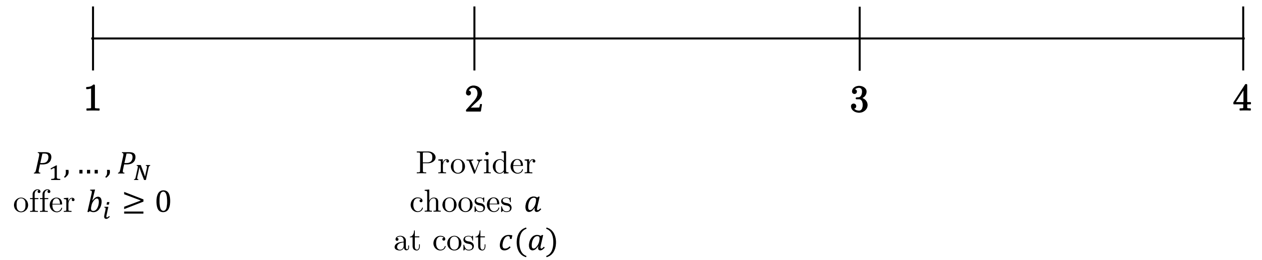
Provider chooses action that determines probability of “success”

Timing

Timing

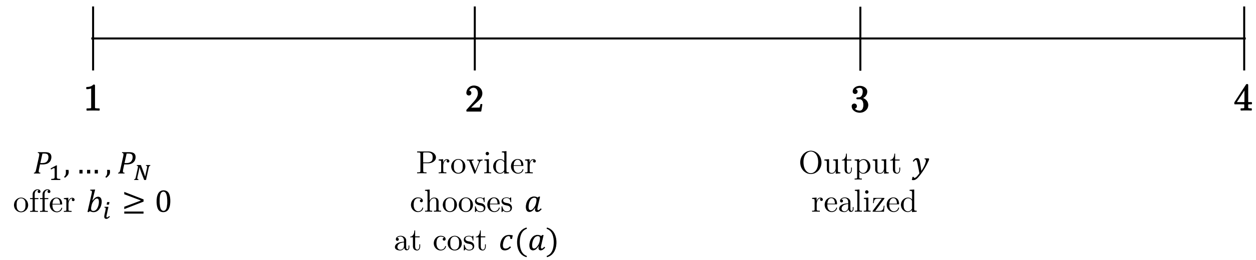
1: $P_1, \ldots, P_N$ simultaneously offer bonus contracts $b_i \geq 0$

Timing



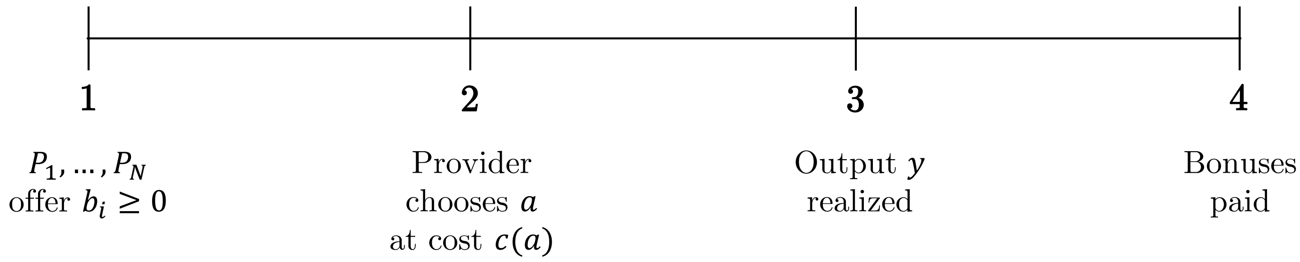
2: Provider chooses action $a \in A \subseteq [0,1]$ at cost $c(a)$

Timing



3: Outcome $y \in \{0,1\}$ realized. $Pr[y = 1|a] = a$. Each Payer receives $\frac{1}{N}B$ if $y = 1$ and 0 otherwise.

Timing



4: Provider receives b_i from P_i if $y = 1$ and so receives $(\overbrace{b_1 + \cdots + b_N}^{b})y$.

Payer i's Program

$$\max_{b_i \geq 0} \frac{1}{N} Ba(b) - b_i a(b)$$

Payer i's Program

$$\max_{b_i \geq 0} \frac{1}{N} B a(b) - \overbrace{b_i}^{= b - \bar{b}_{-i}} a(b)$$

Payer i's Program

$$\max_{b \geq \bar{b}_{-i}} \frac{1}{N} Ba(b) - (ba(b) - \bar{b}_{-i} a(b))$$

Payer i's Program

$$\max_{b \geq (1-\frac{1}{N})\bar{b}} \frac{1}{N} B a(b) - (b a(b) - (1 - \frac{1}{N})\bar{b} a(b))$$

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Single-Payer Problem

$$\max_{b \geq (1-\frac{1}{N})\bar{b}} \frac{1}{N} B a(b) - (b a(b) - (1 - \frac{1}{N})\bar{b} a(b))$$

Single-Payer Problem

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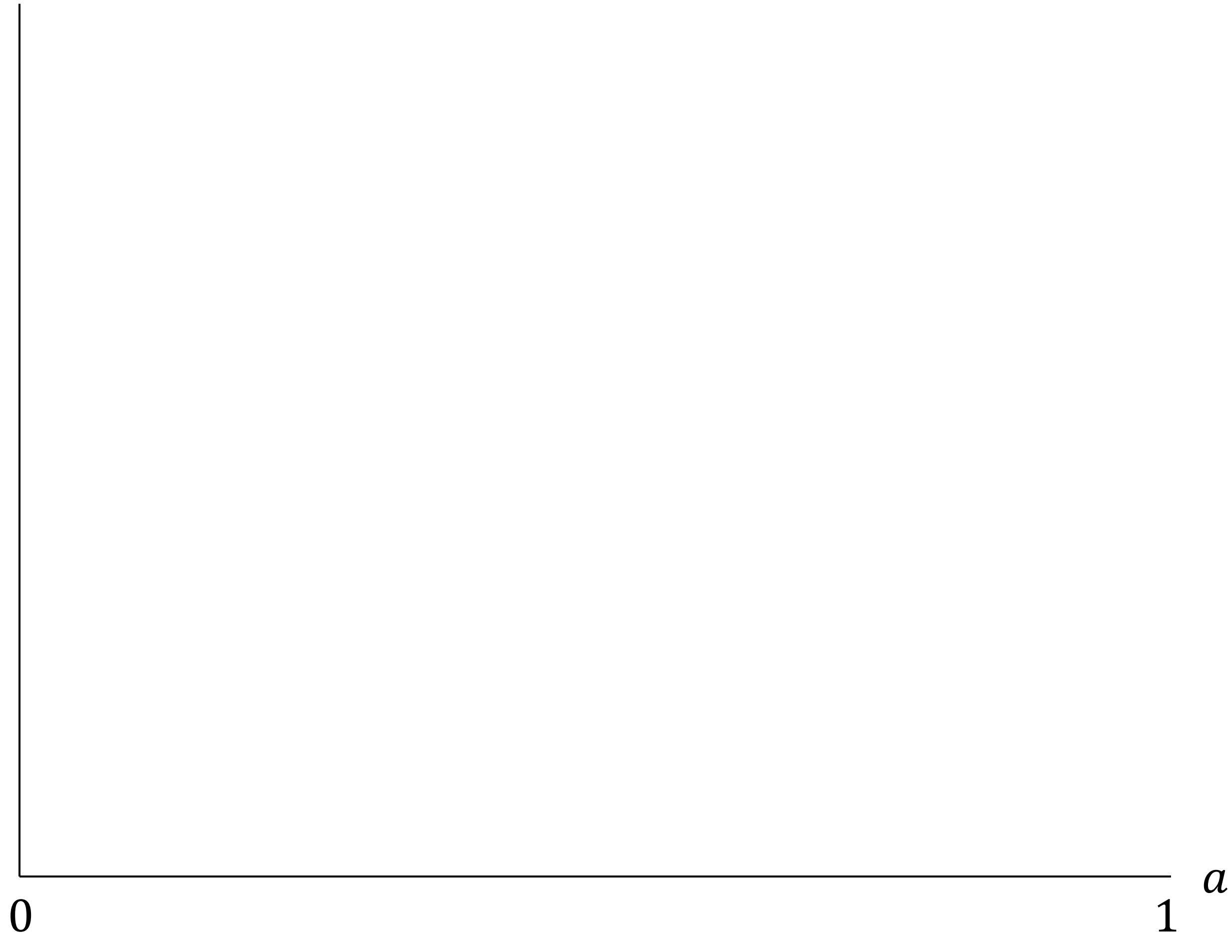
Single-Payer Problem



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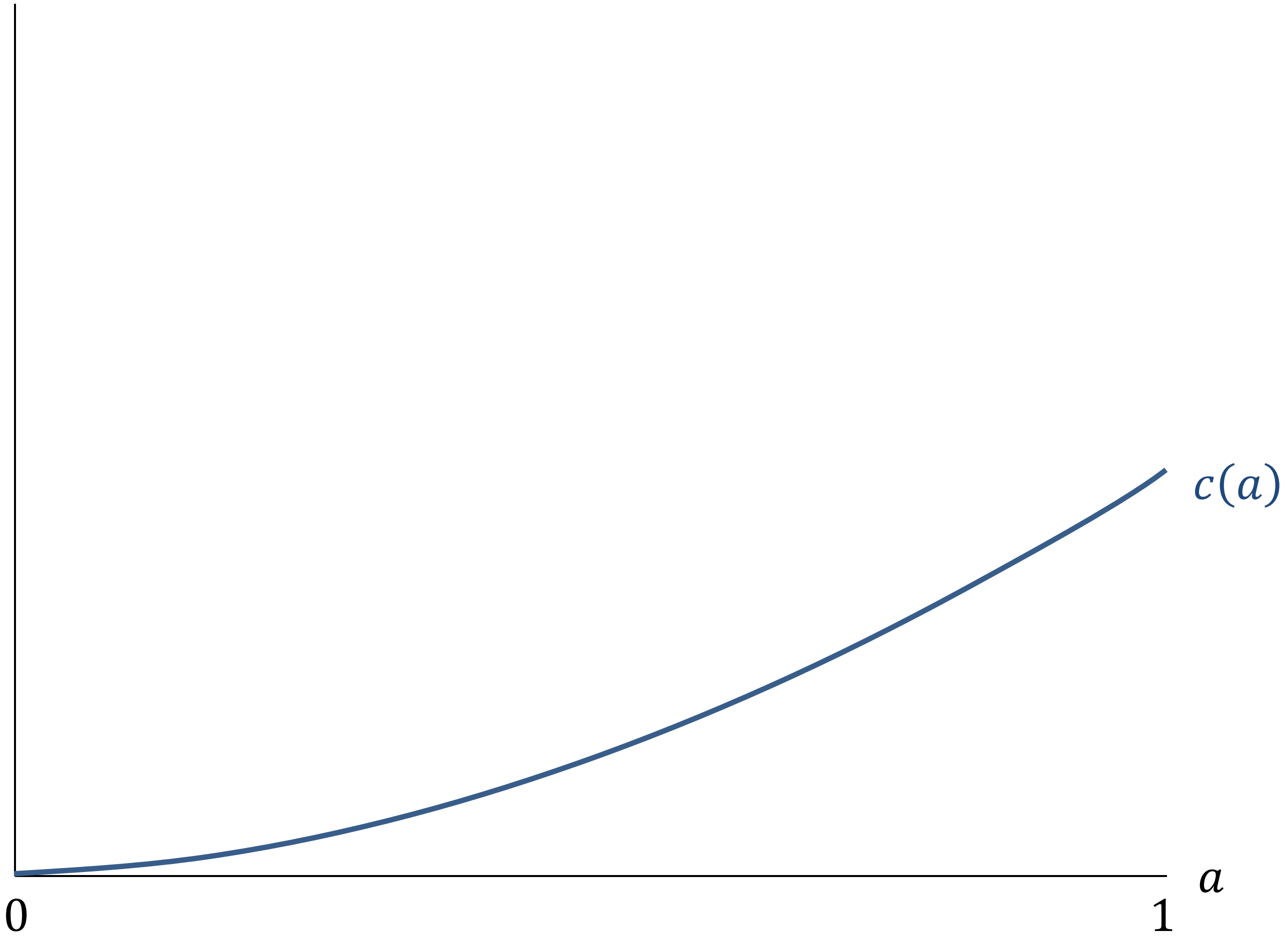

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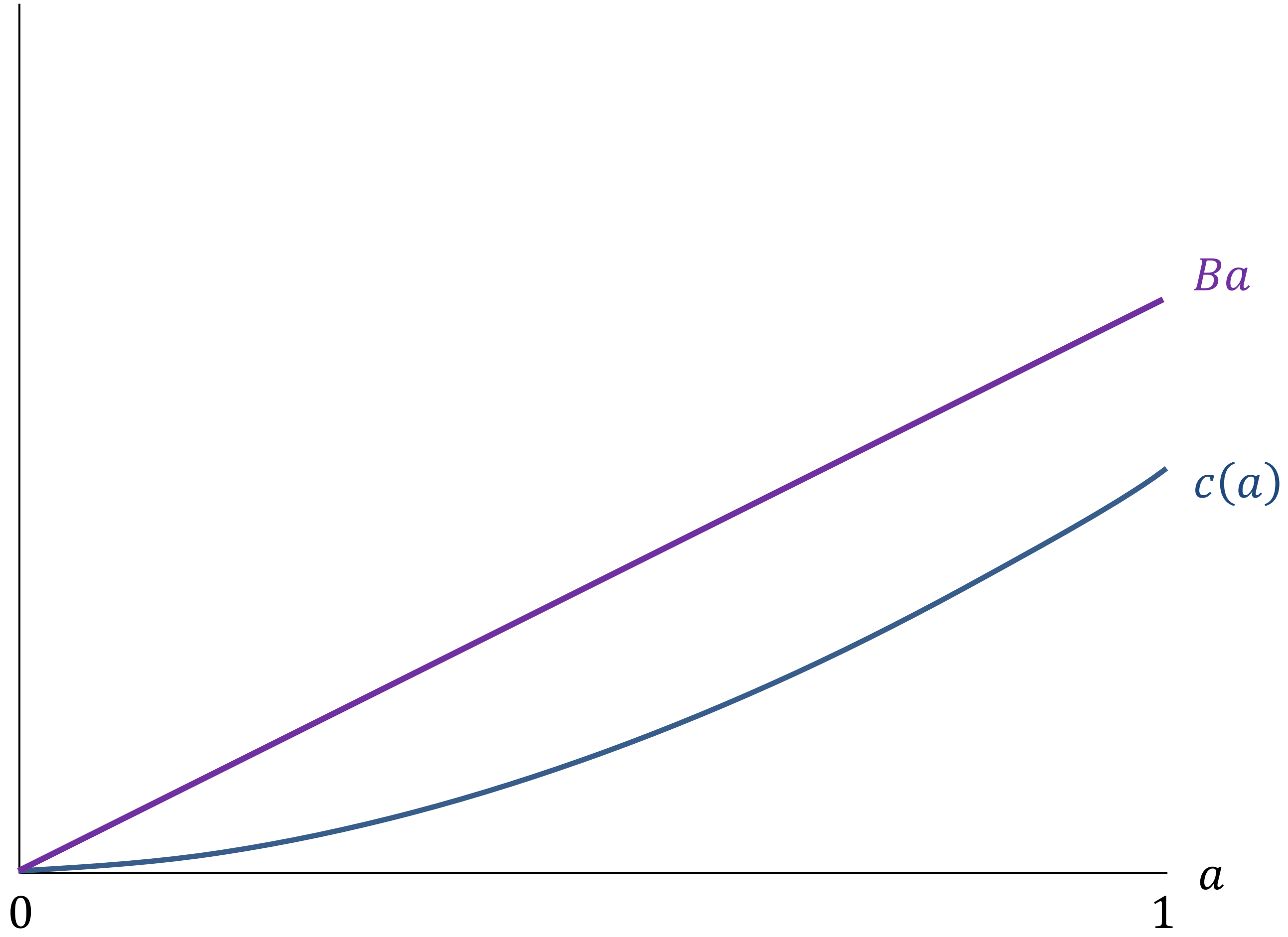

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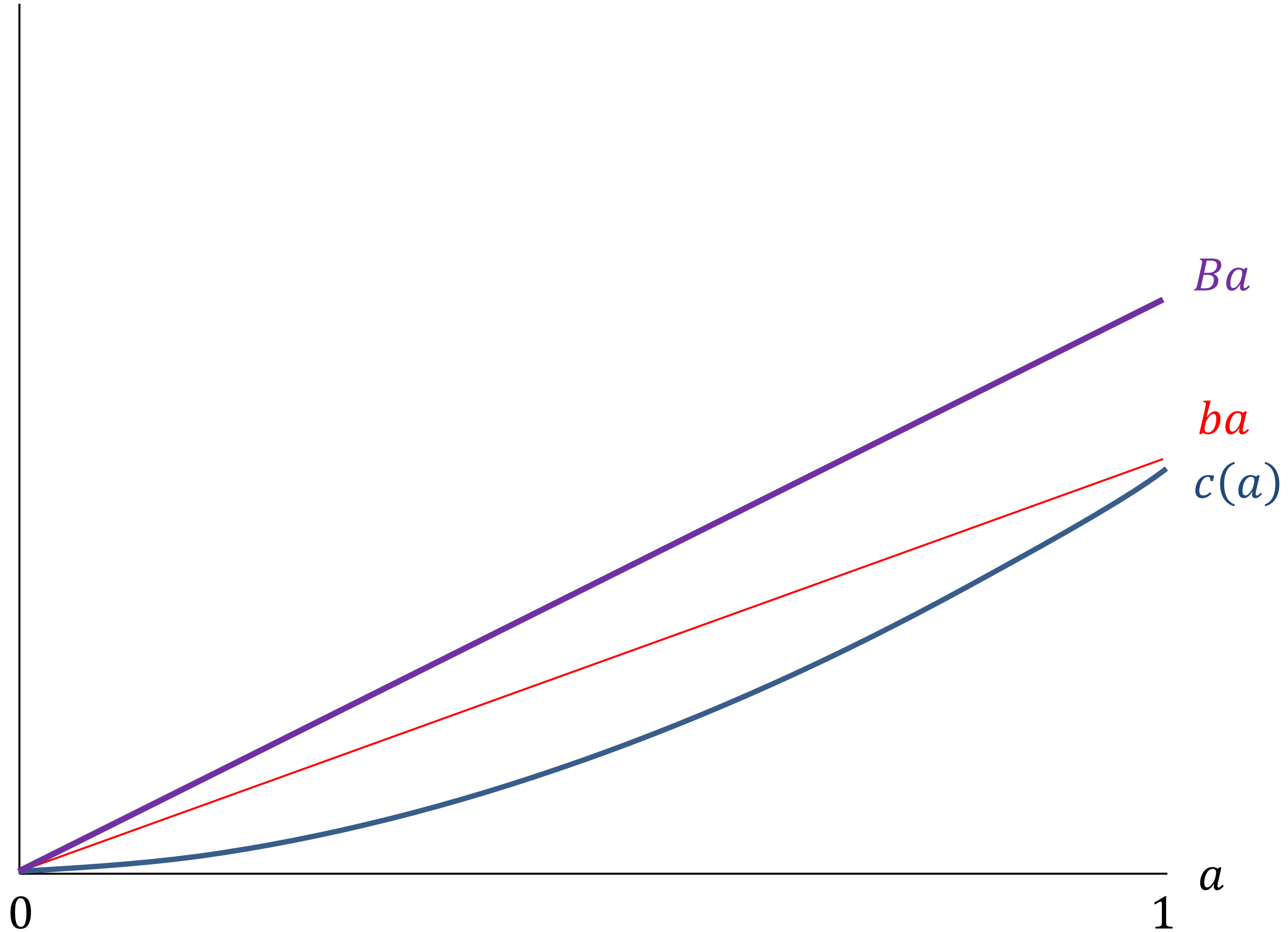

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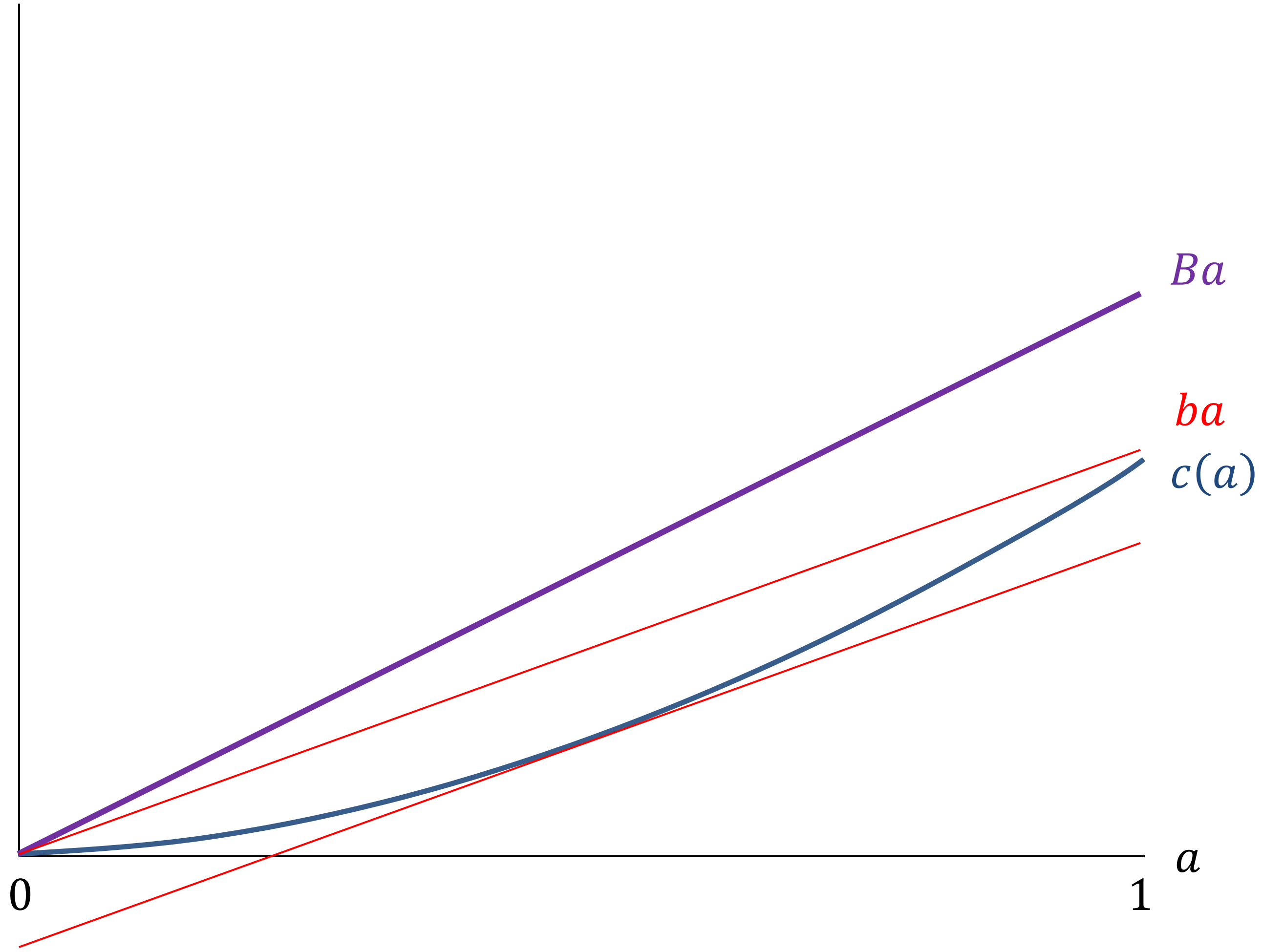

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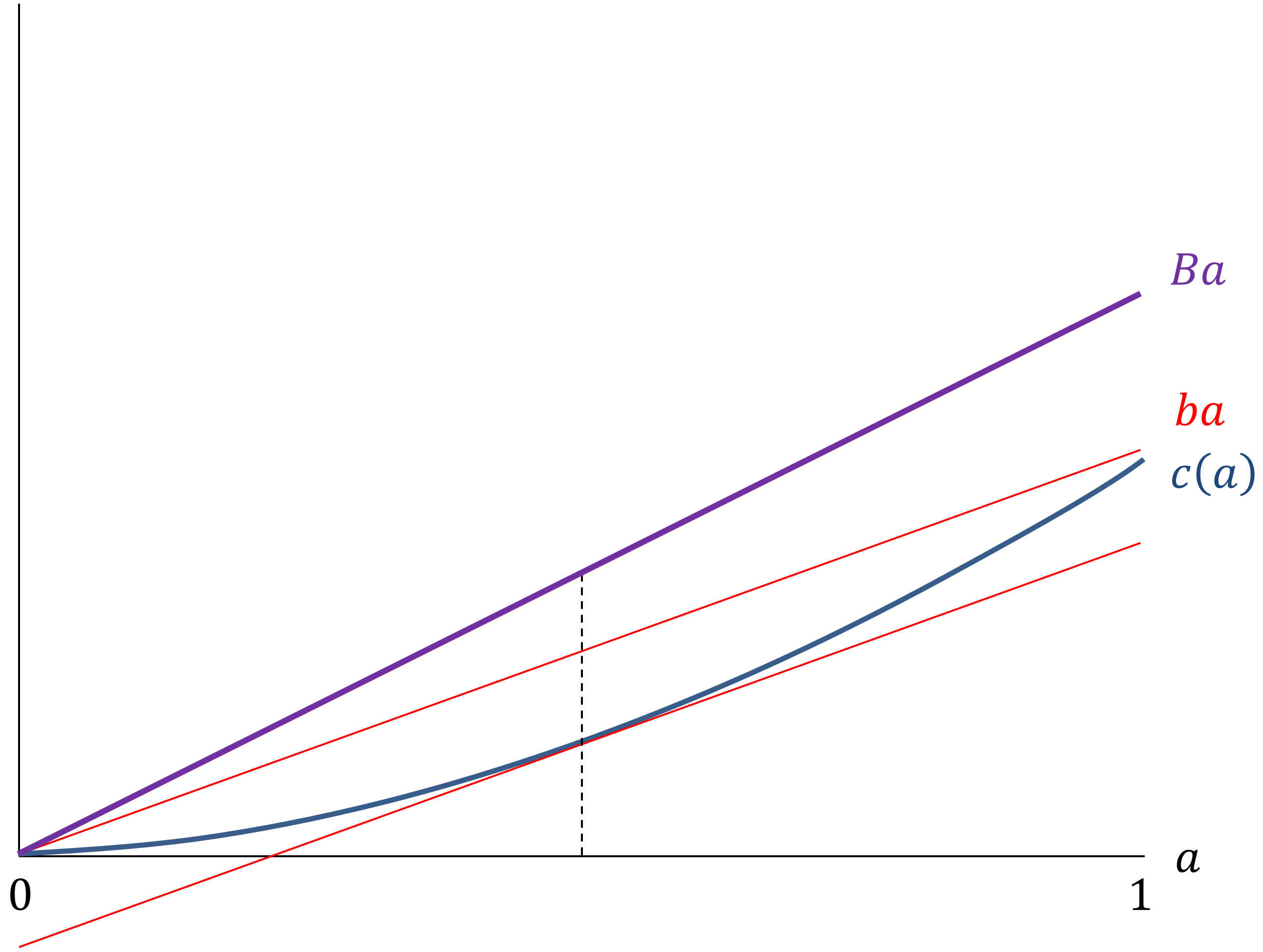
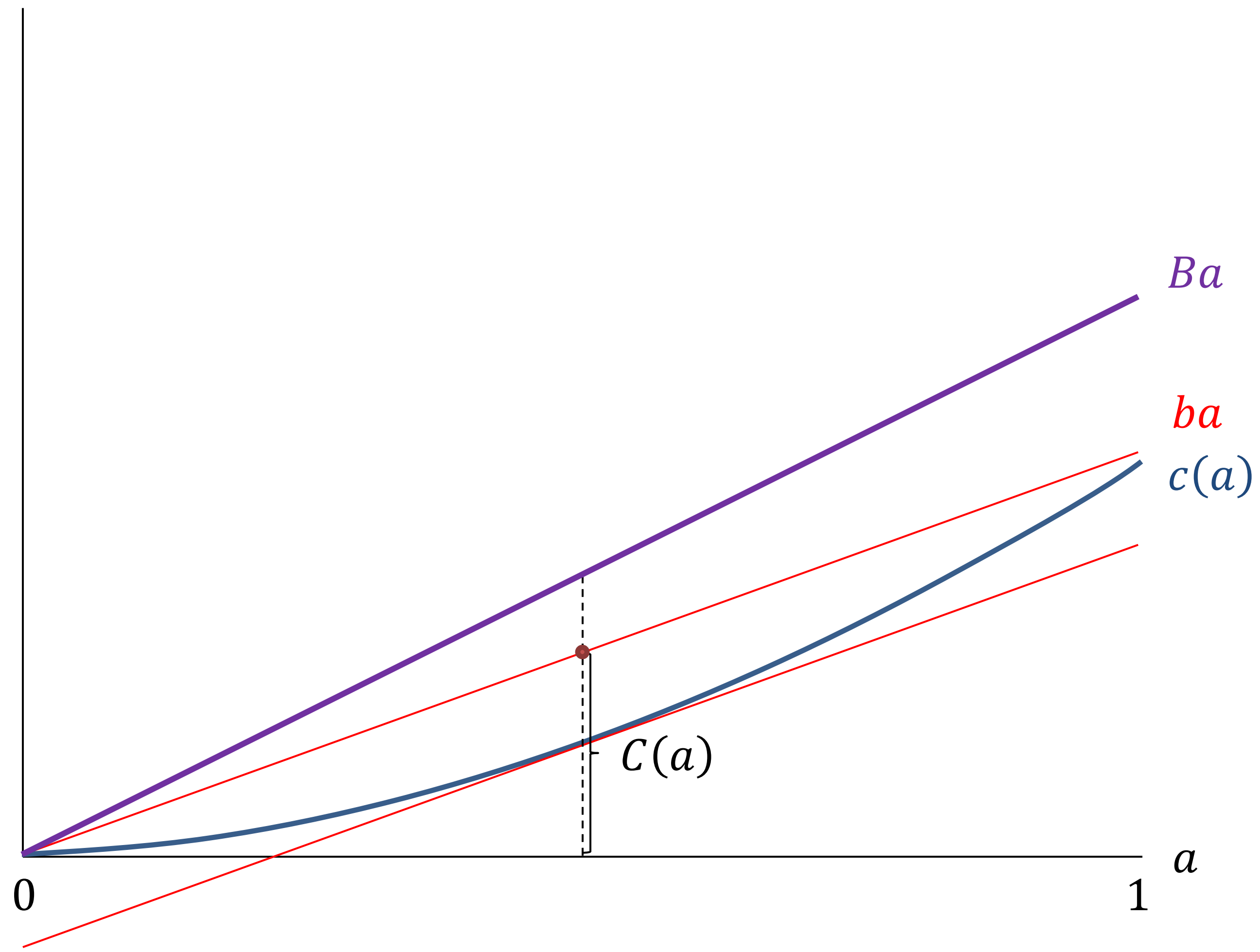


Cost of Implementing an Action



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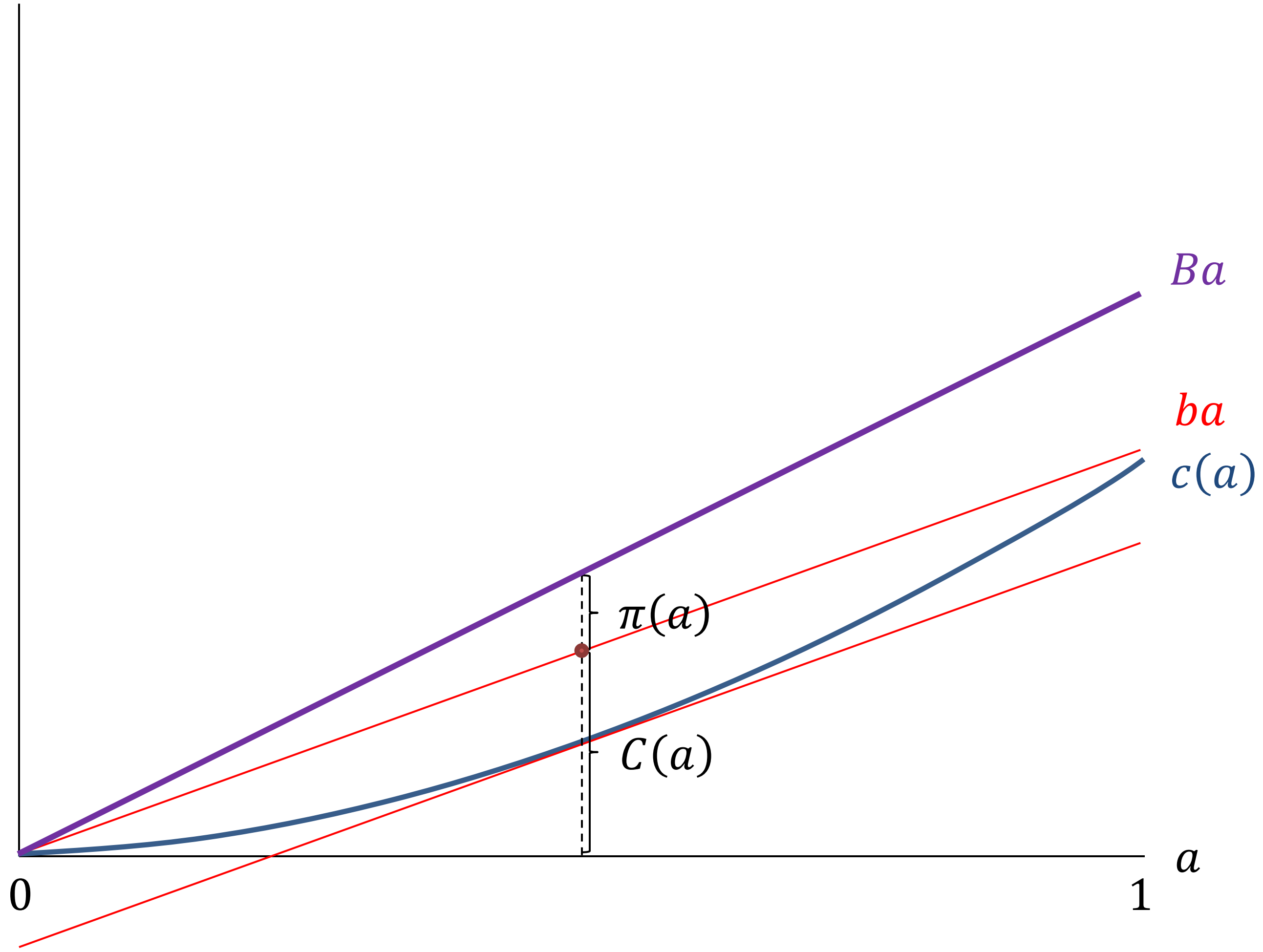
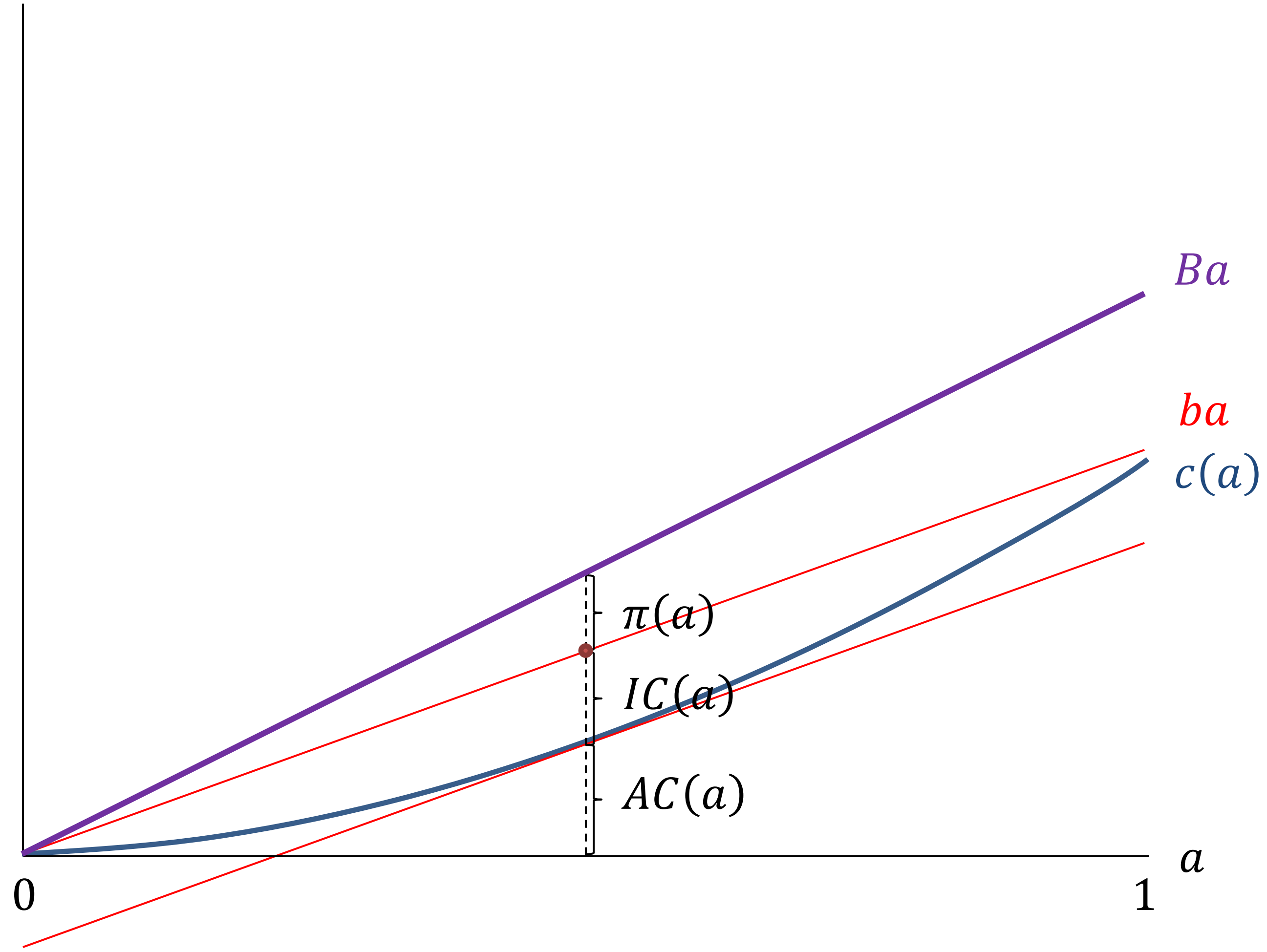
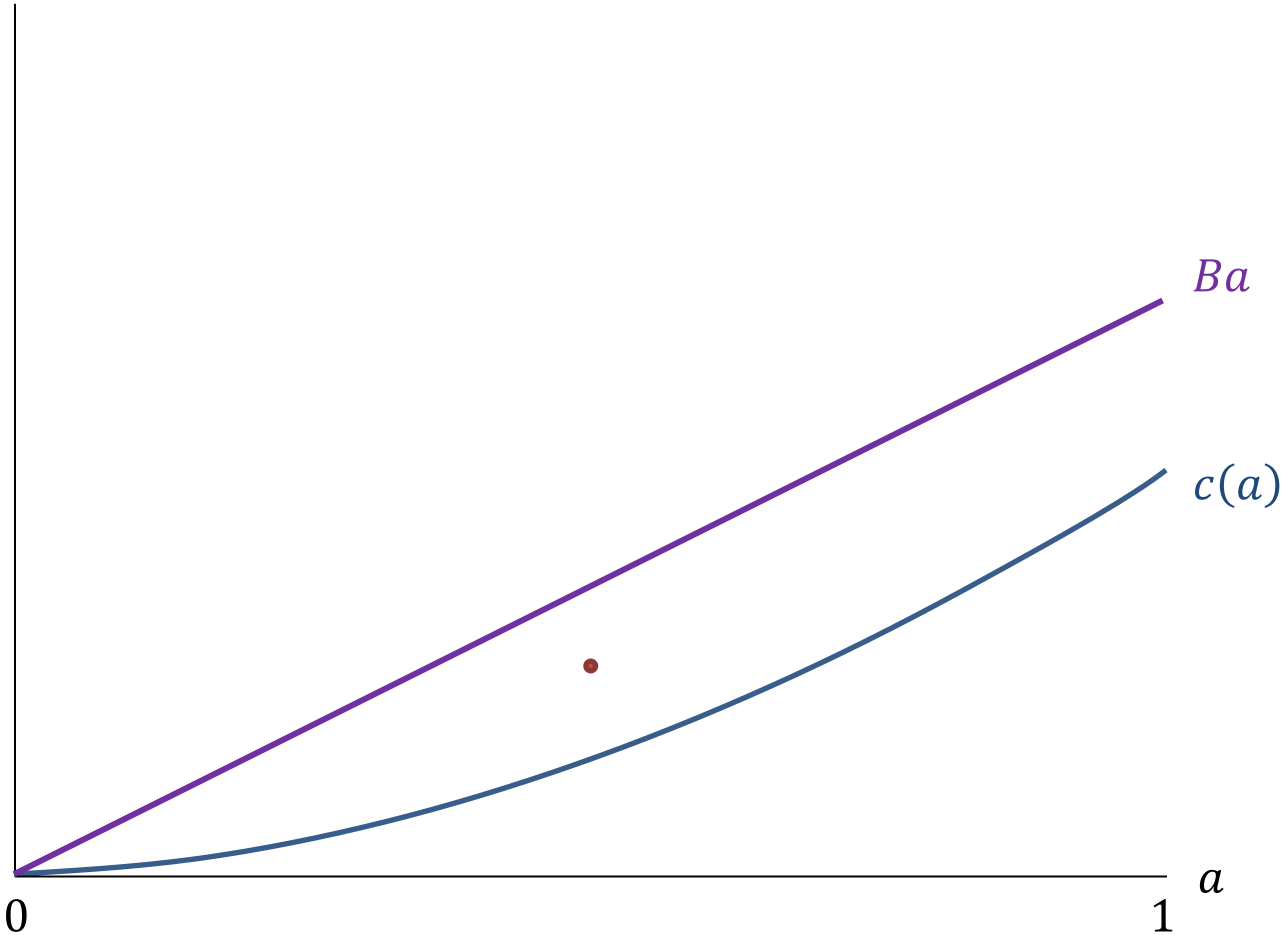


Action Costs Plus Incentive Costs



$$C(a) = AC(a) + IC(a)$$

Single Payer's Cost Function



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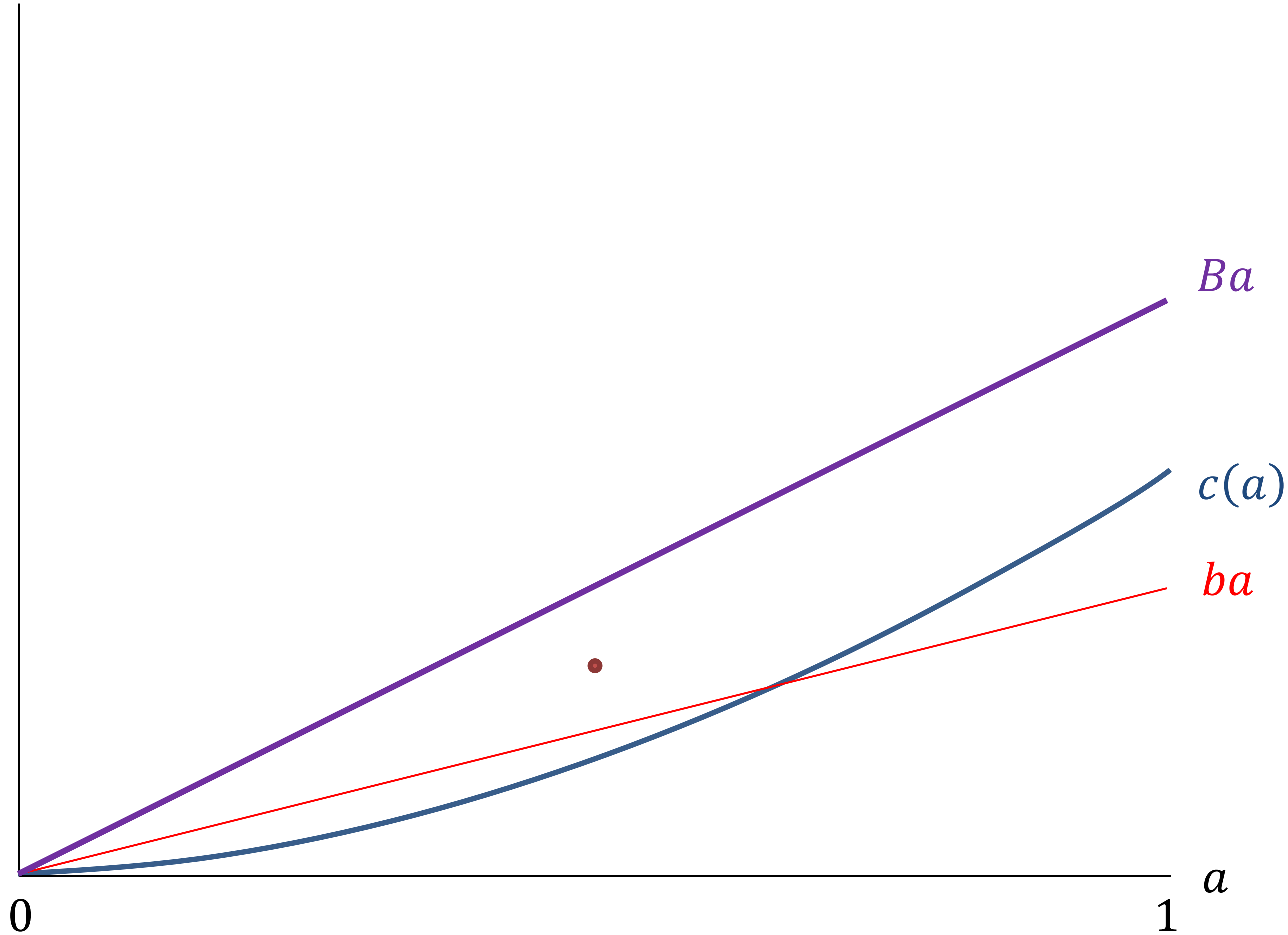

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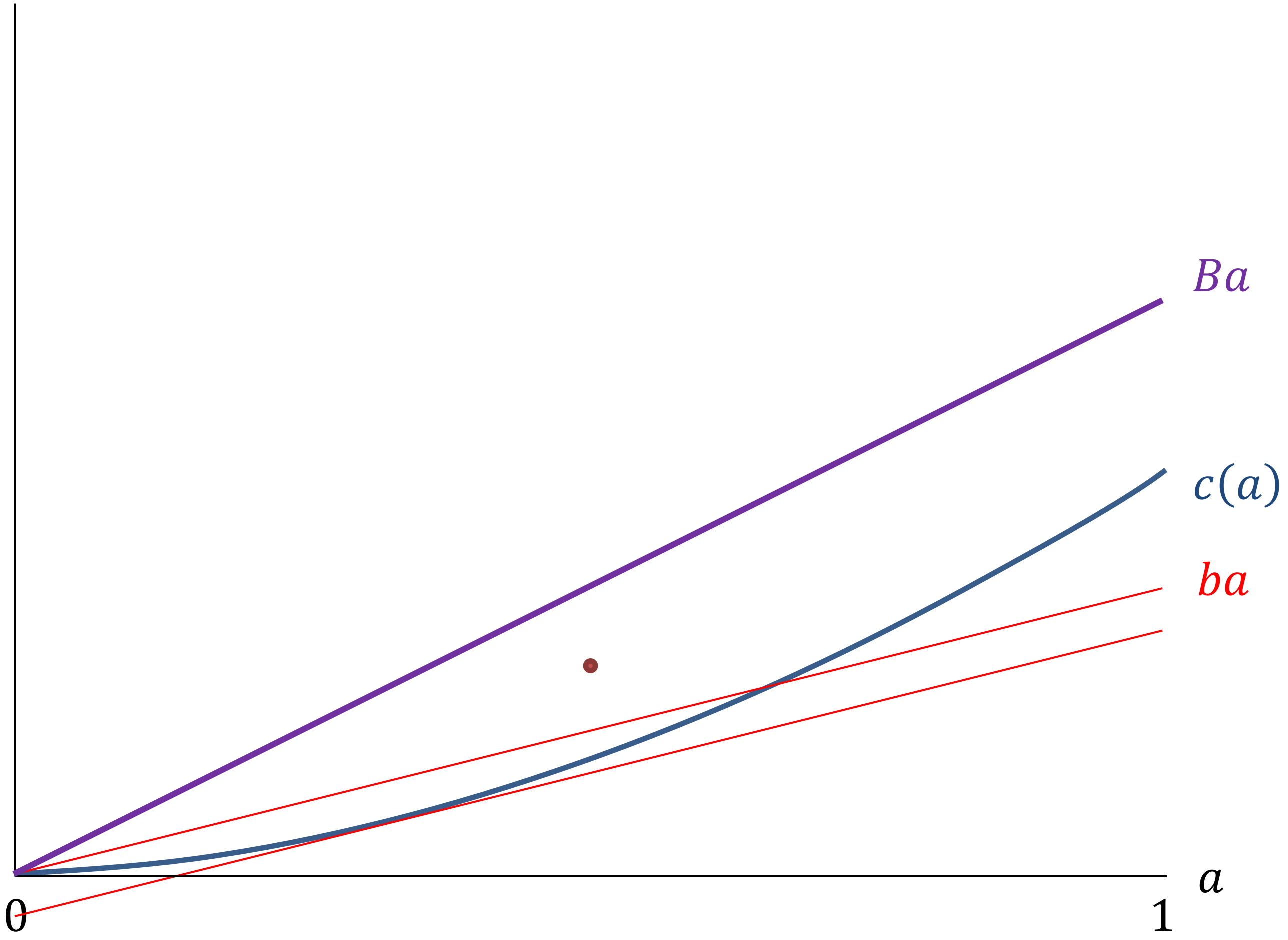

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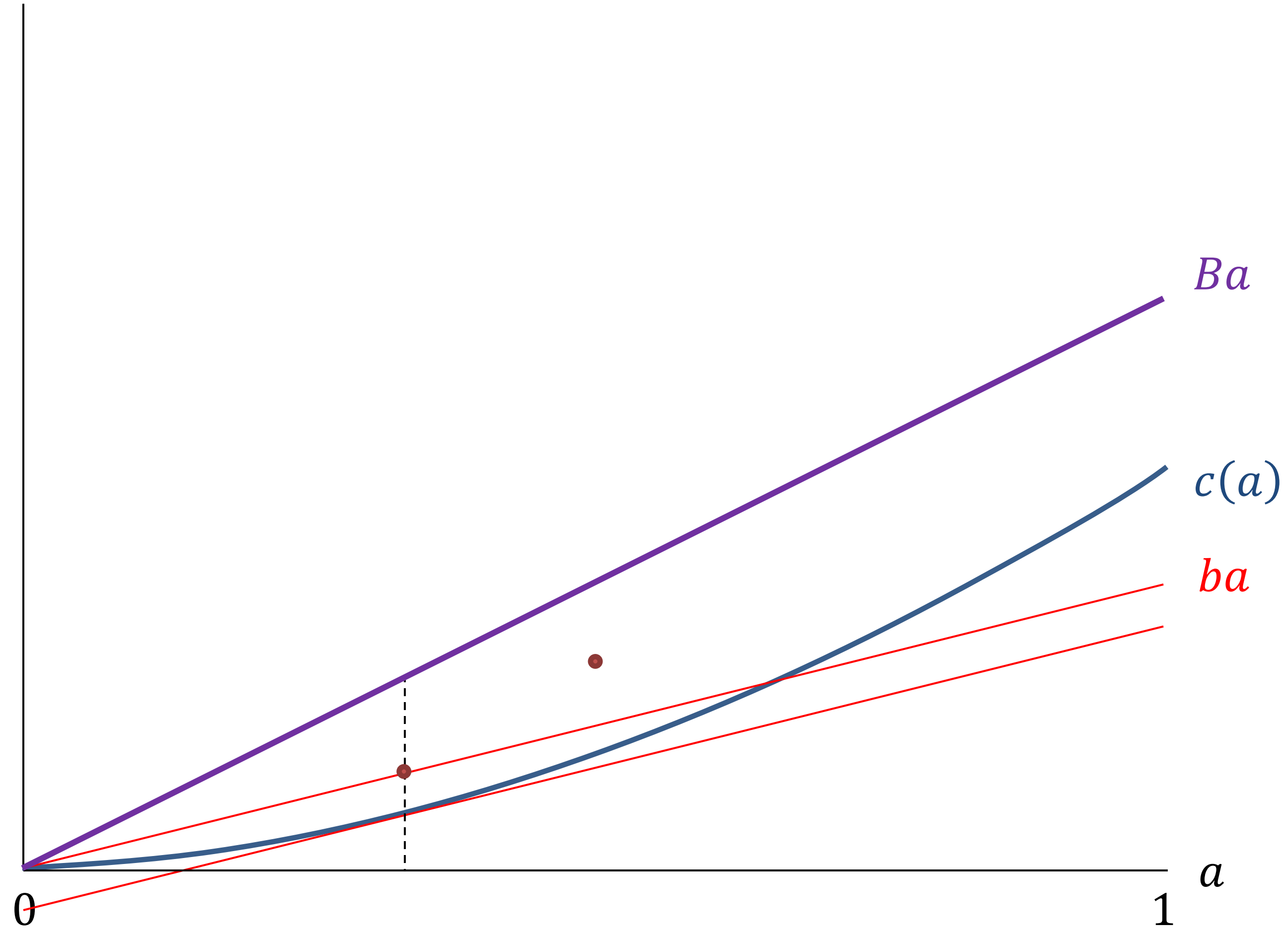

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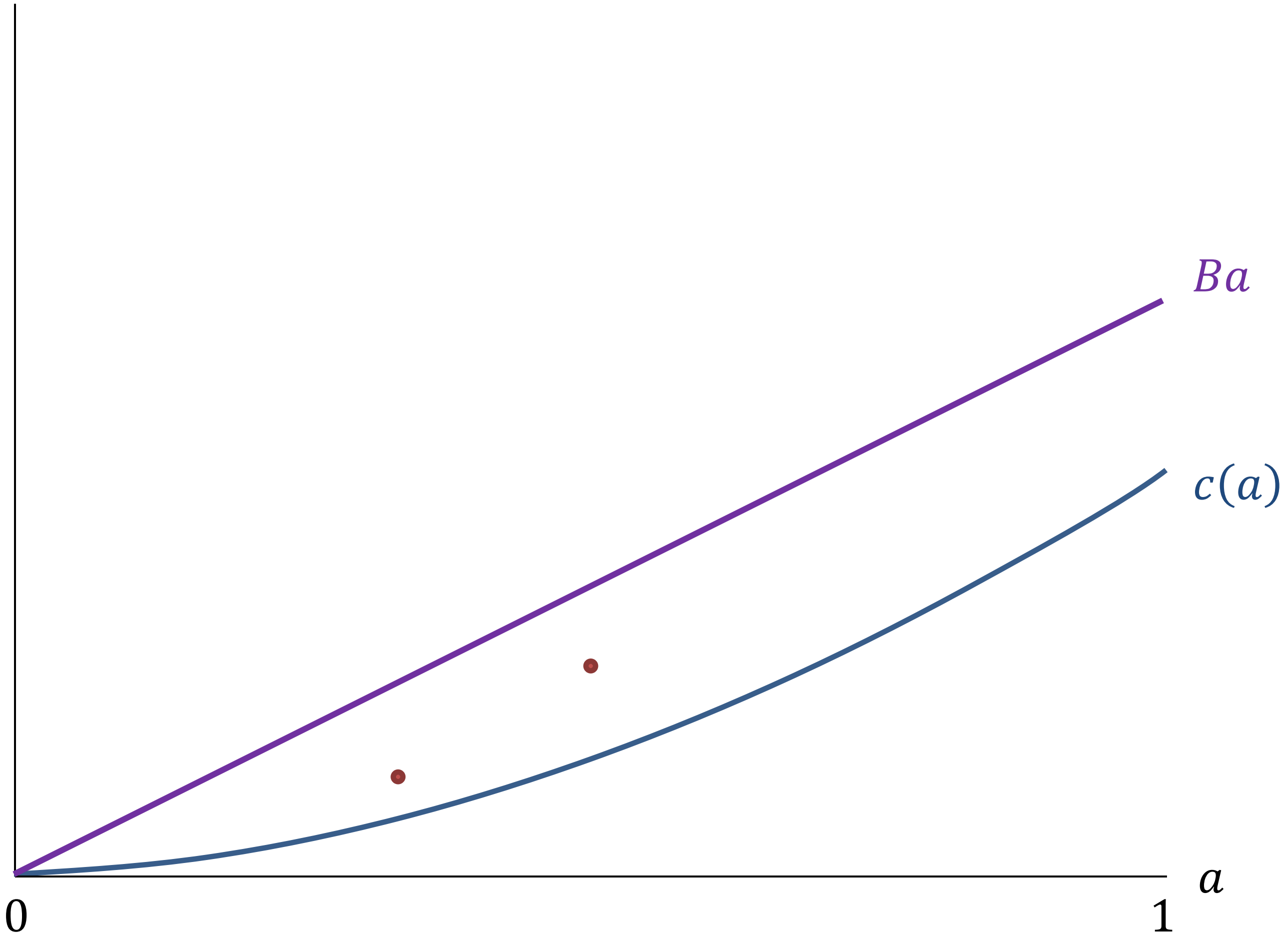

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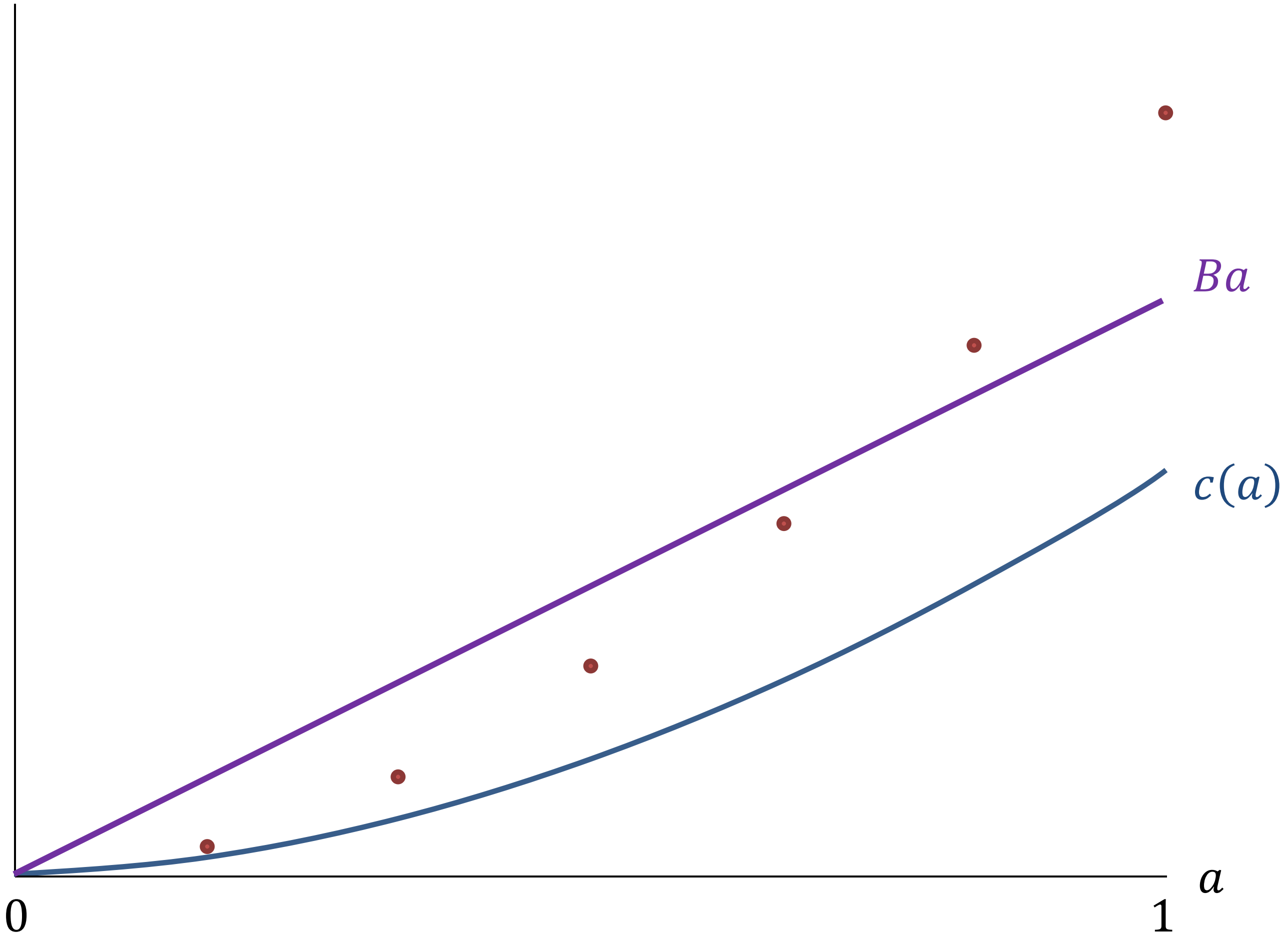

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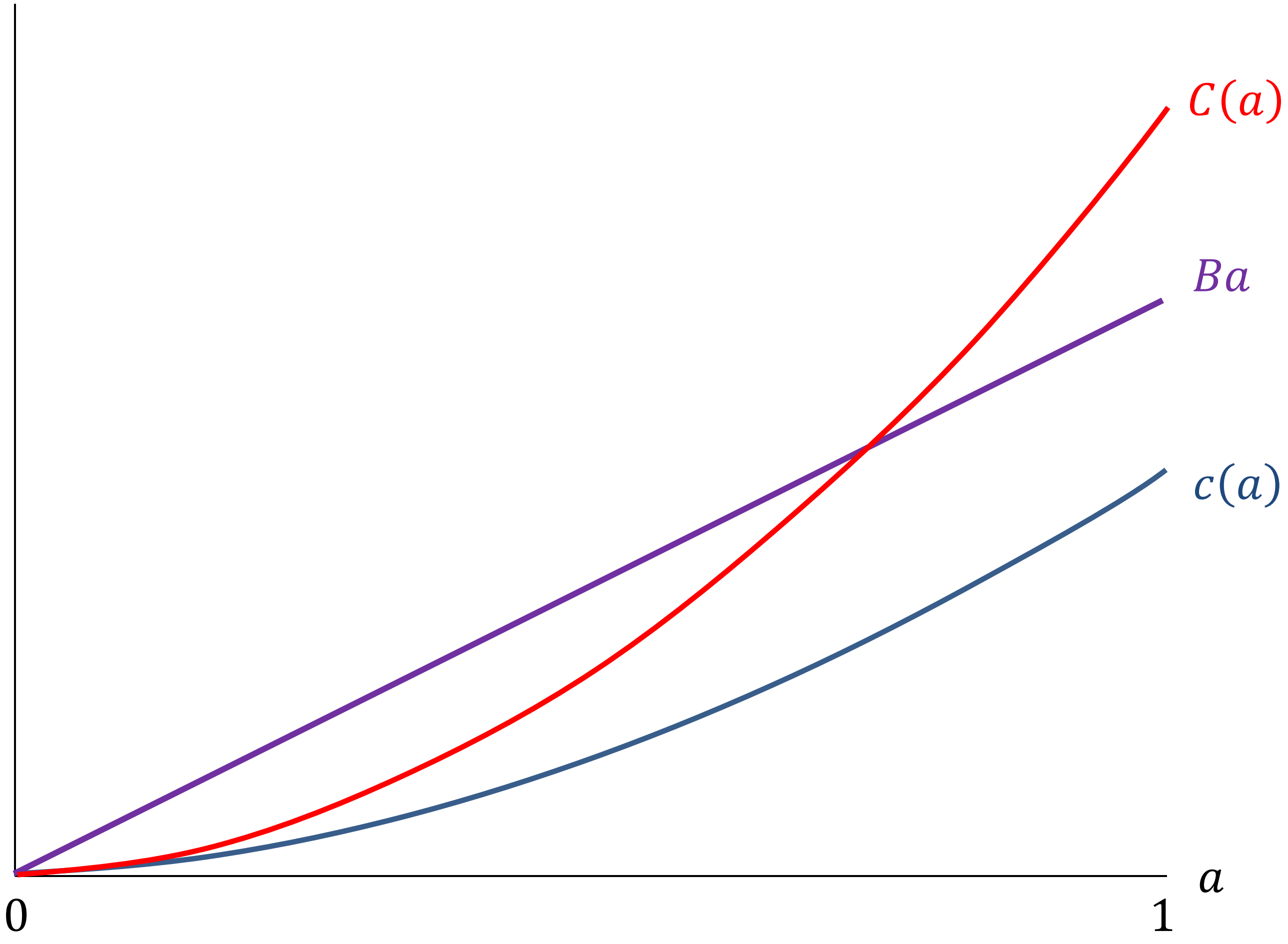

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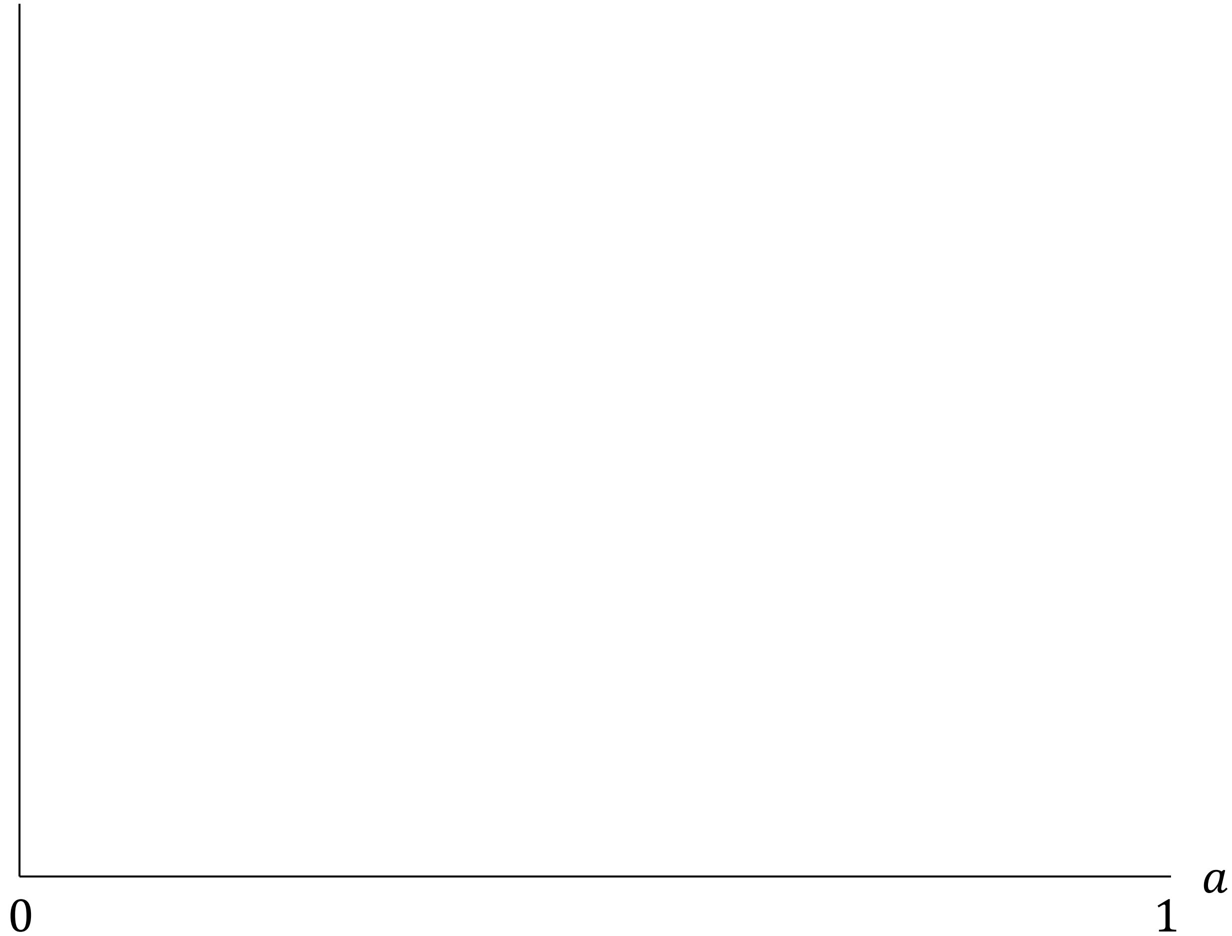
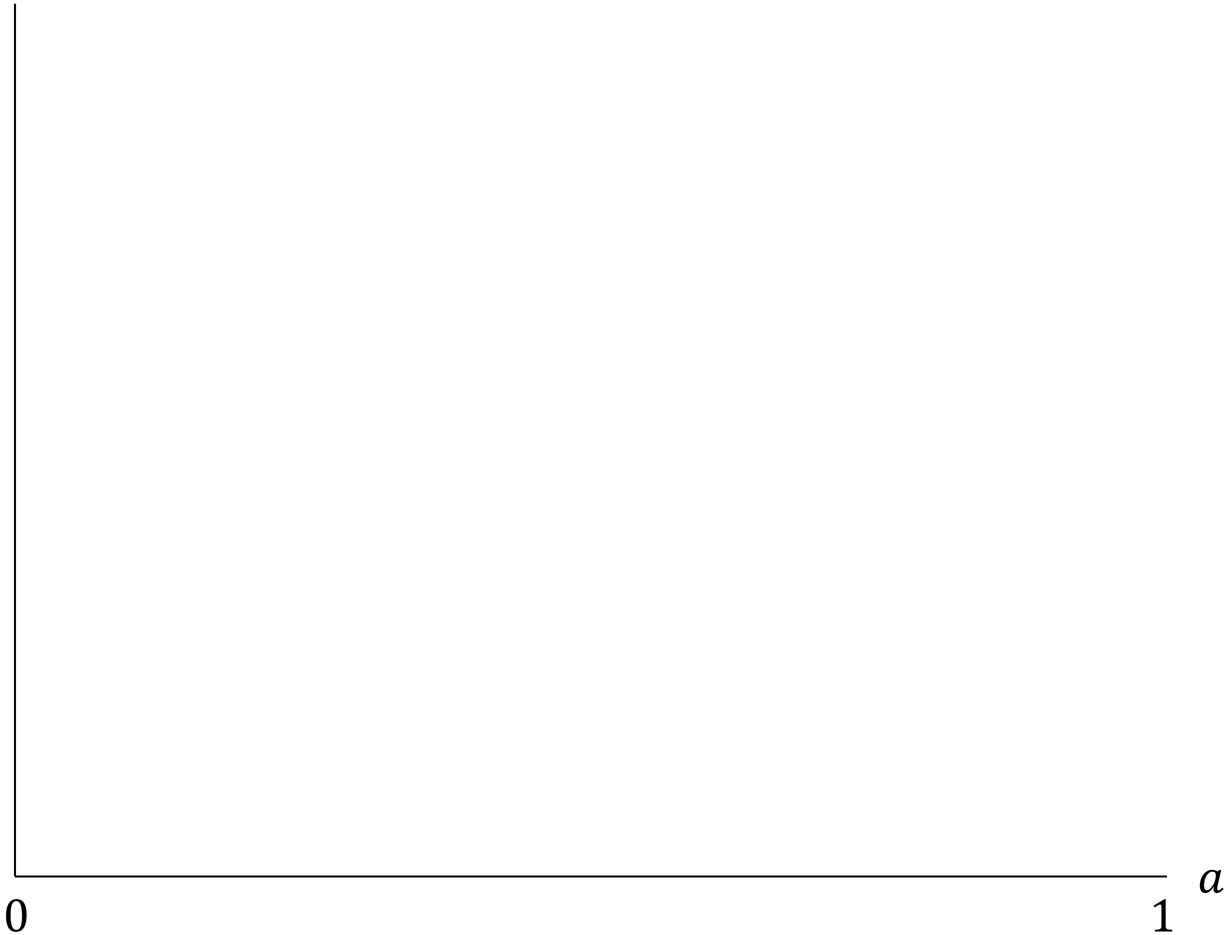
What Action to Implement?

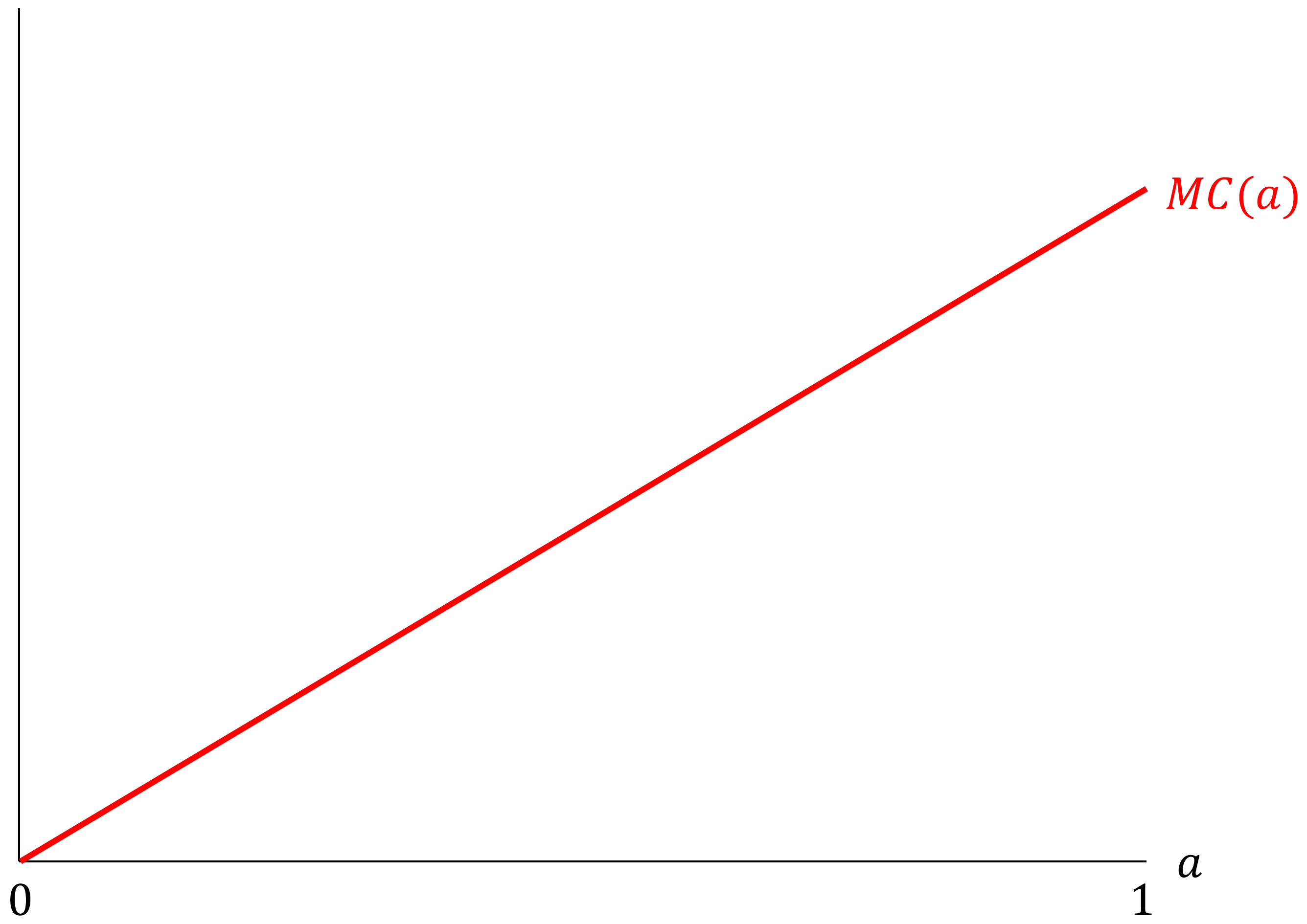


Marginal Benefits Equal Marginal Costs



$$B = MC(a^{SB})$$

Marginal Costs



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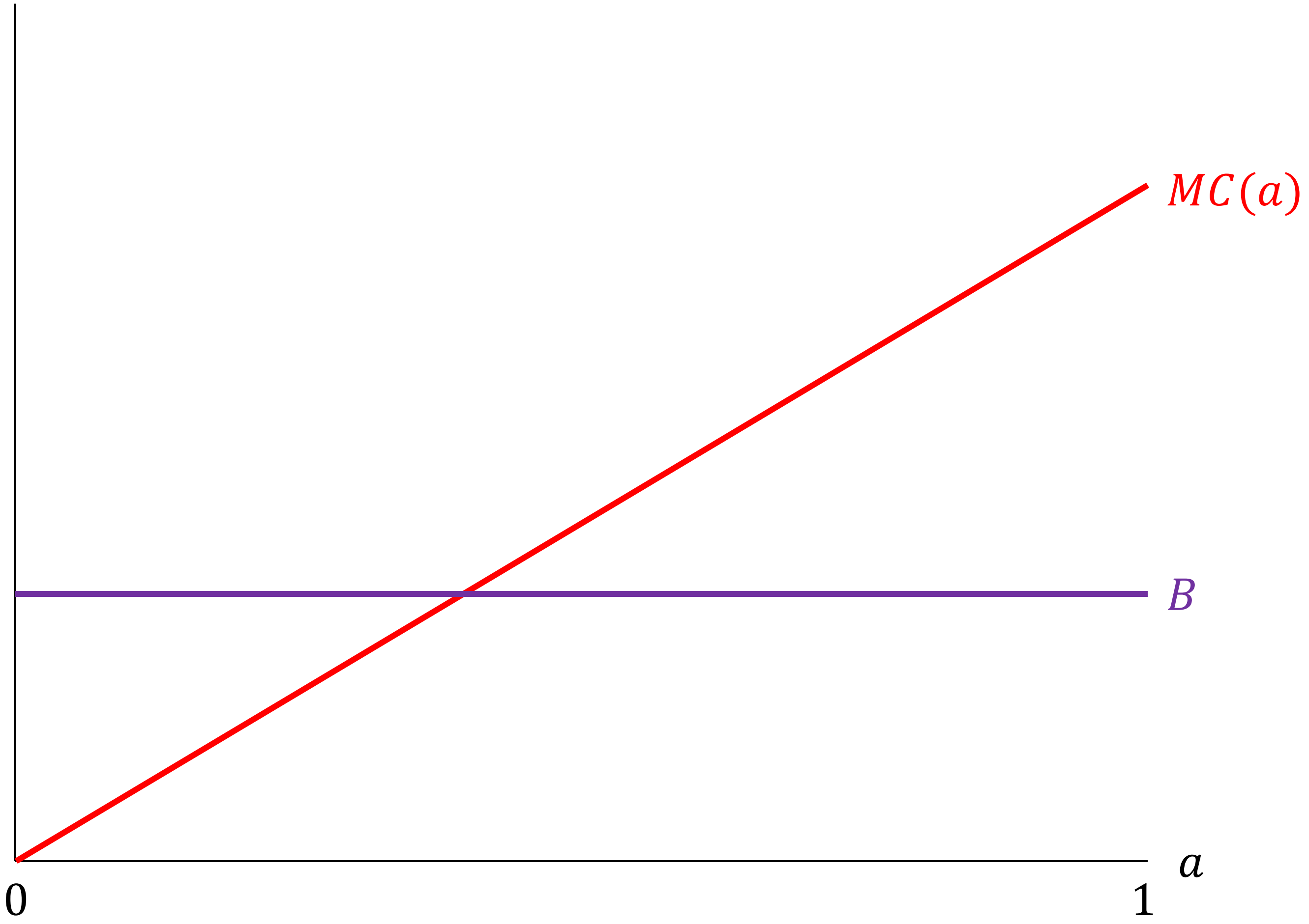

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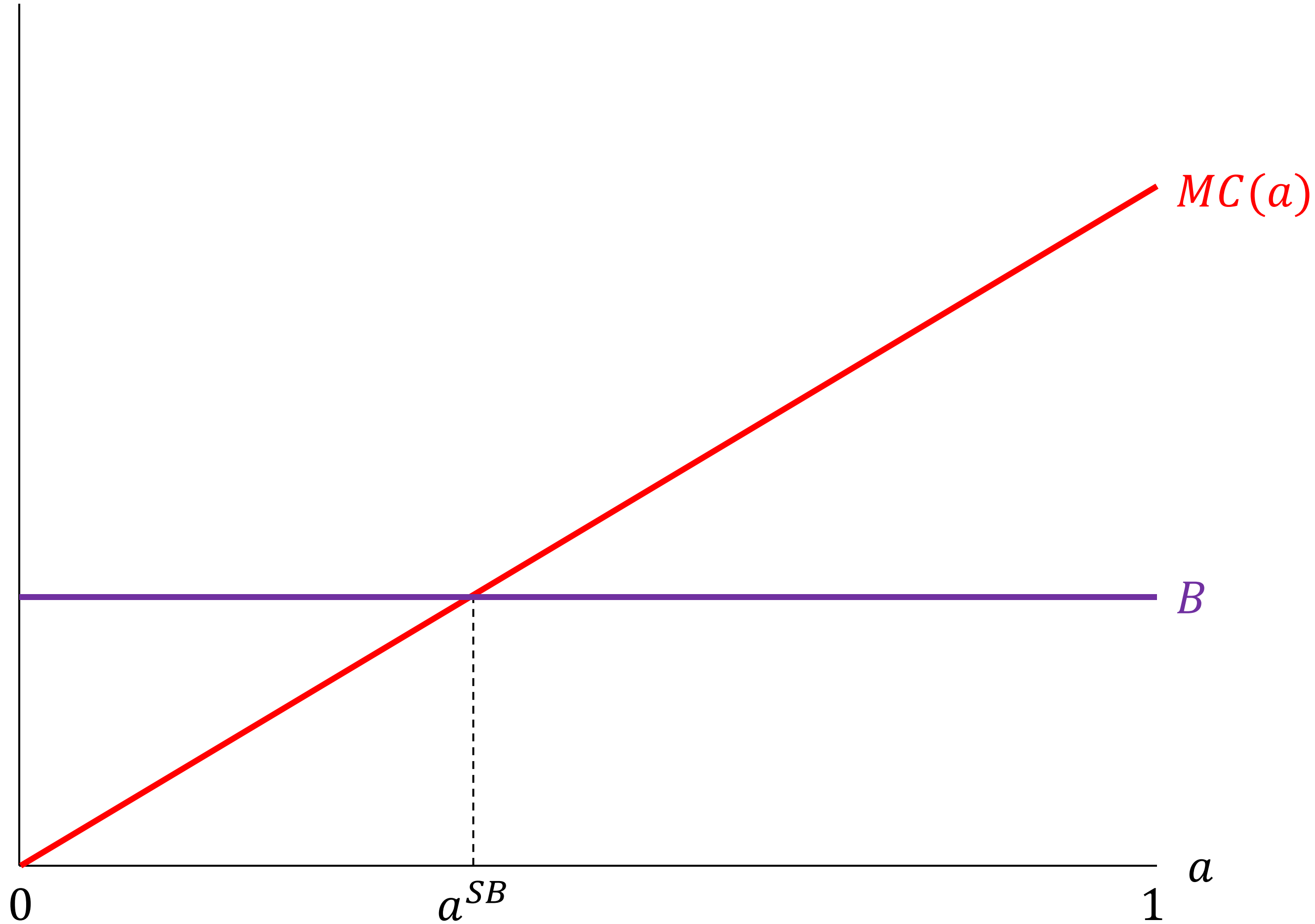
Second-Best Action



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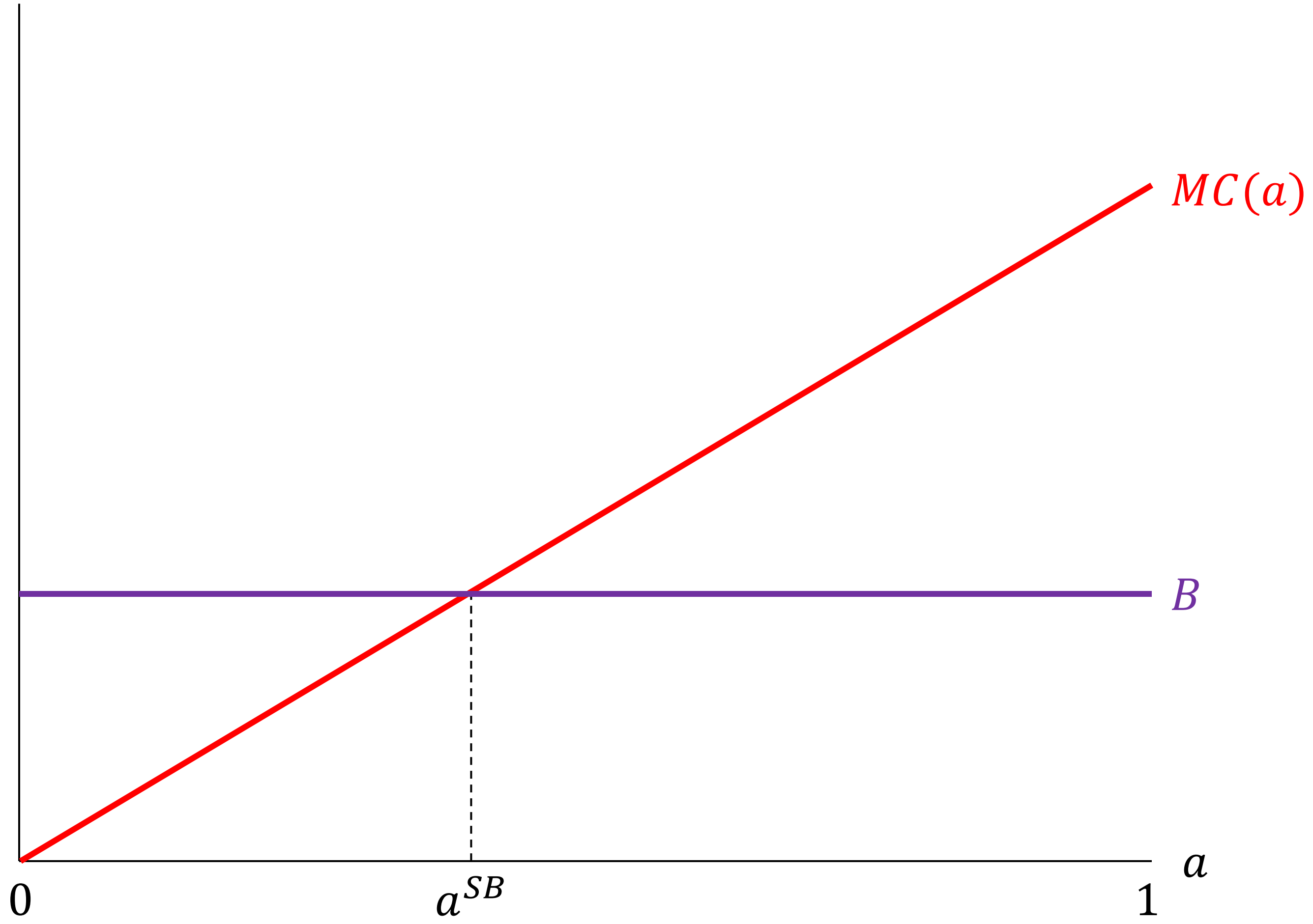
Marginal Action and Incentive Costs



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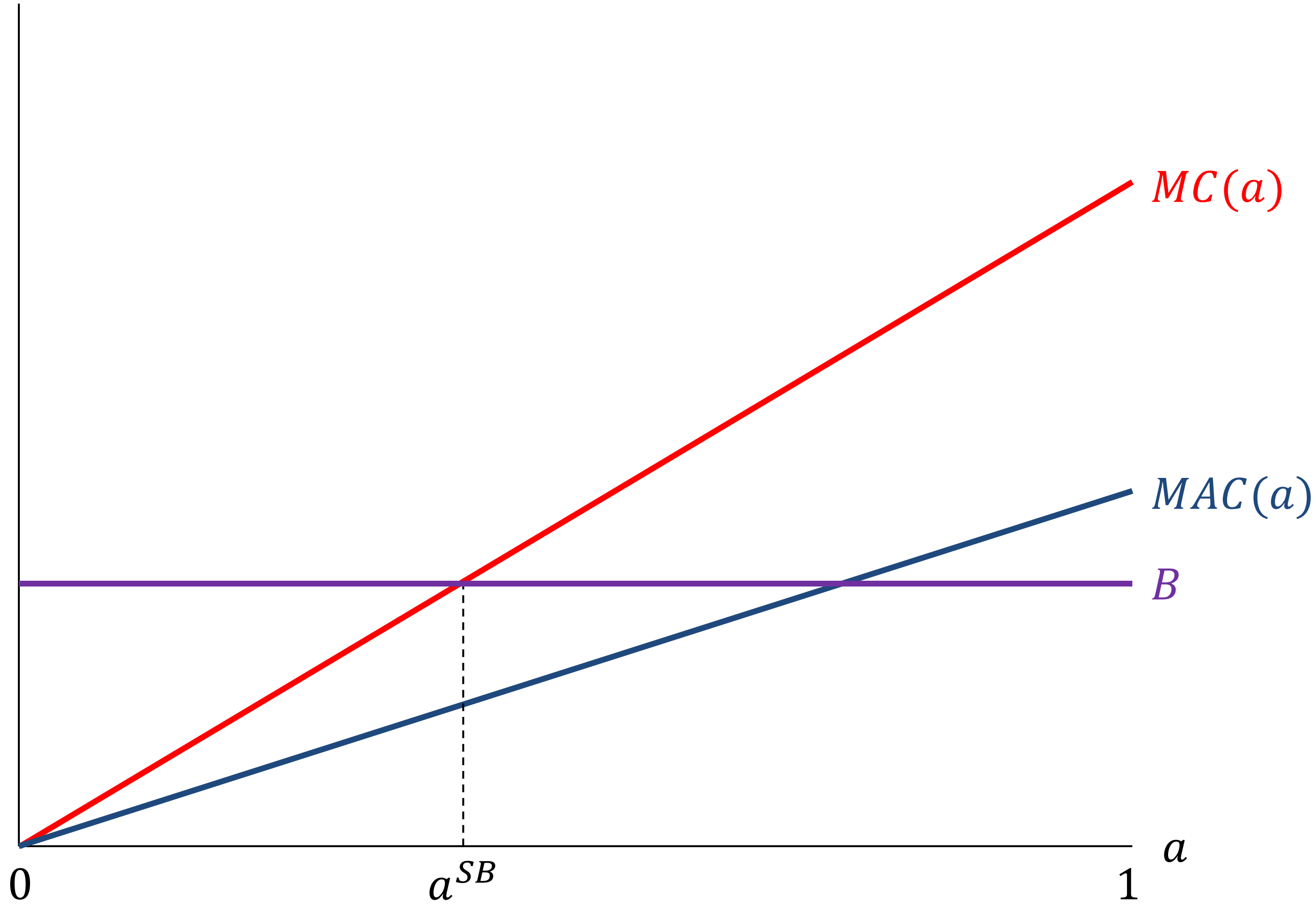
Marginal Action and Incentive Costs



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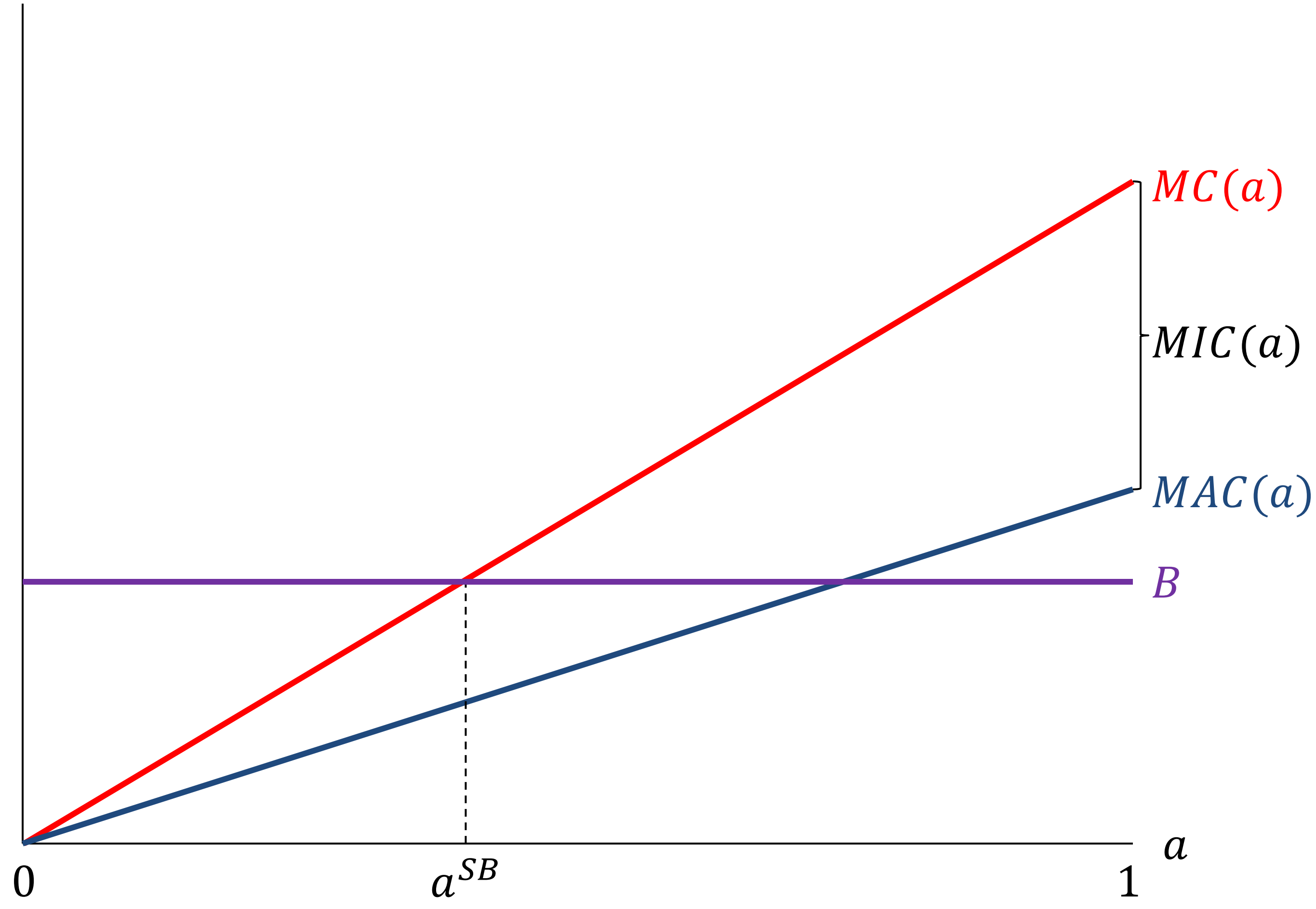

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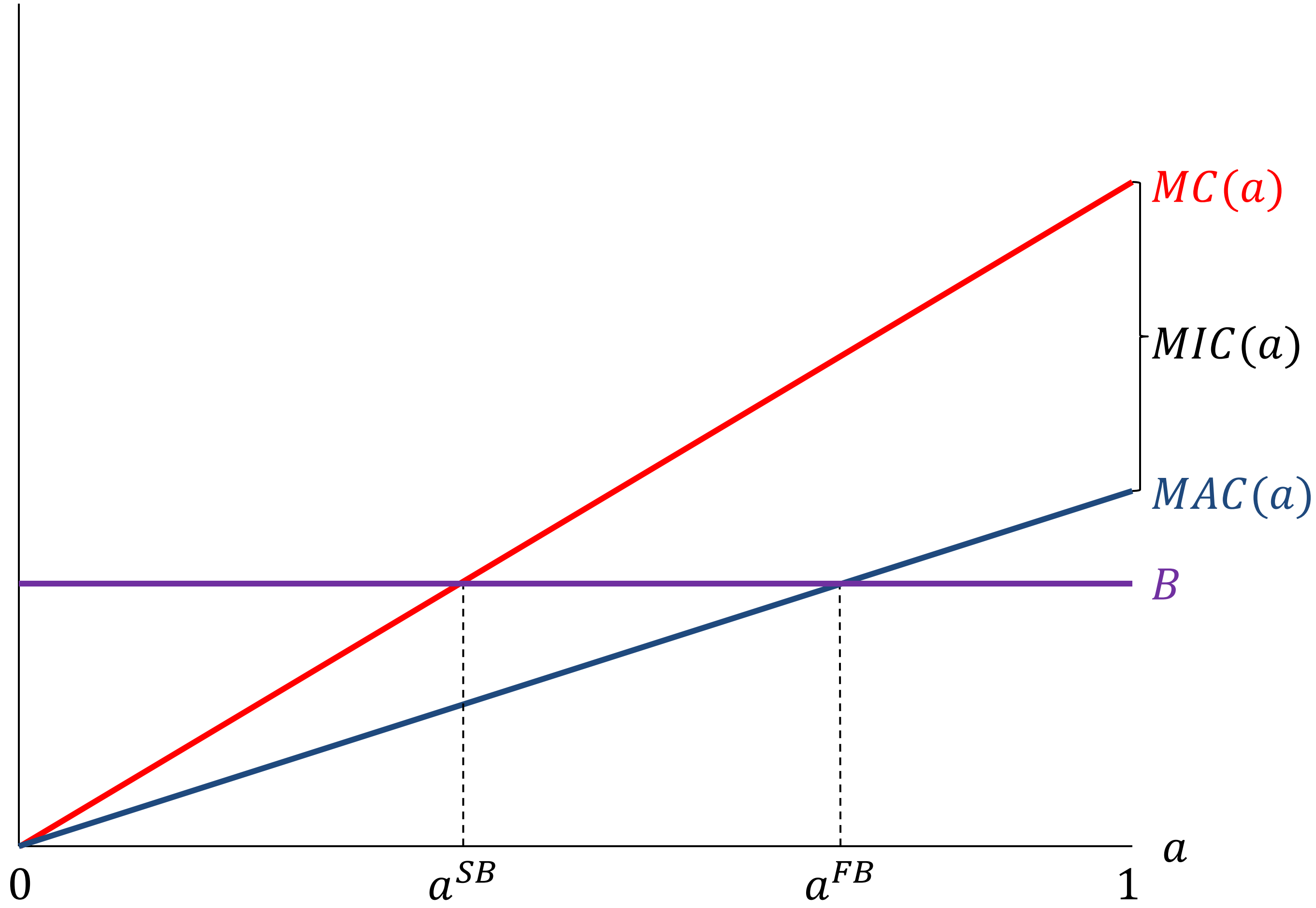
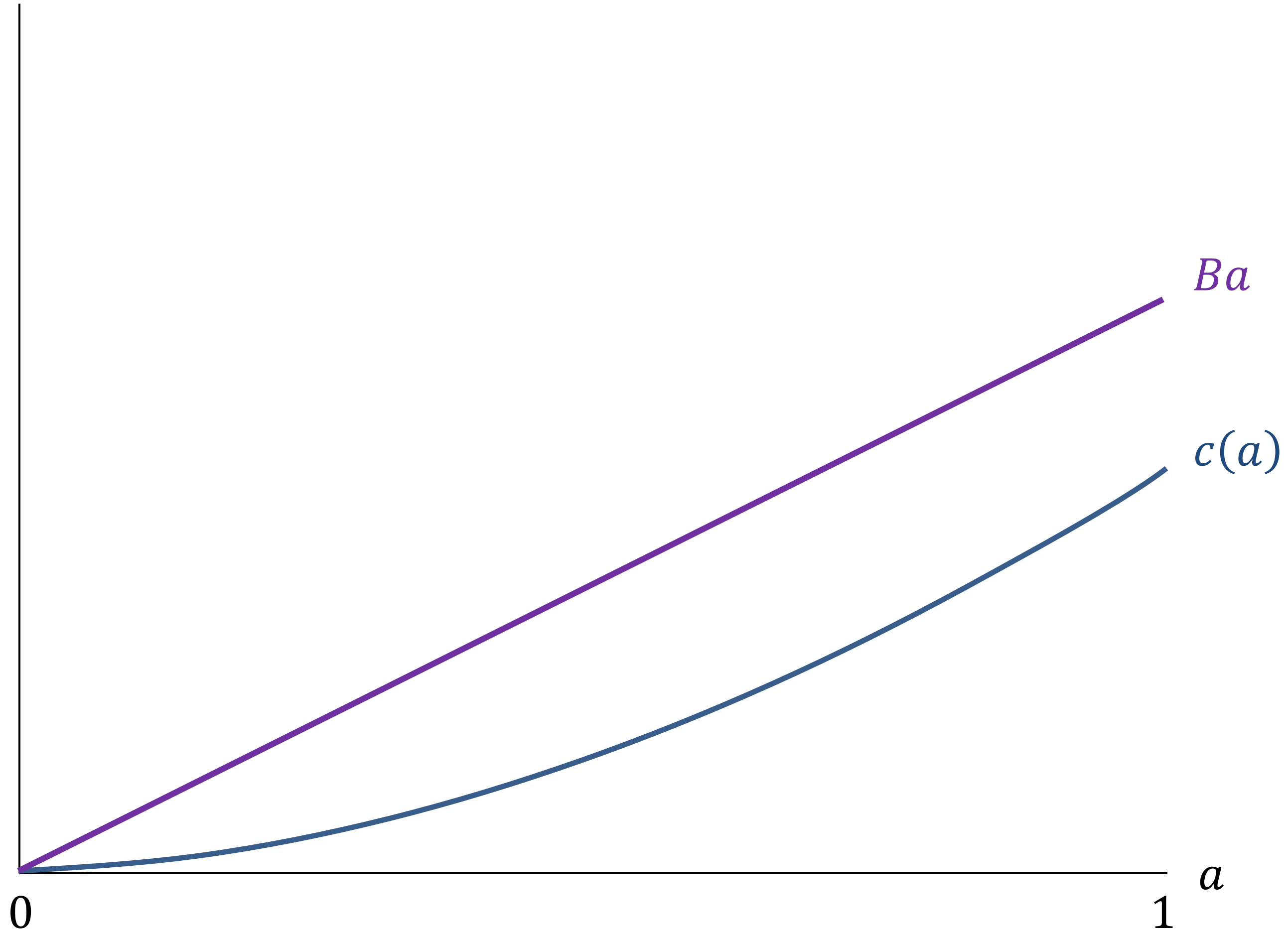
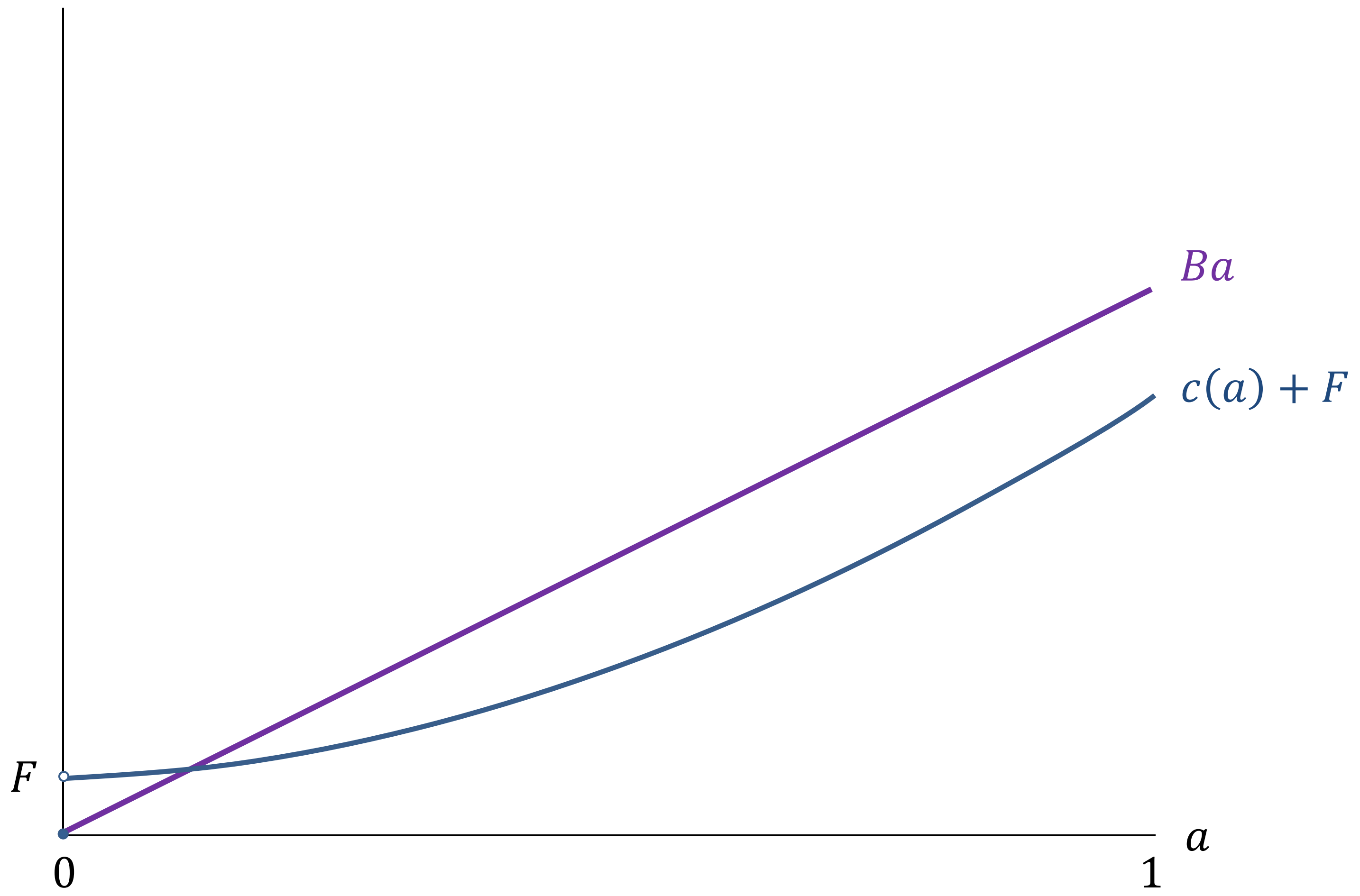


$B = MAC(a^{SB}) + MIC(a^{SB})$

What if Lumpy Investments are Involved?



Fixed Costs



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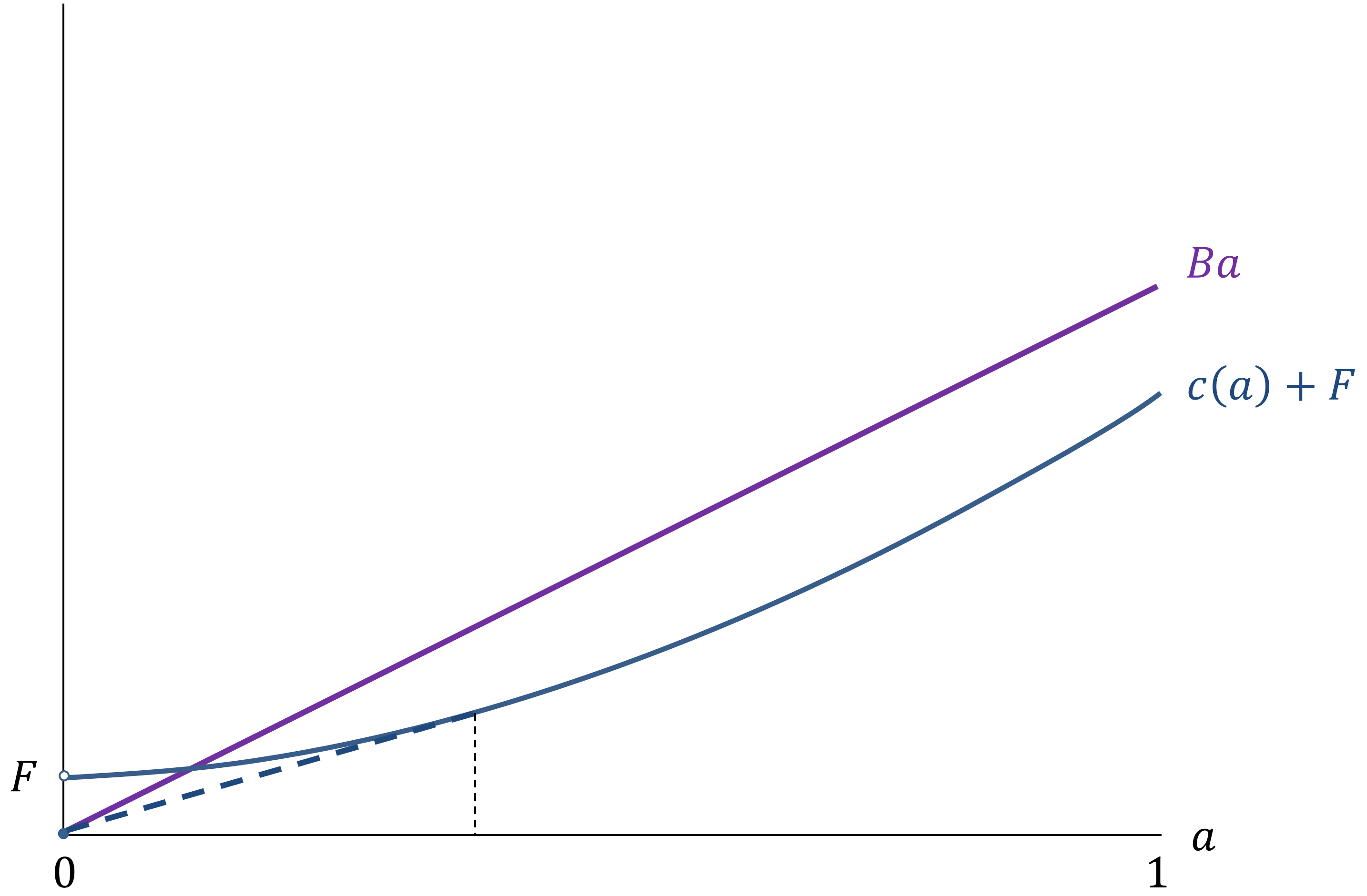
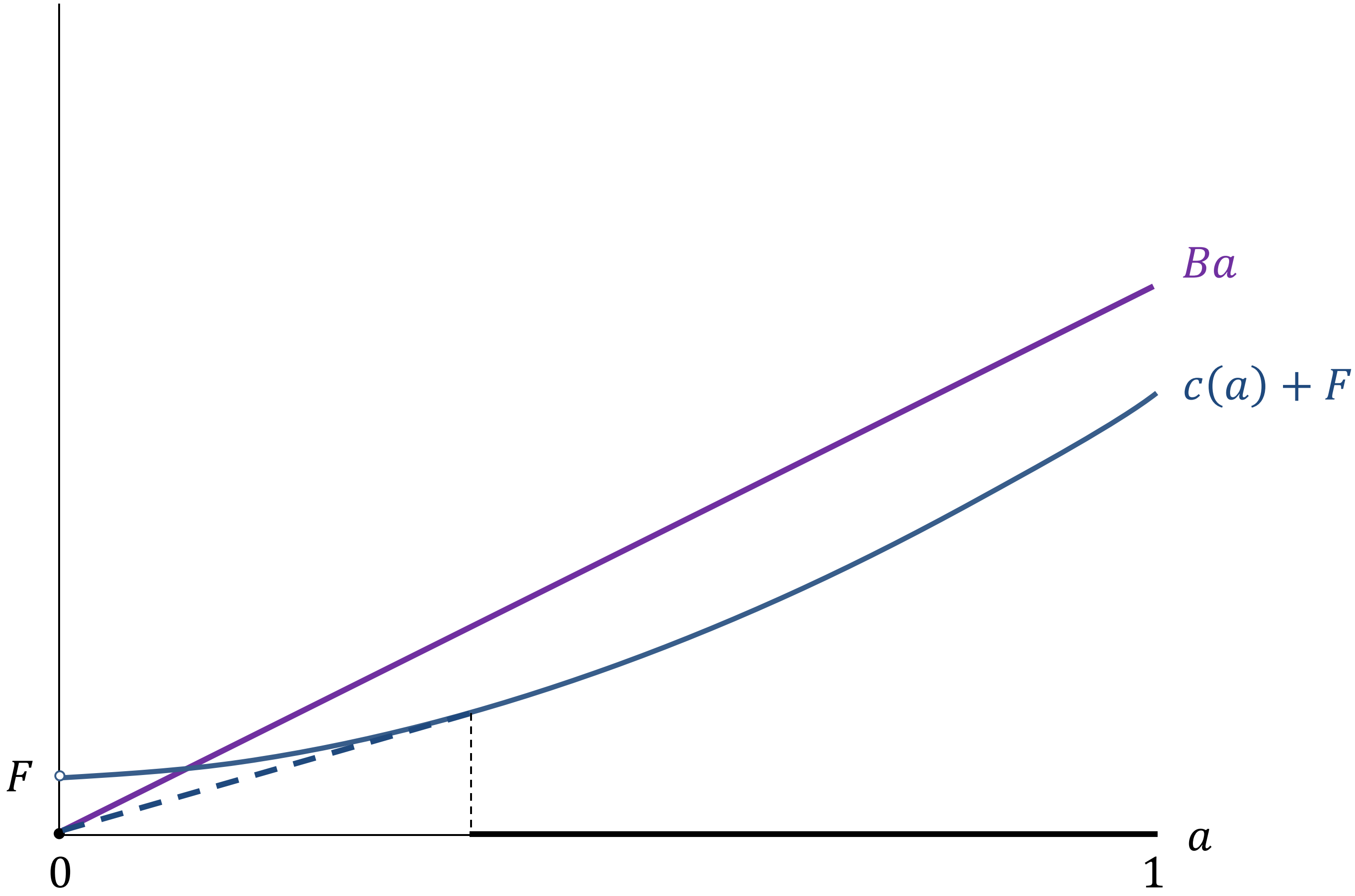


Can't Implement Everything



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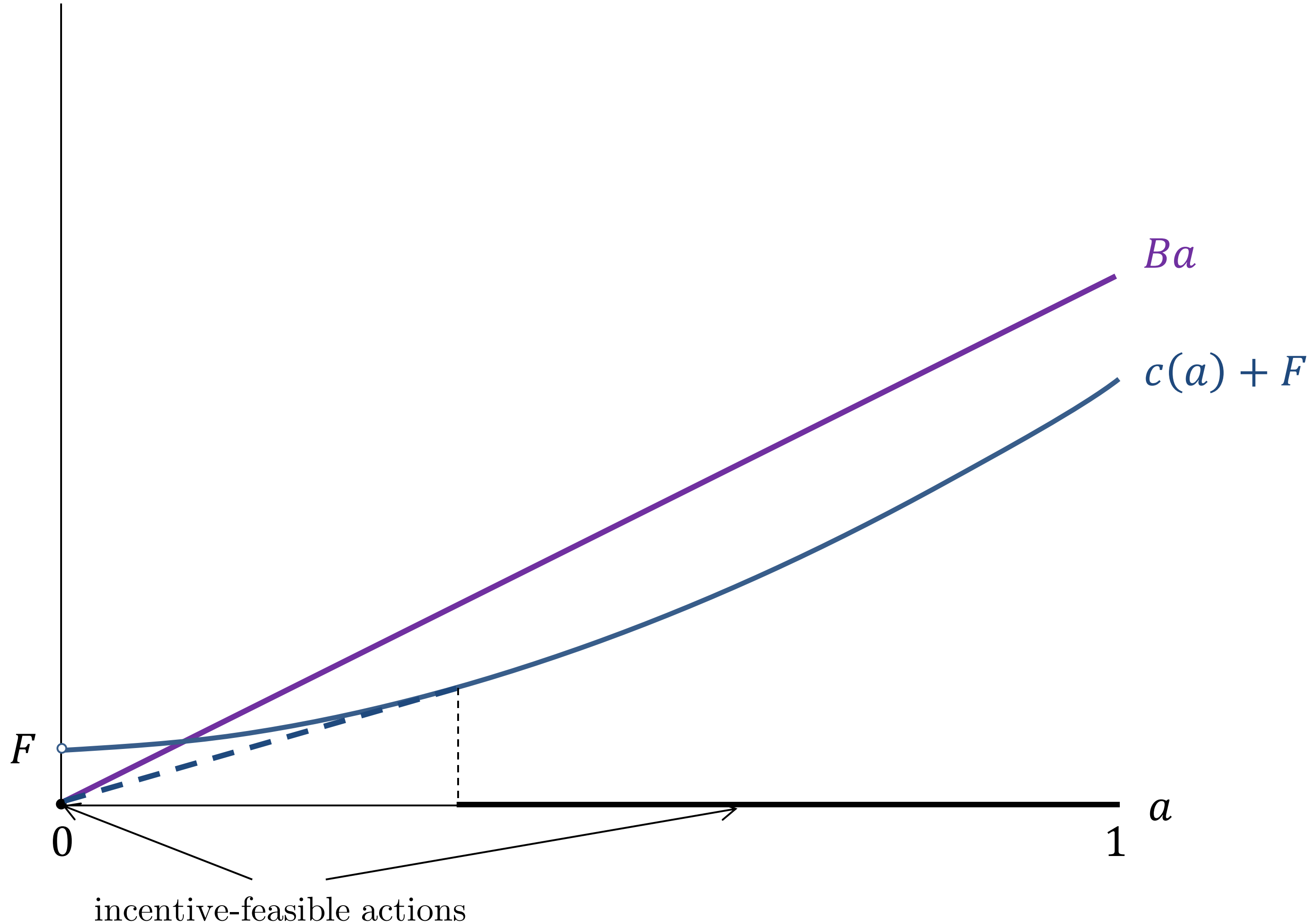

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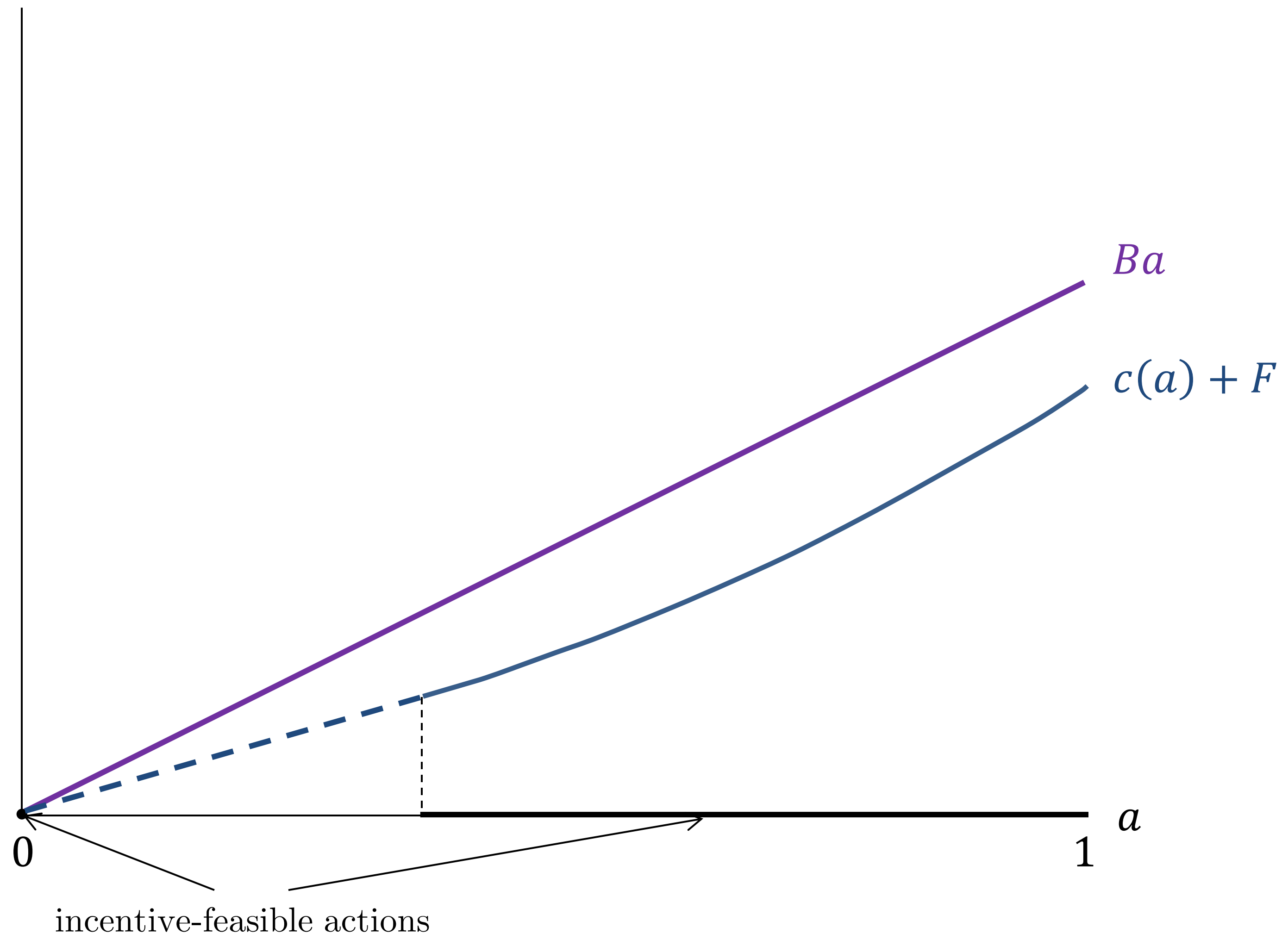
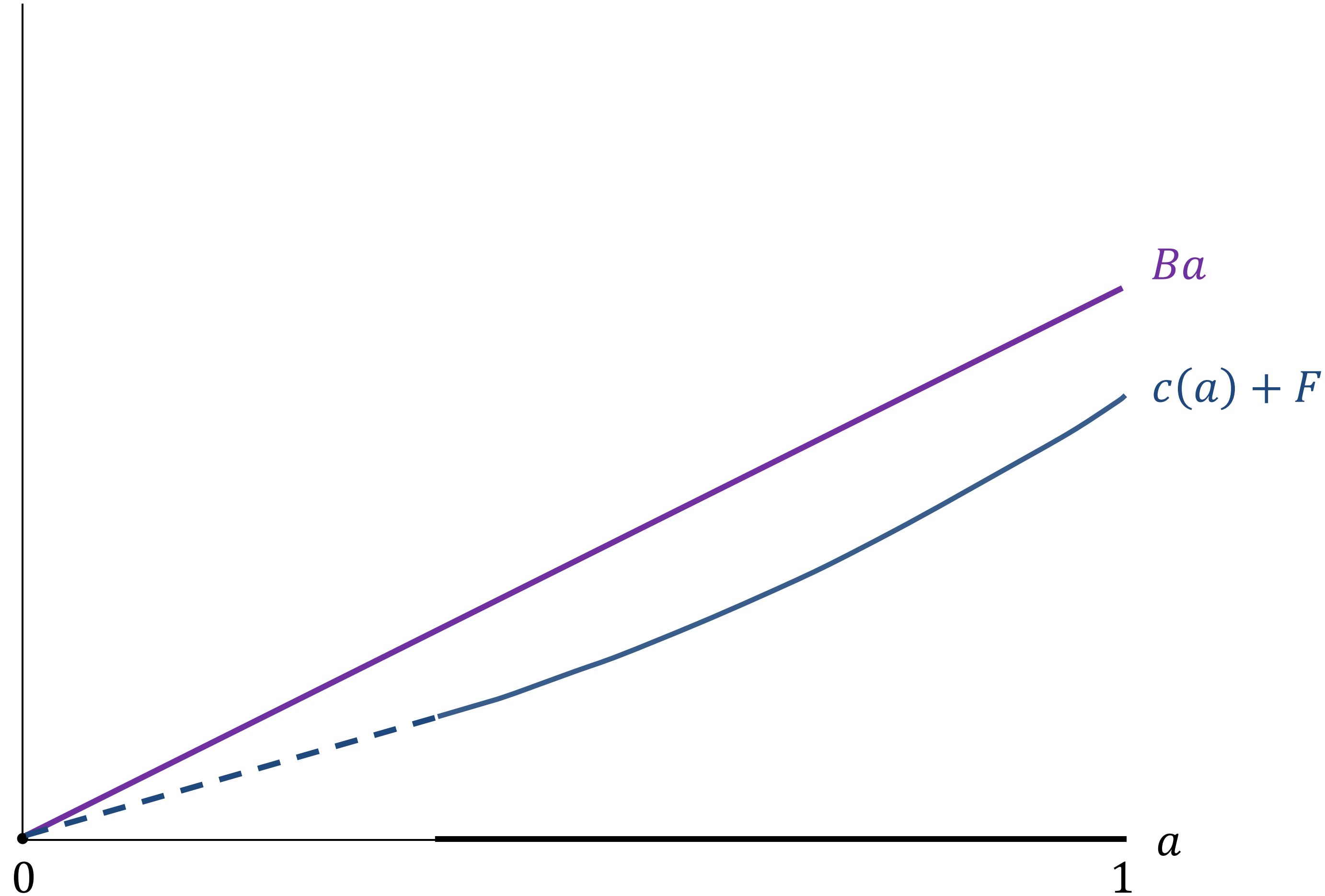


Single Payer's Cost Function



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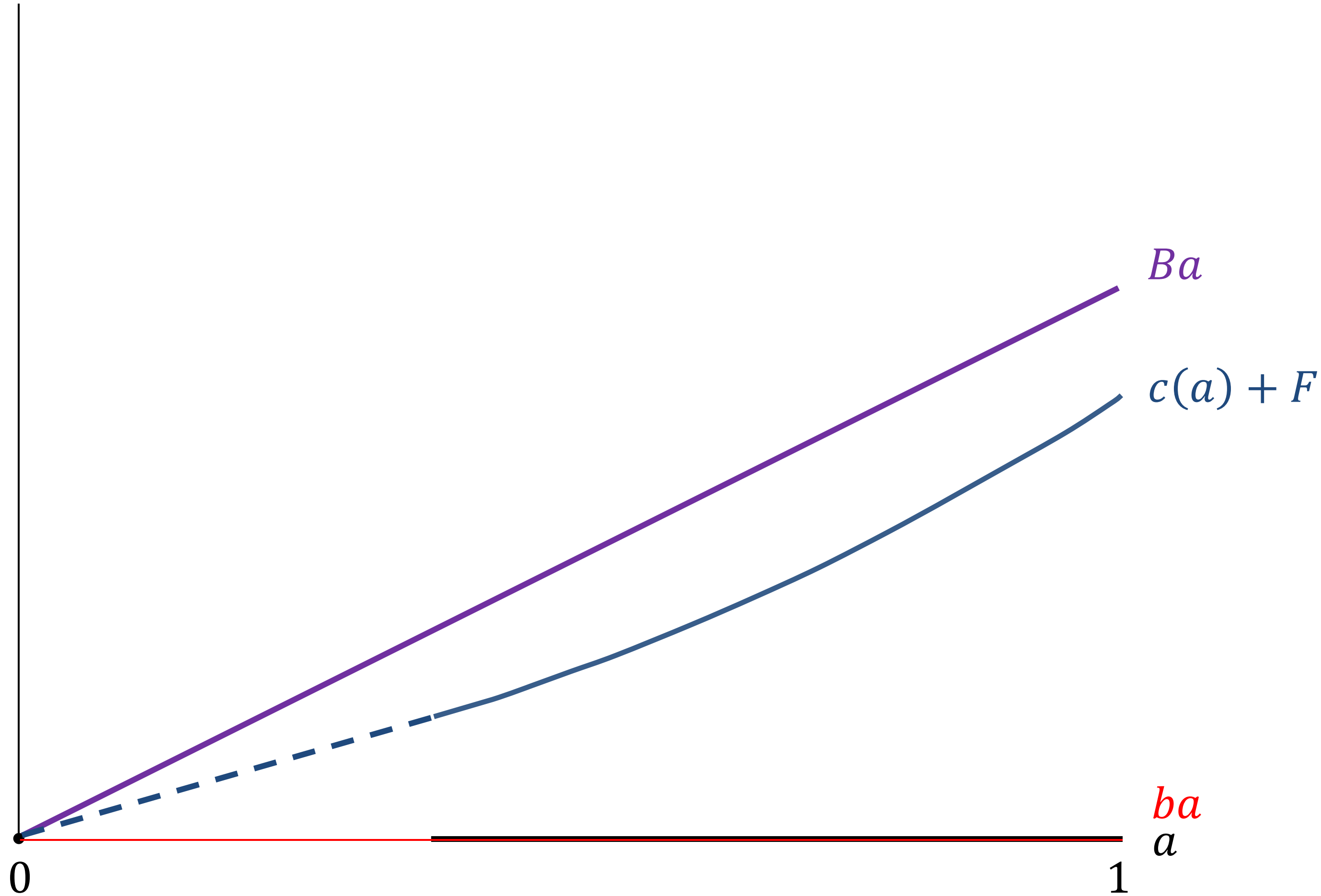

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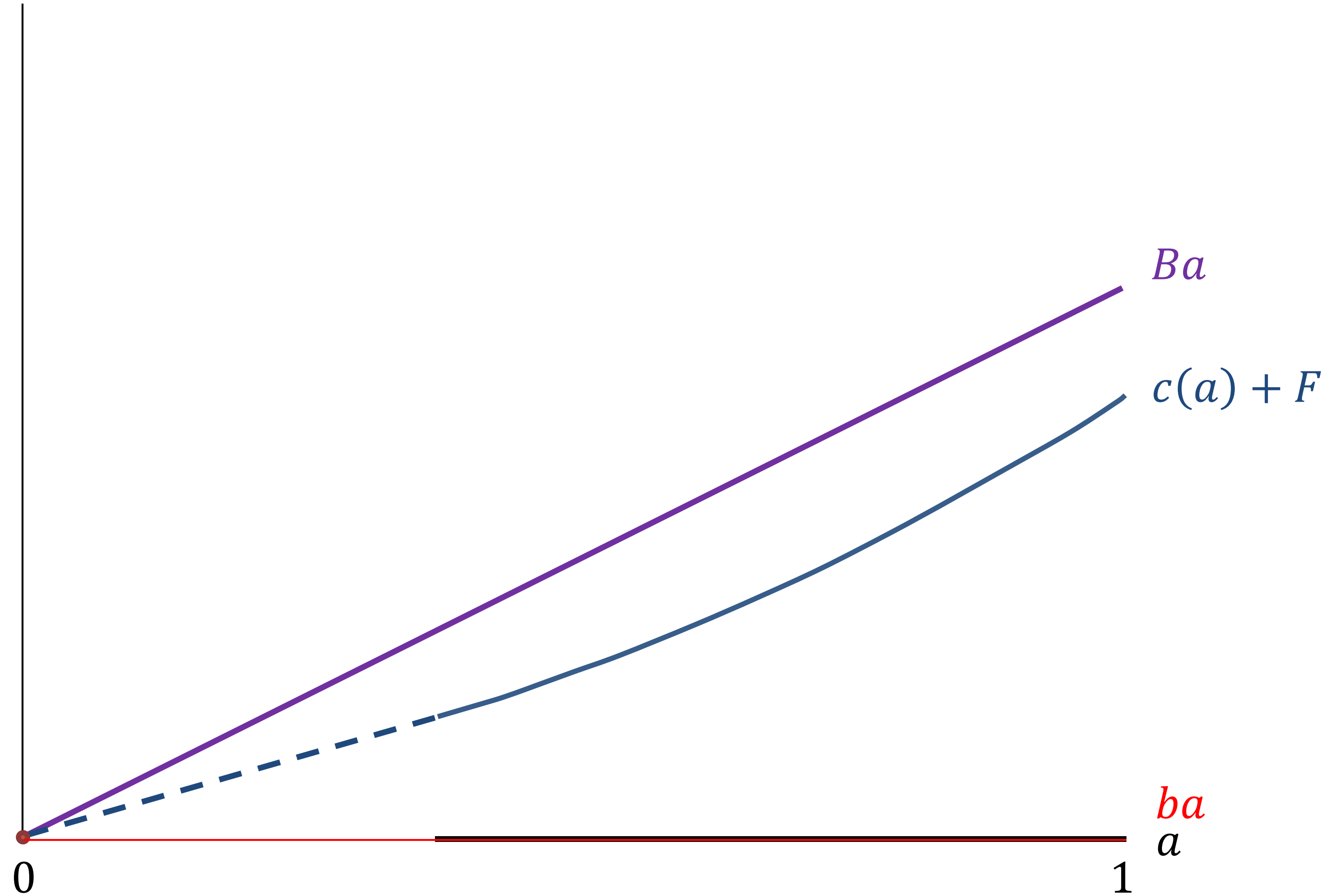

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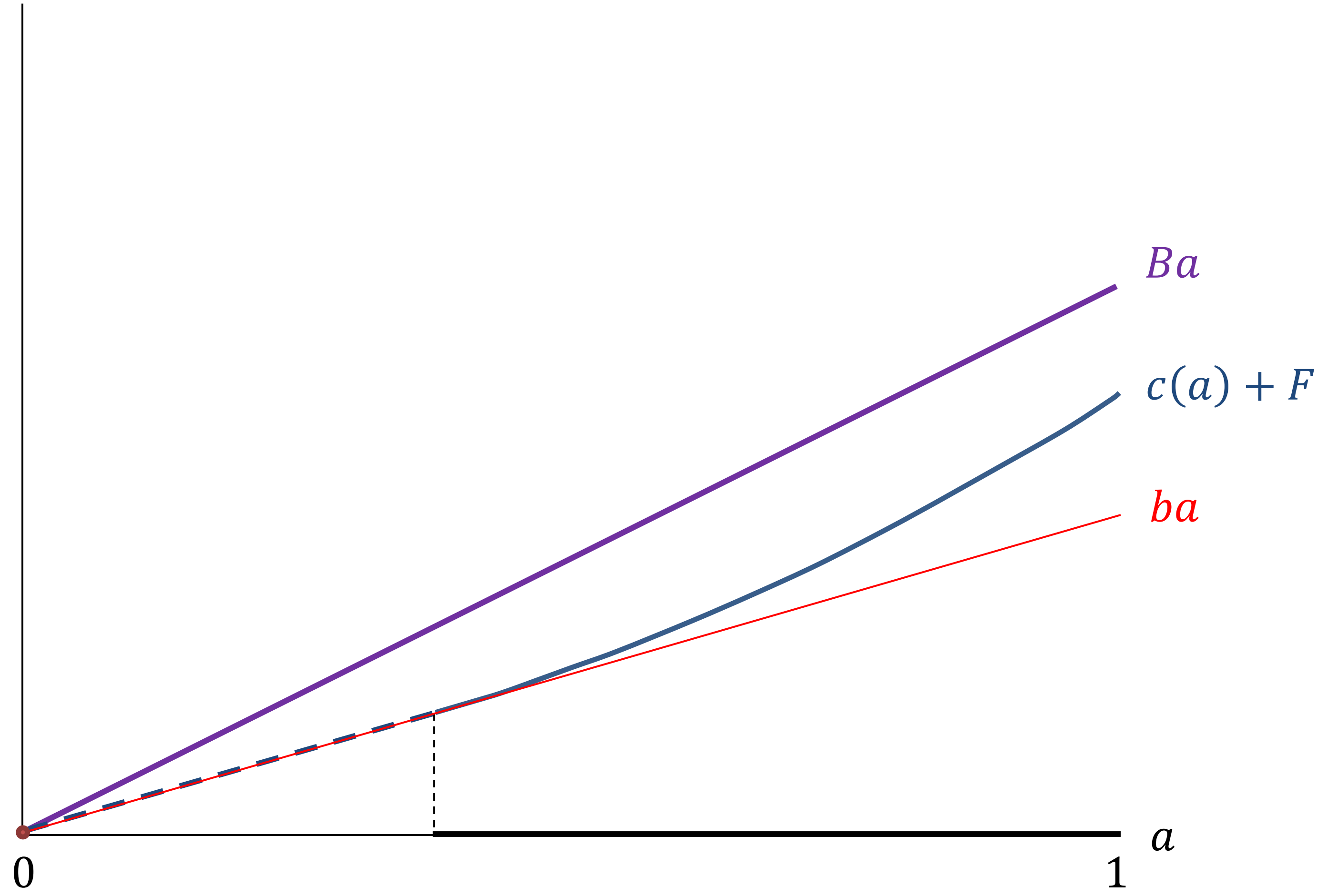

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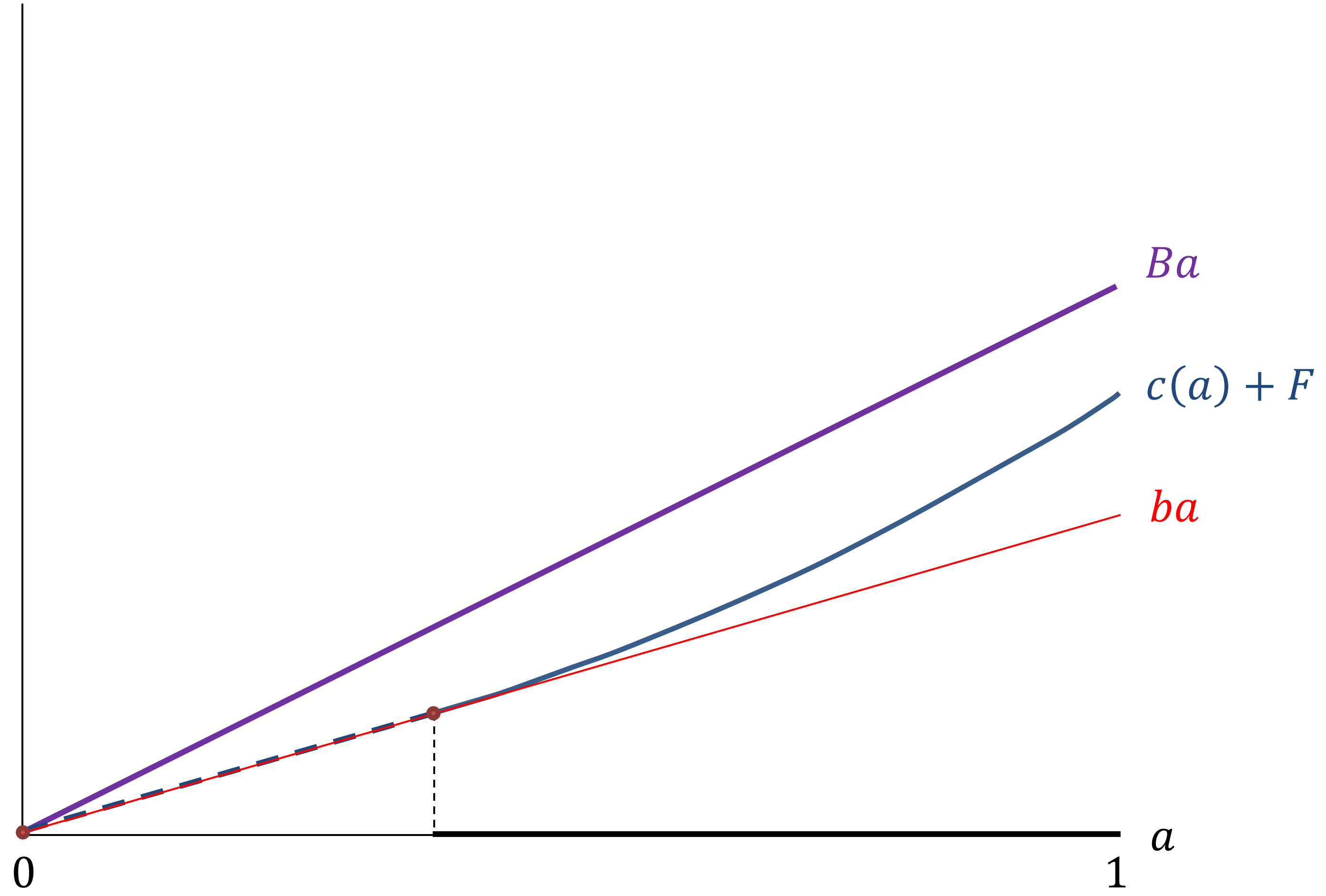

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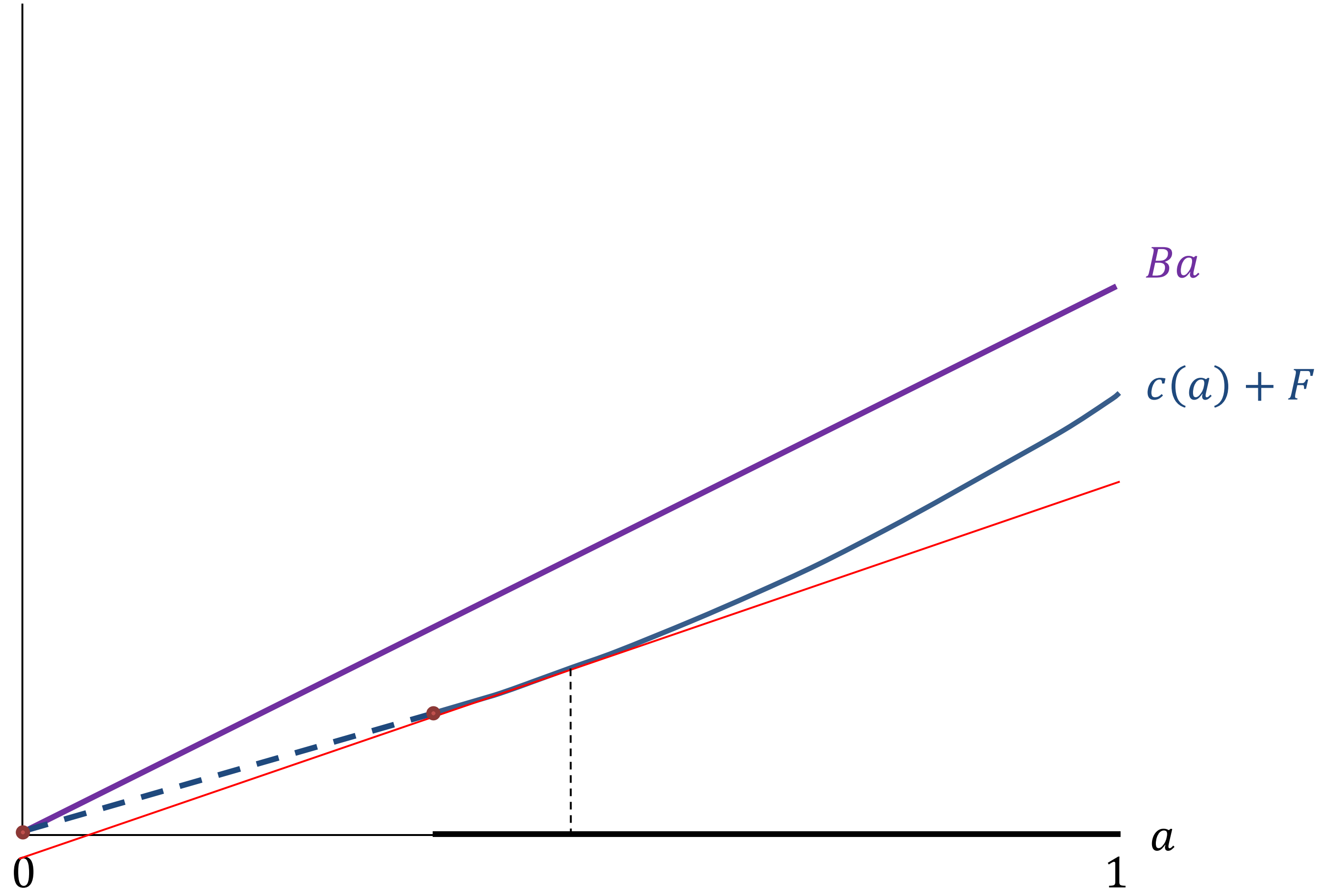

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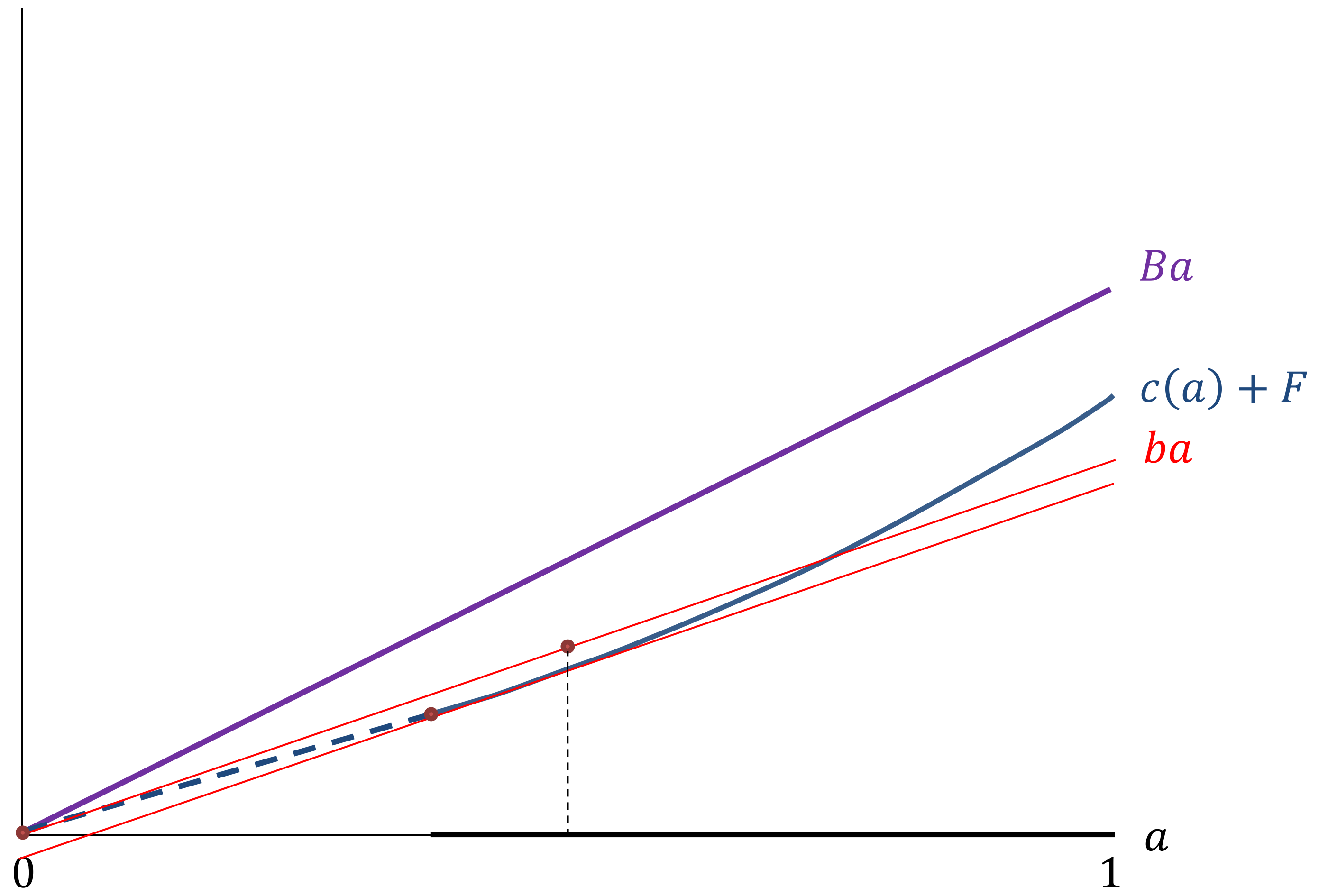

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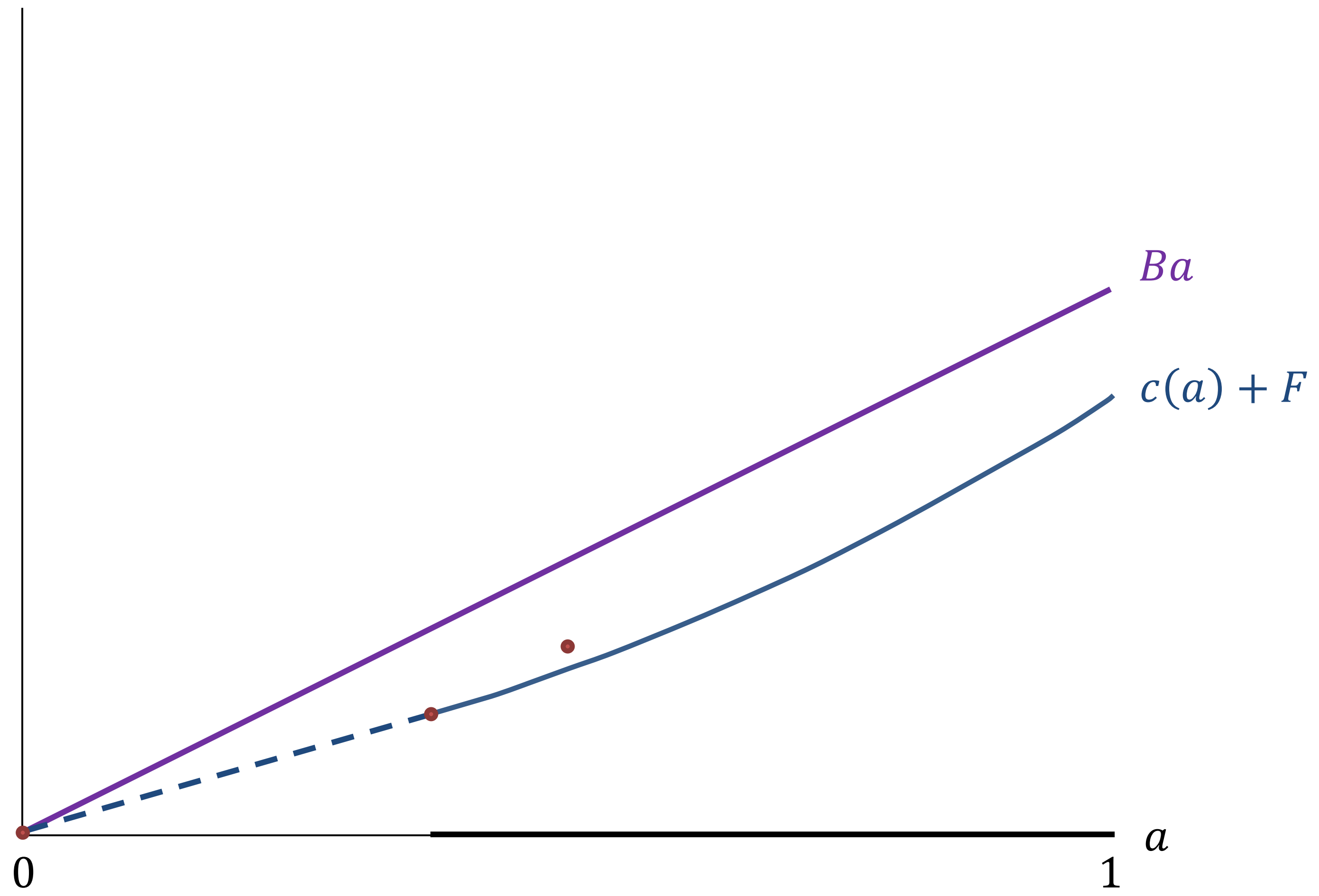

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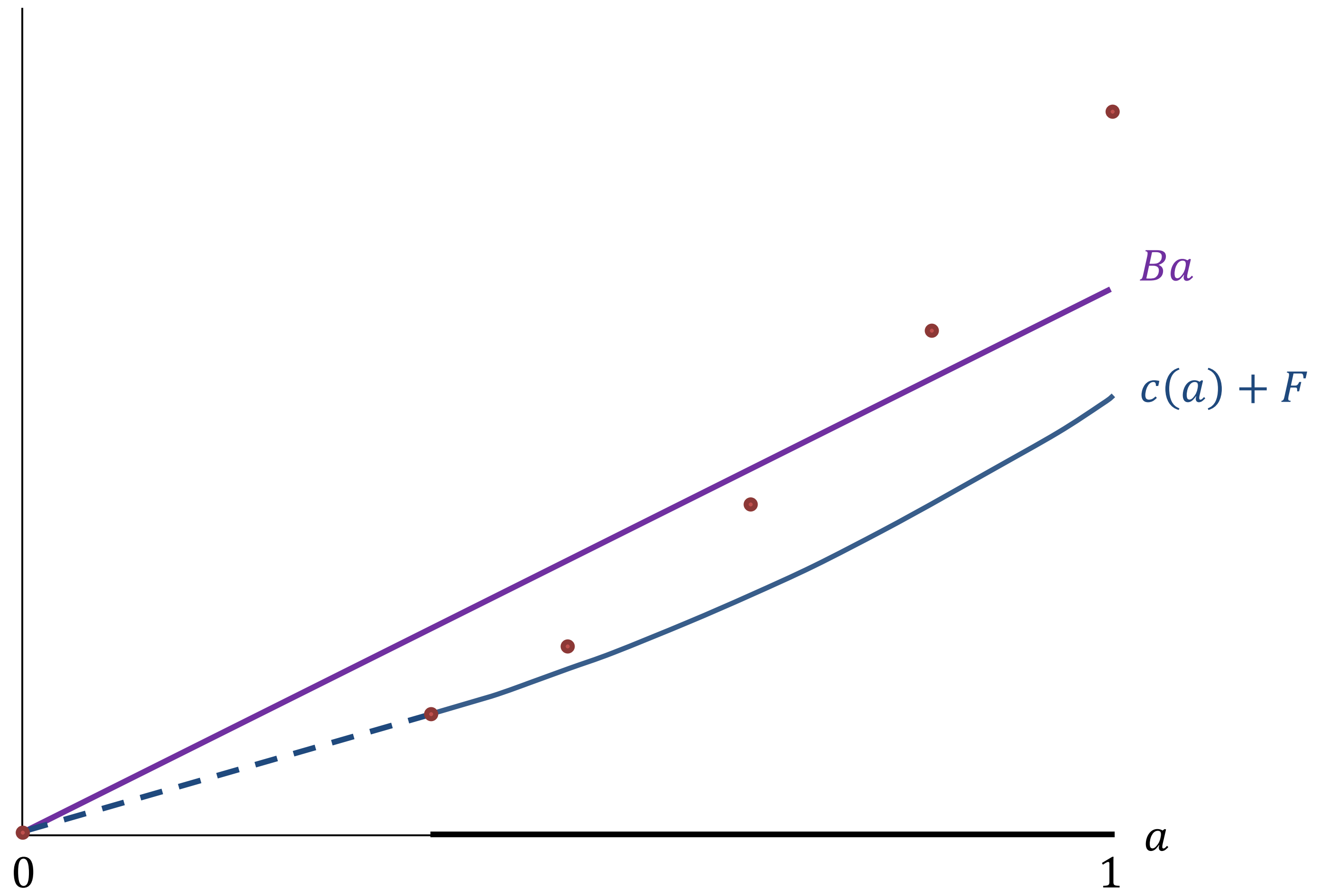

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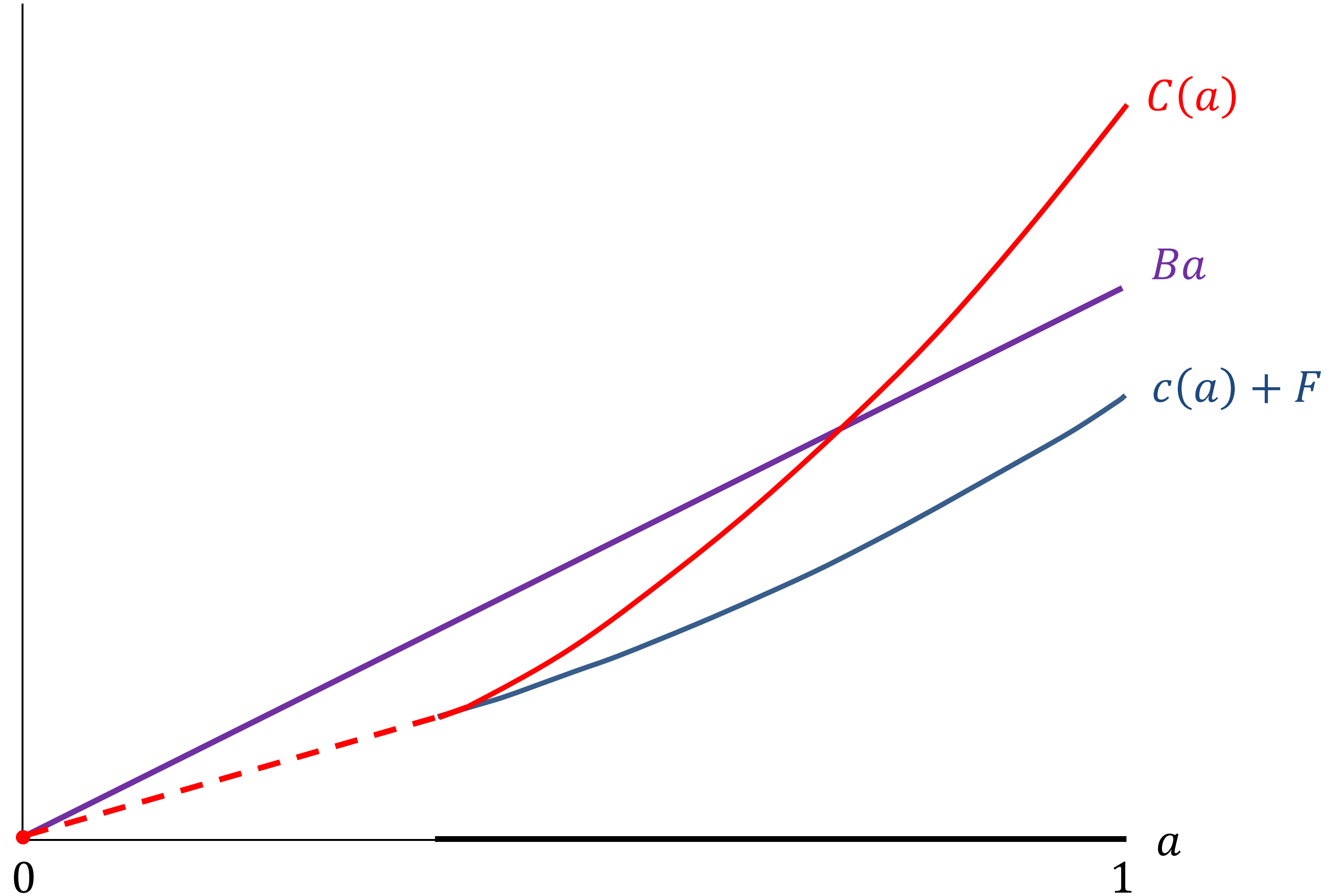
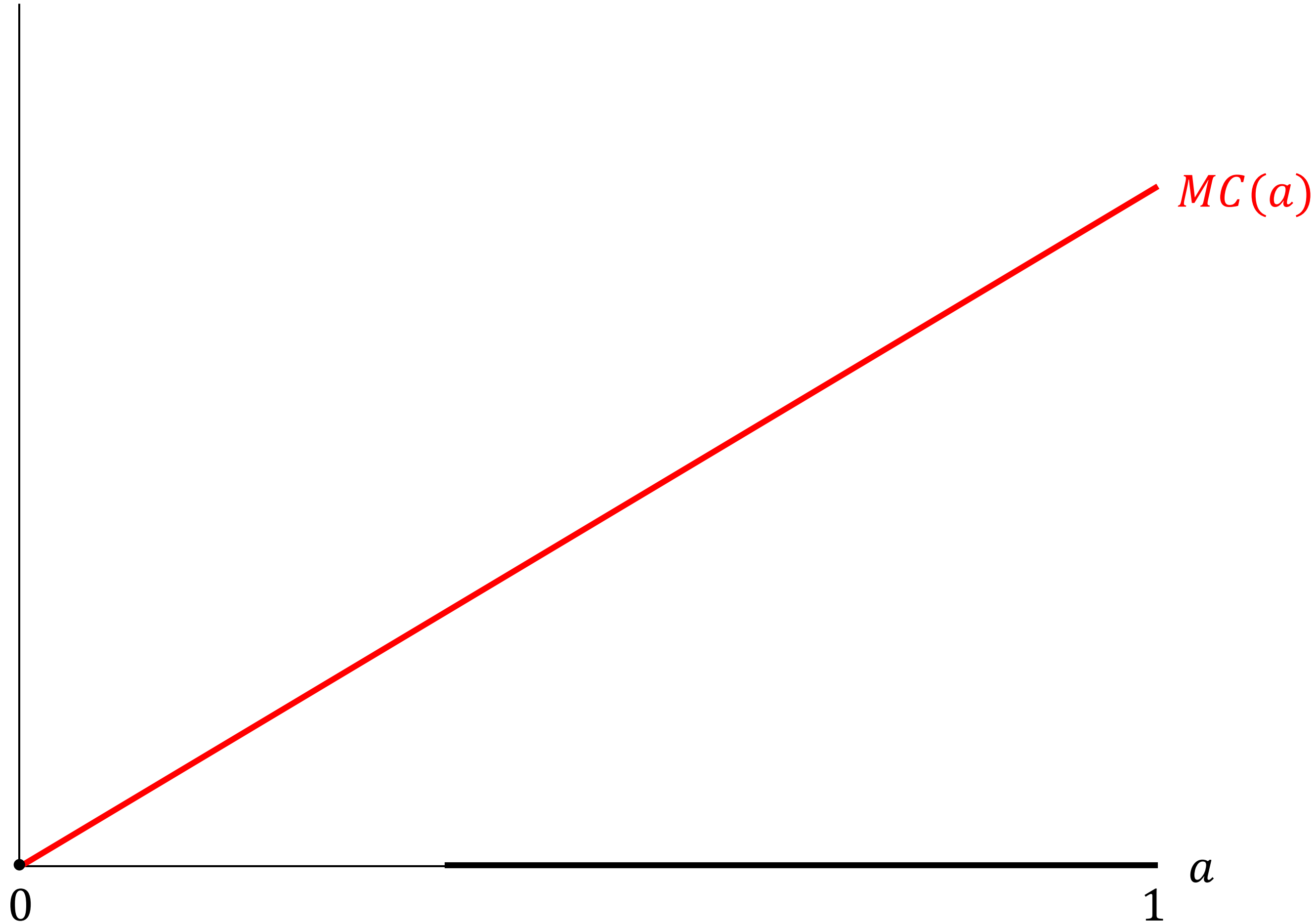


What Action to Implement?

Marginal Conditions

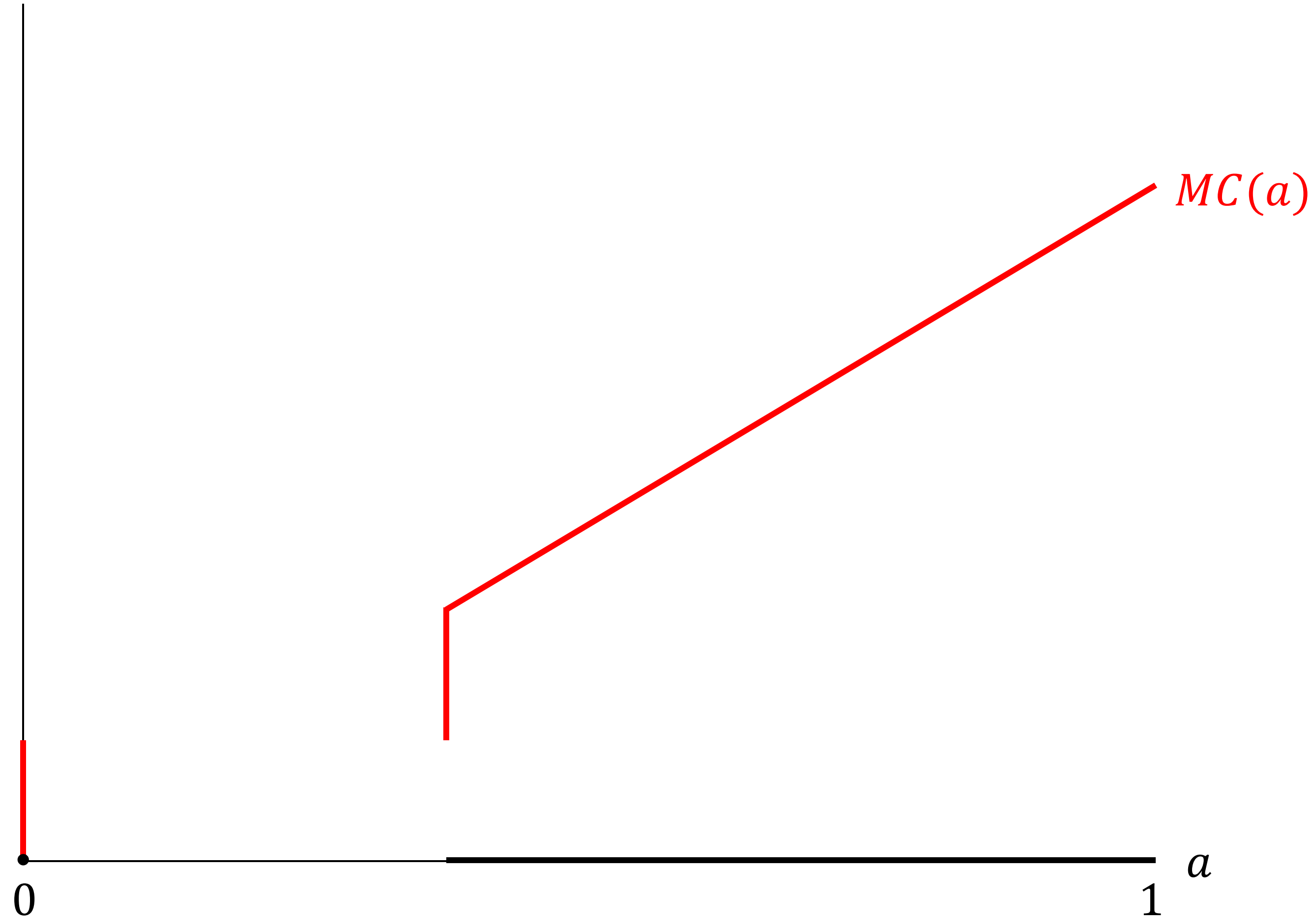
$$MC^{-}(a^{SB}) \leq B \leq MC^{+}(a^{SB})$$

Marginal Cost Correspondence



$$MC^{-}(a^{SB}) \leq B \leq MC^{+}(a^{SB})$$

Sticking Point at 0



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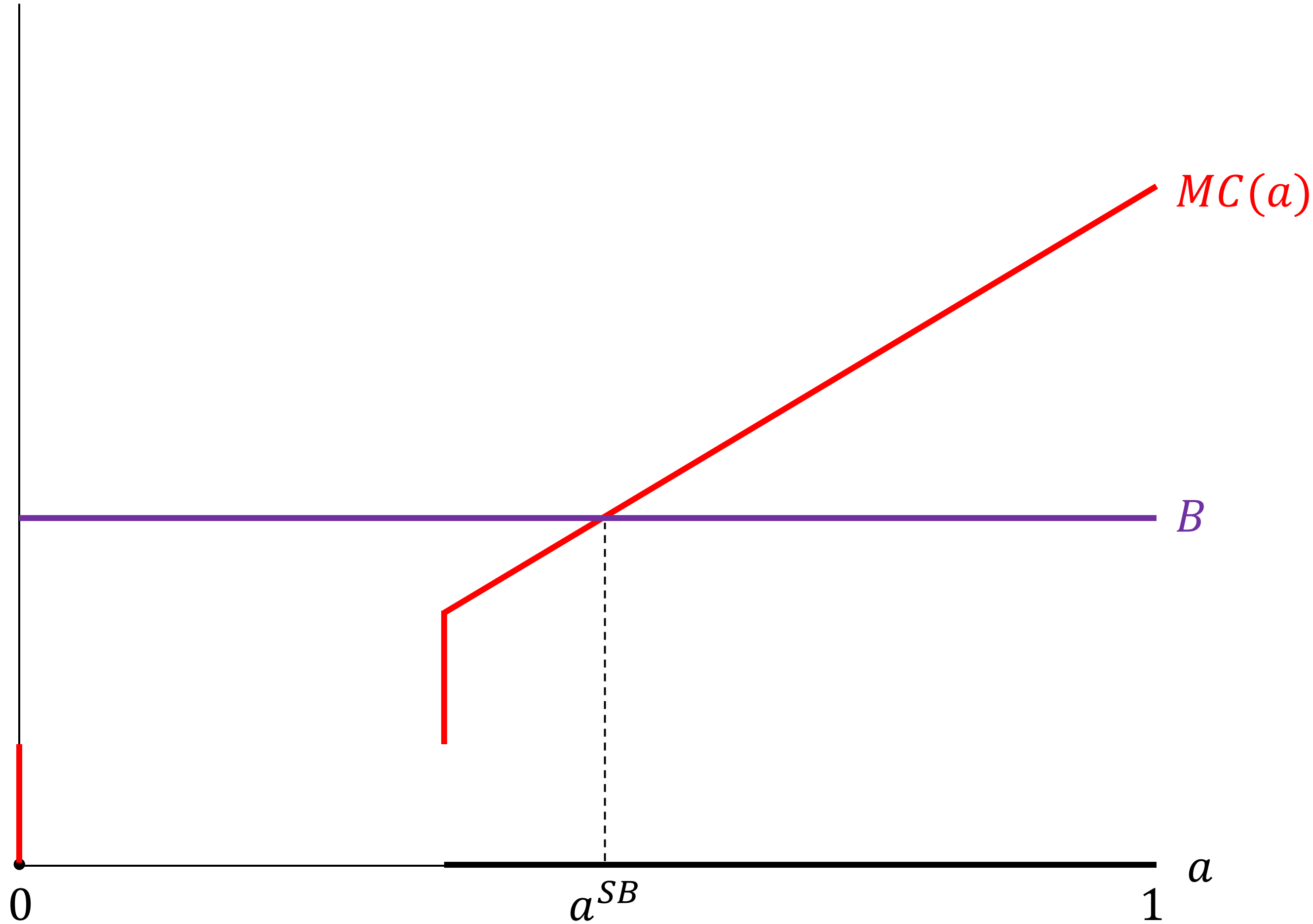
Second-Best Action



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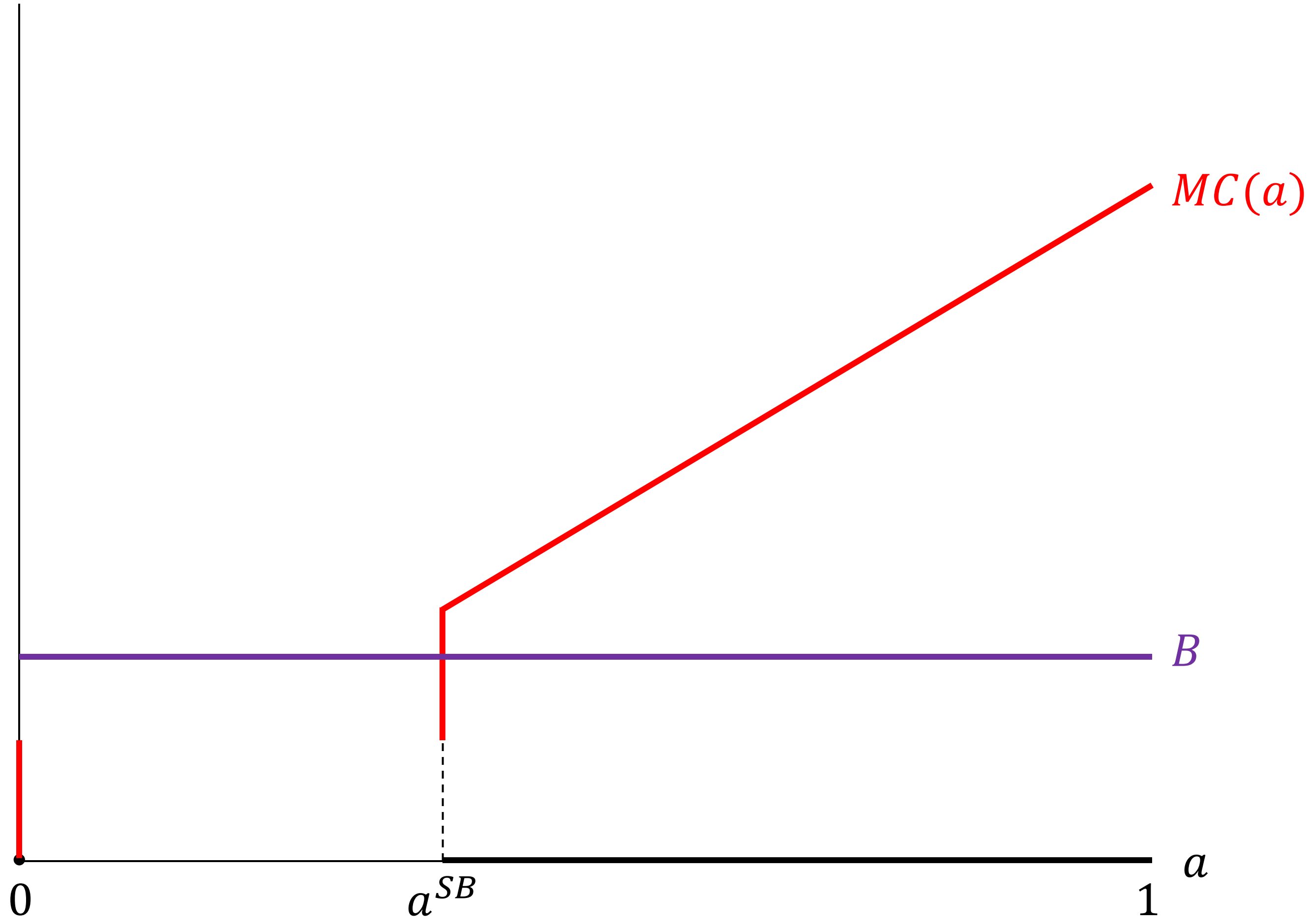

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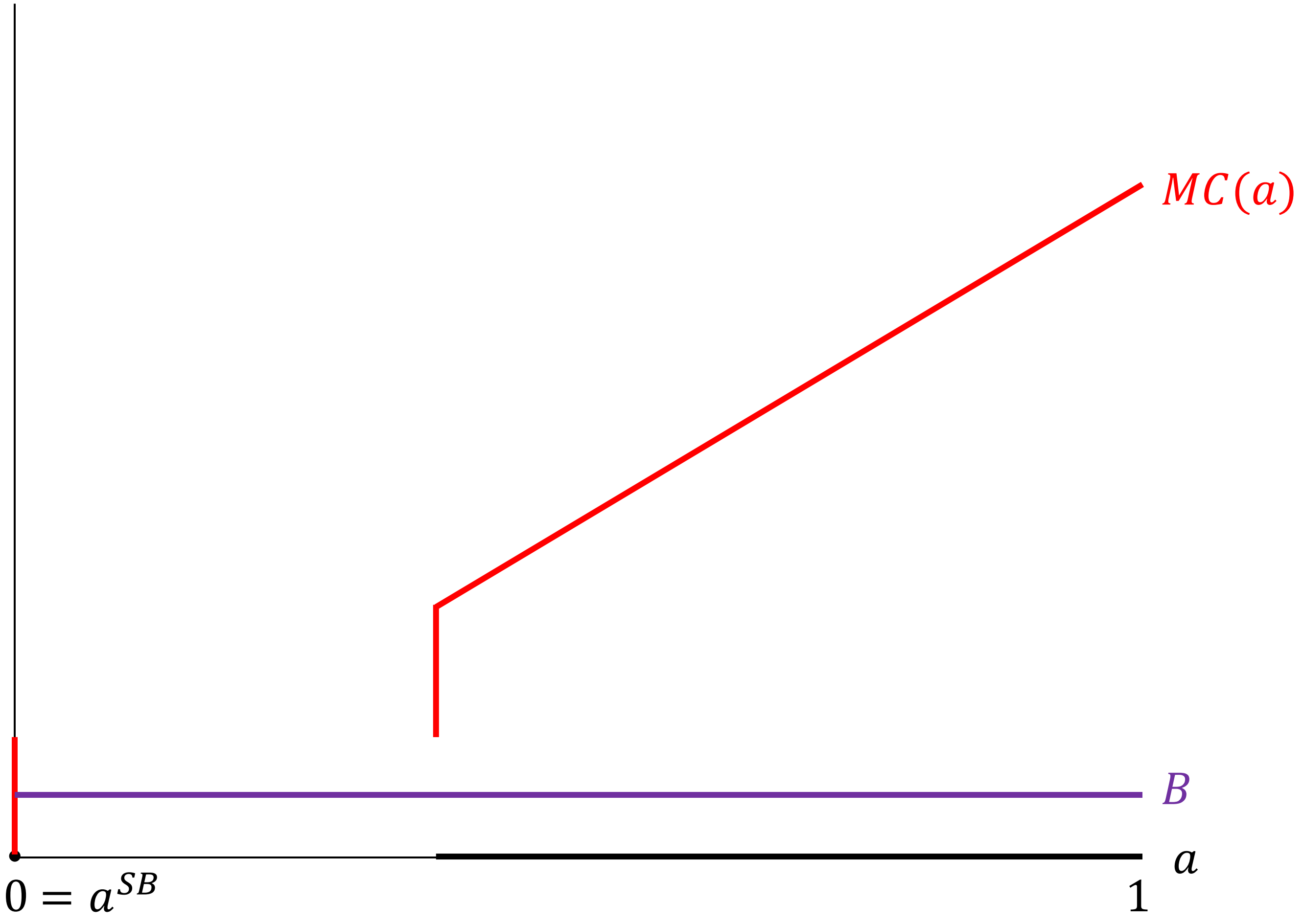
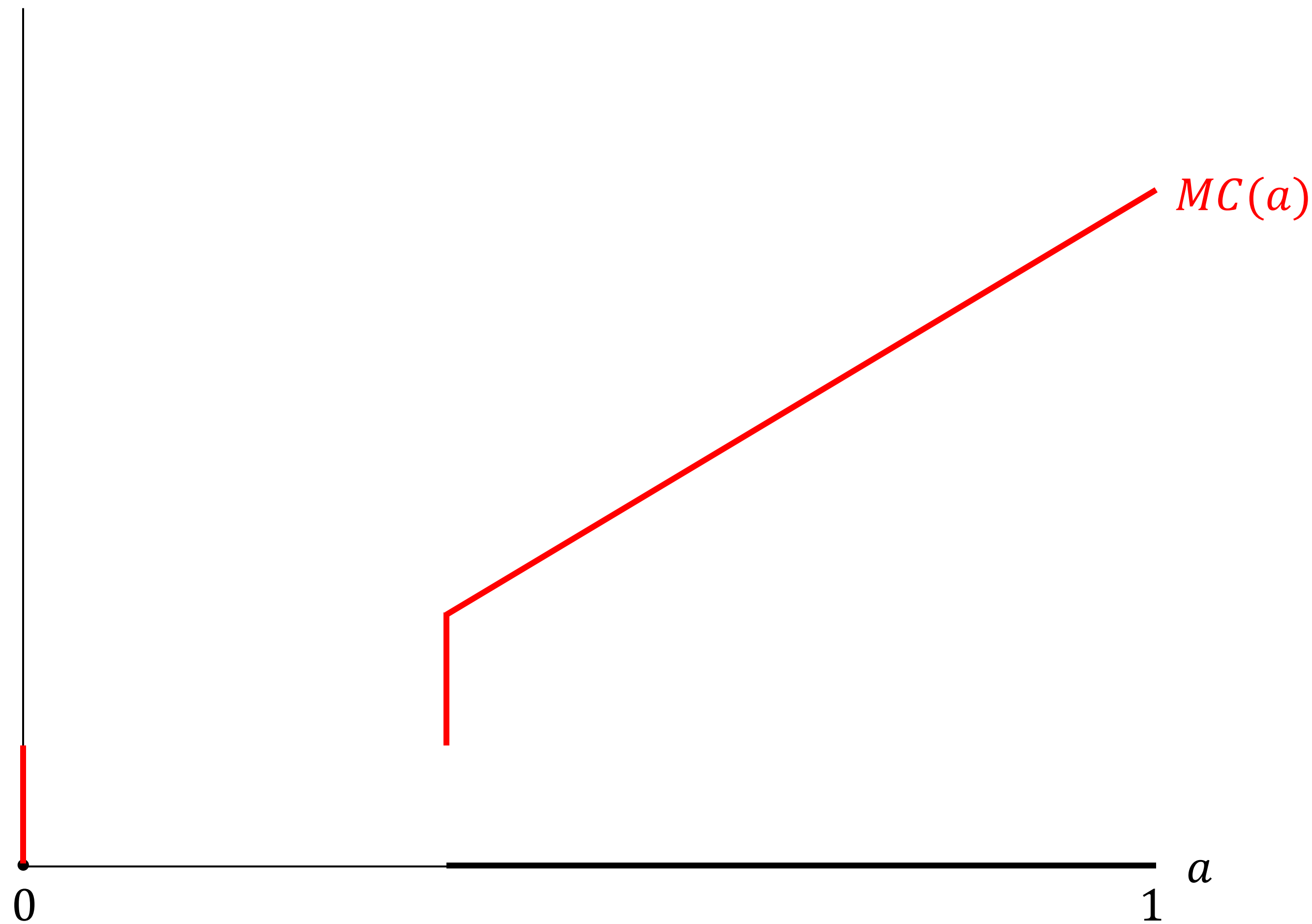


$$MC^{-}(a^{SB}) \leq B \leq MC^{+}(a^{SB})$$

Decompose Marginal Cost Correspondence



$$MAC^{-}(a^{SB}) + MIC^{-}(a^{SB}) \leq B \leq MAC^{+}(a^{SB}) + MIC^{+}(a^{SB})$$

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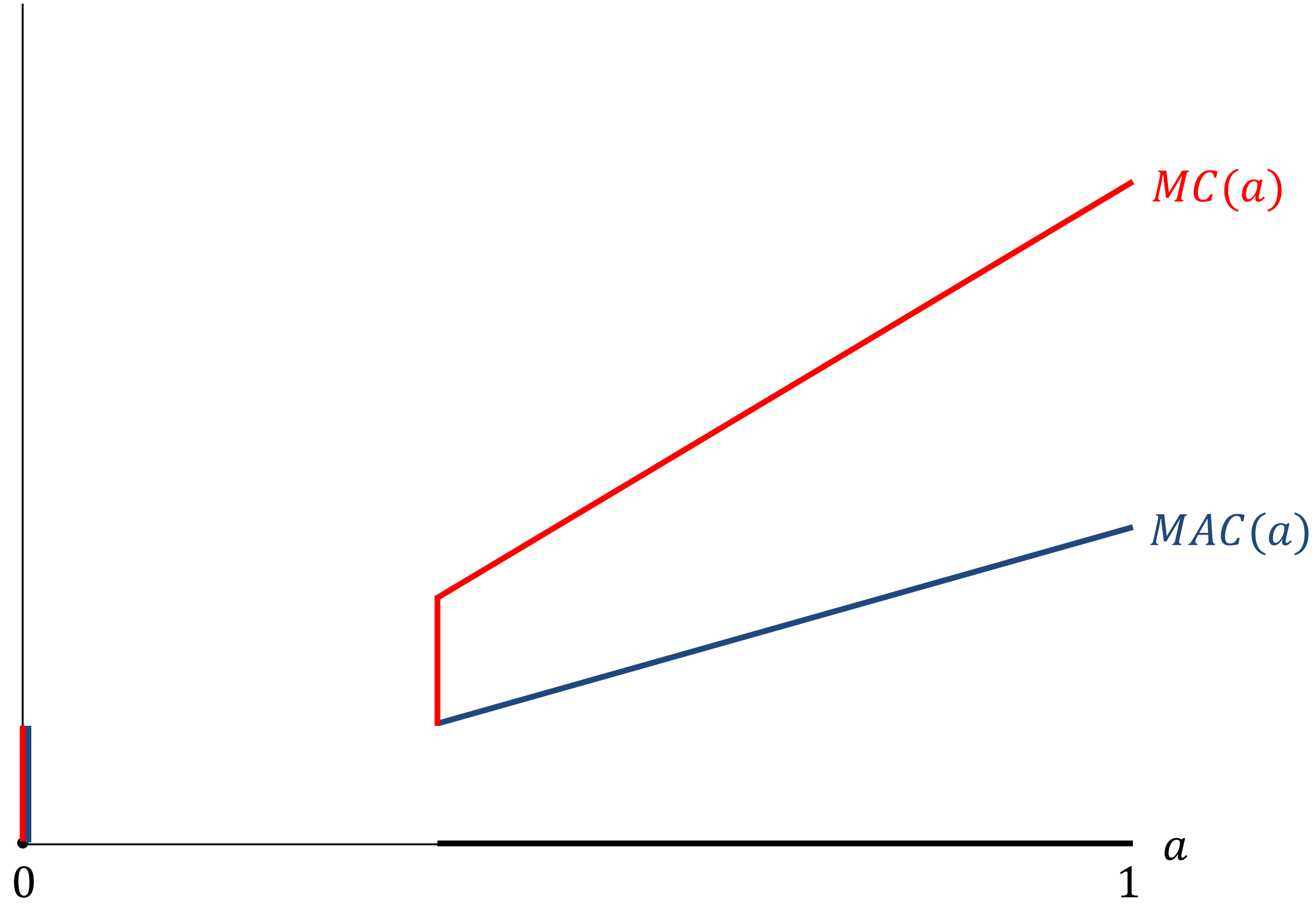

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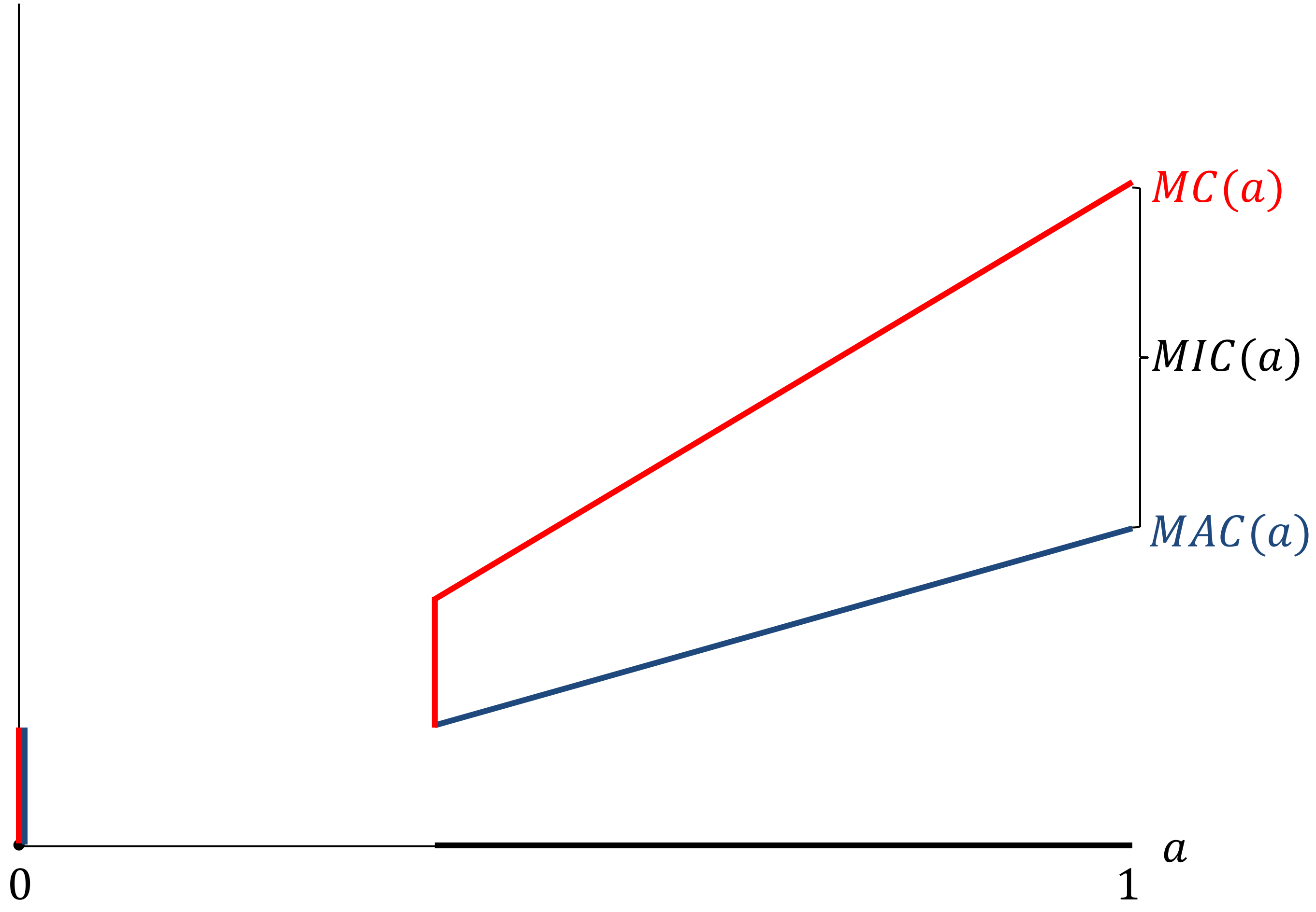

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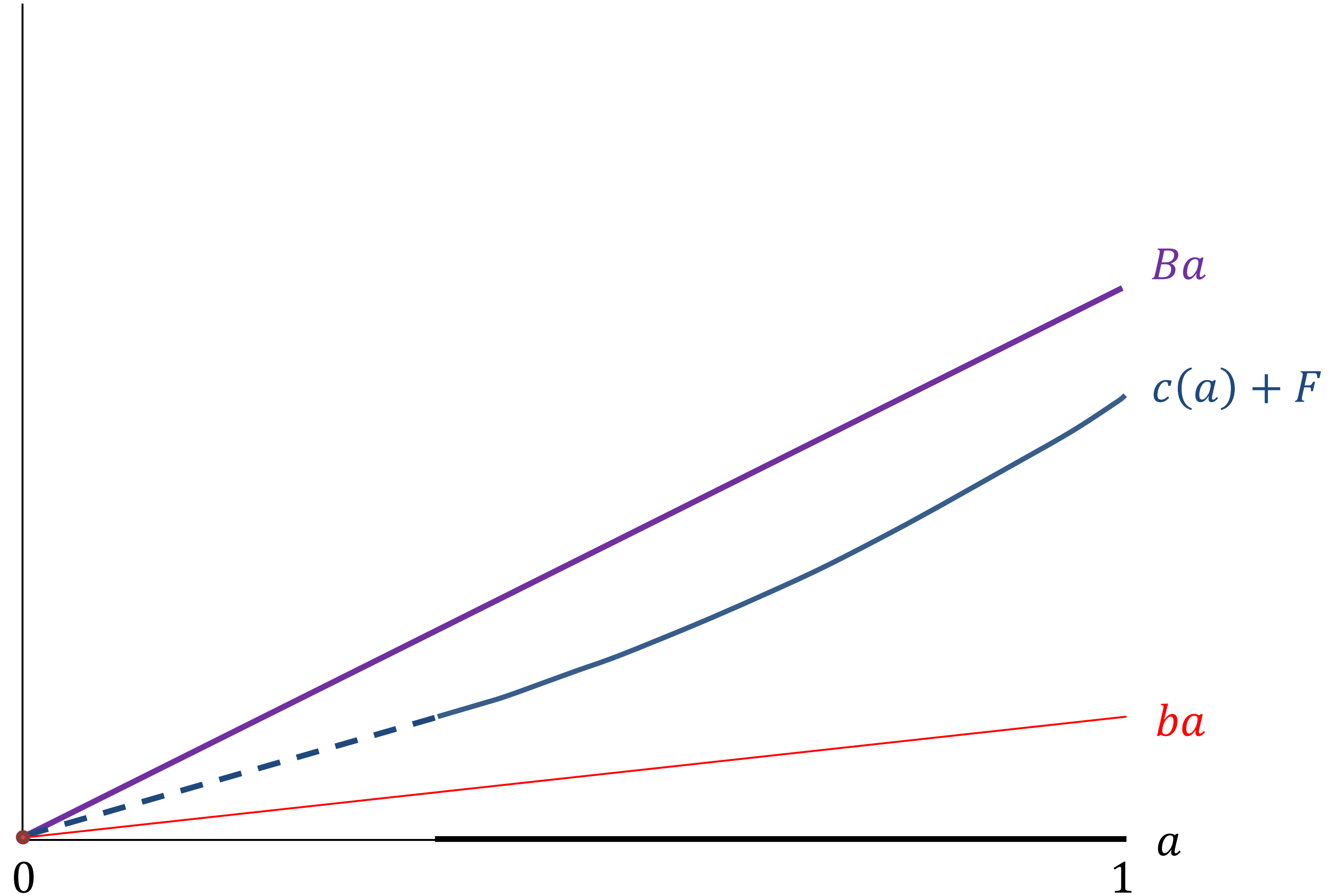
Notation and Terminology

Cost-minimizing contract b_a^* is the cheapest contract that gets provider to choose action a

Cost-minimizing contracts



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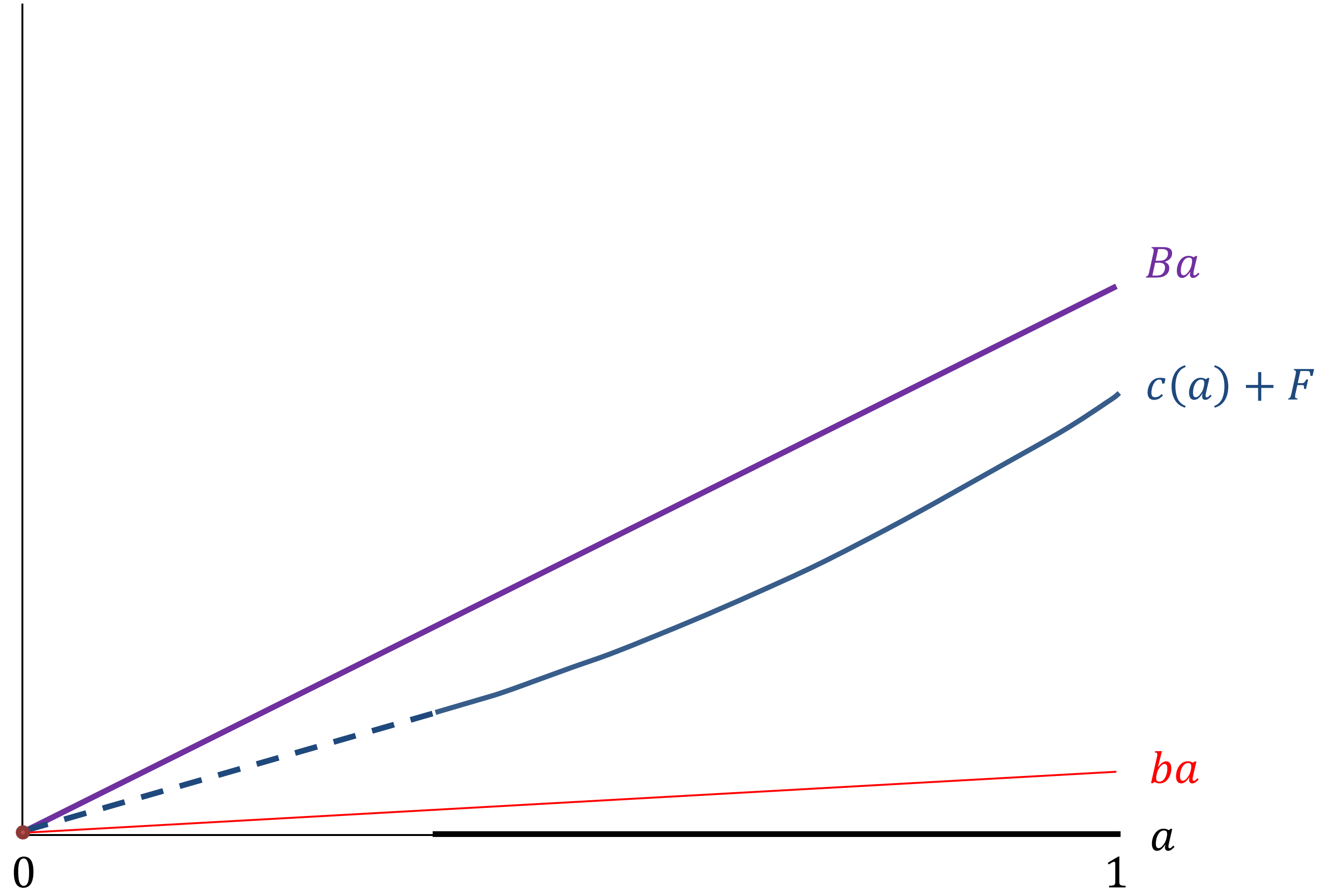

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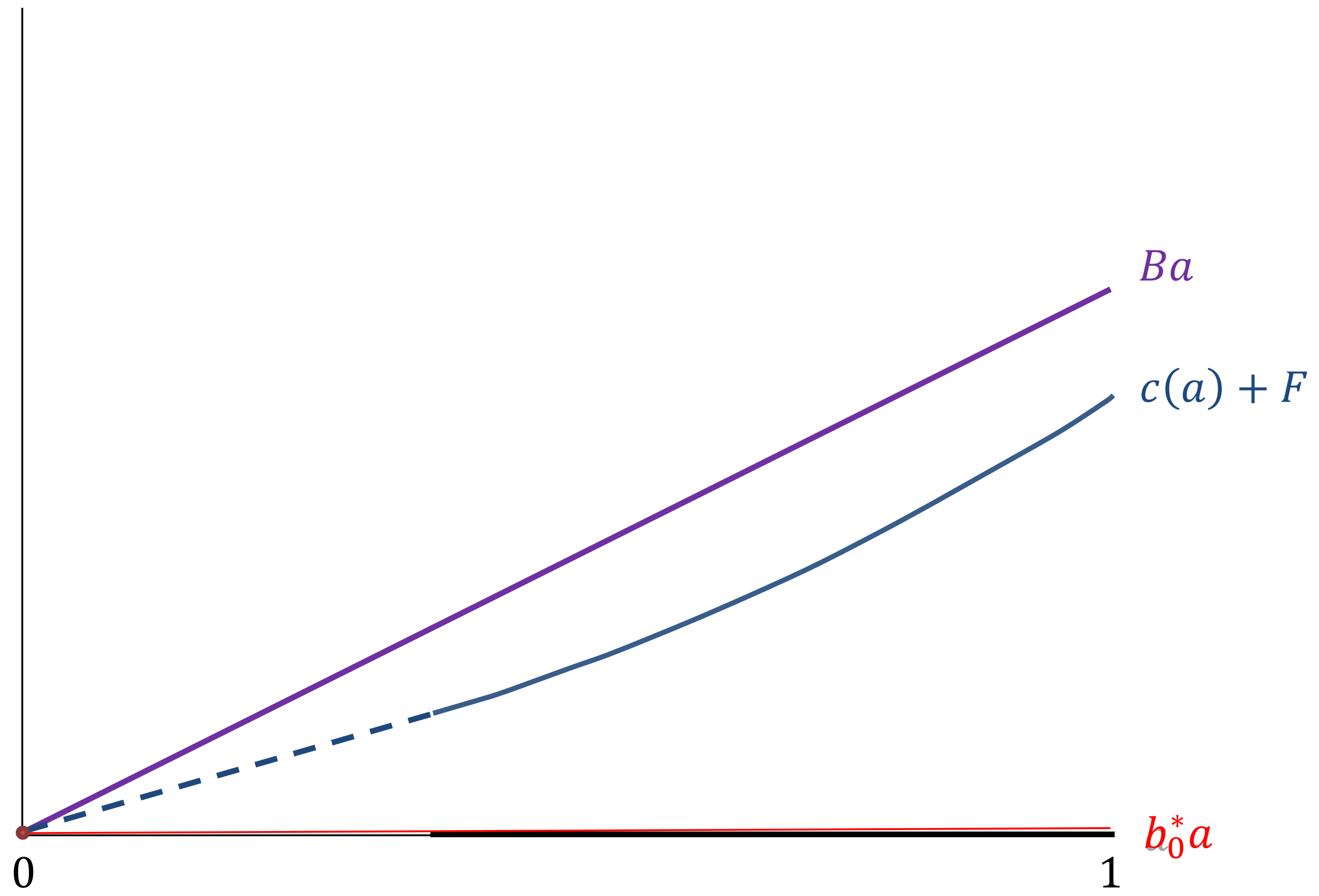

Notation and Terminology

Cost-minimizing contract b_a^* is the cheapest contract that gets provider to choose action a. Generally, $b_a^* = MAC^{-}(a)$.

Payer i **supports** action a if she offers $b_i = \frac{1}{N} b_a^*$

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Action $\overline{a}$ is an **equilibrium action** if whenever all other payers support action $\overline{a}$, payer i also wants to support action $\overline{a}$

Multiple-Payer Problem

$$\max_{b \geq (1-\frac{1}{N})\bar{b}} \frac{1}{N} B a(b) - (b a(b) - (1 - \frac{1}{N})\bar{b} a(b))$$

Multiple-Payer Problem

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Multiple-Payer Problem

$$\max_{a} \frac{1}{N} Ba - (b_a^* a - (1 - \frac{1}{N}) b_{\bar{a}}^* a)$$

Multiple-Payer Problem

$$\max_{a} \frac{1}{N} Ba - (C(a) - (1 - \frac{1}{N}) b_{\bar{a}}^{*} a)$$

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$$\max_a \frac{1}{N} Ba - (C(a) - (1 - \frac{1}{N}) MAC^{-}(\bar{a})a)$$

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Marginal Conditions

$$C_i(a, \bar{a}) = C(a) - (1 - \frac{1}{N})MAC^-(\bar{a})a$$

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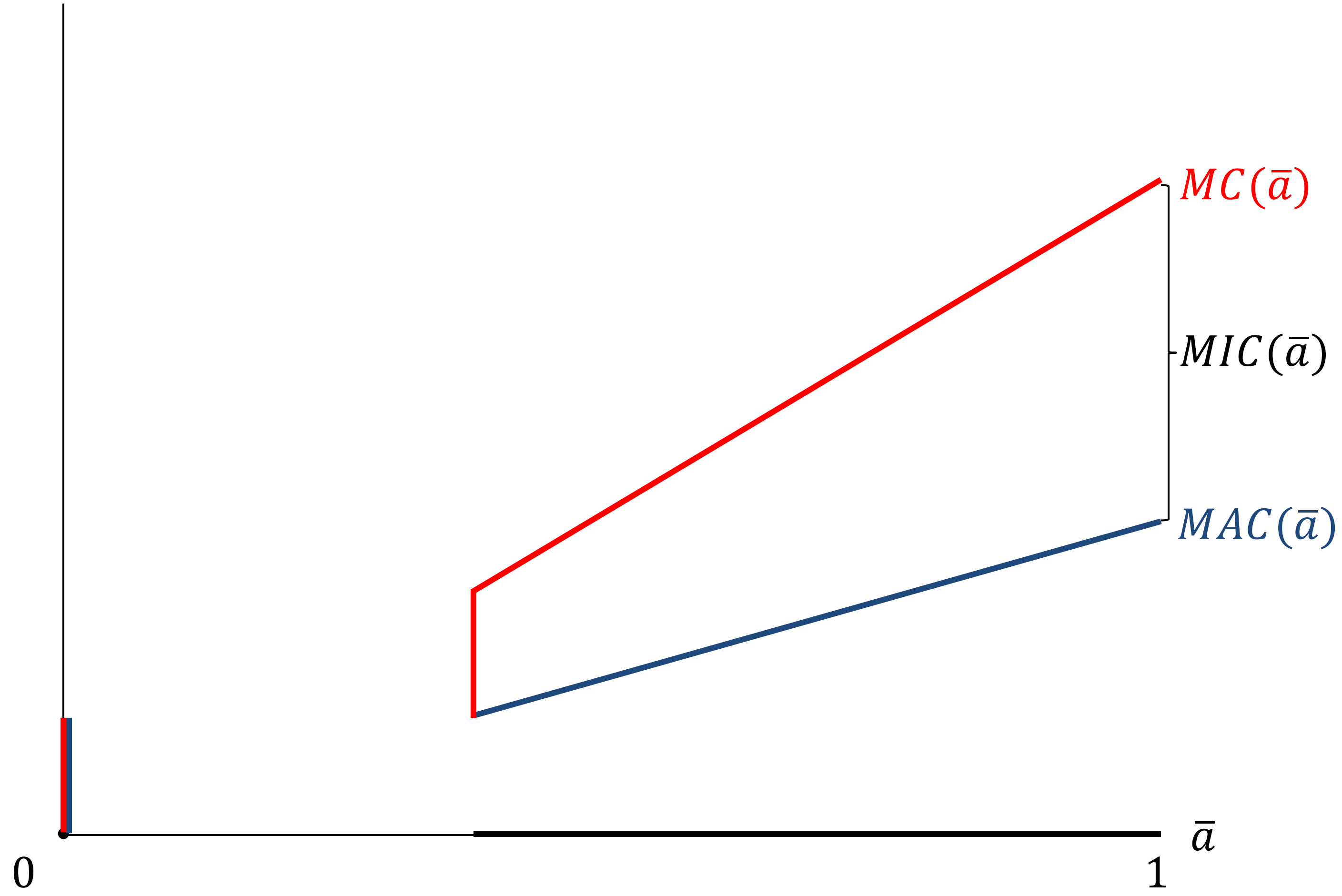
Marginal Conditions for Multiple Payers



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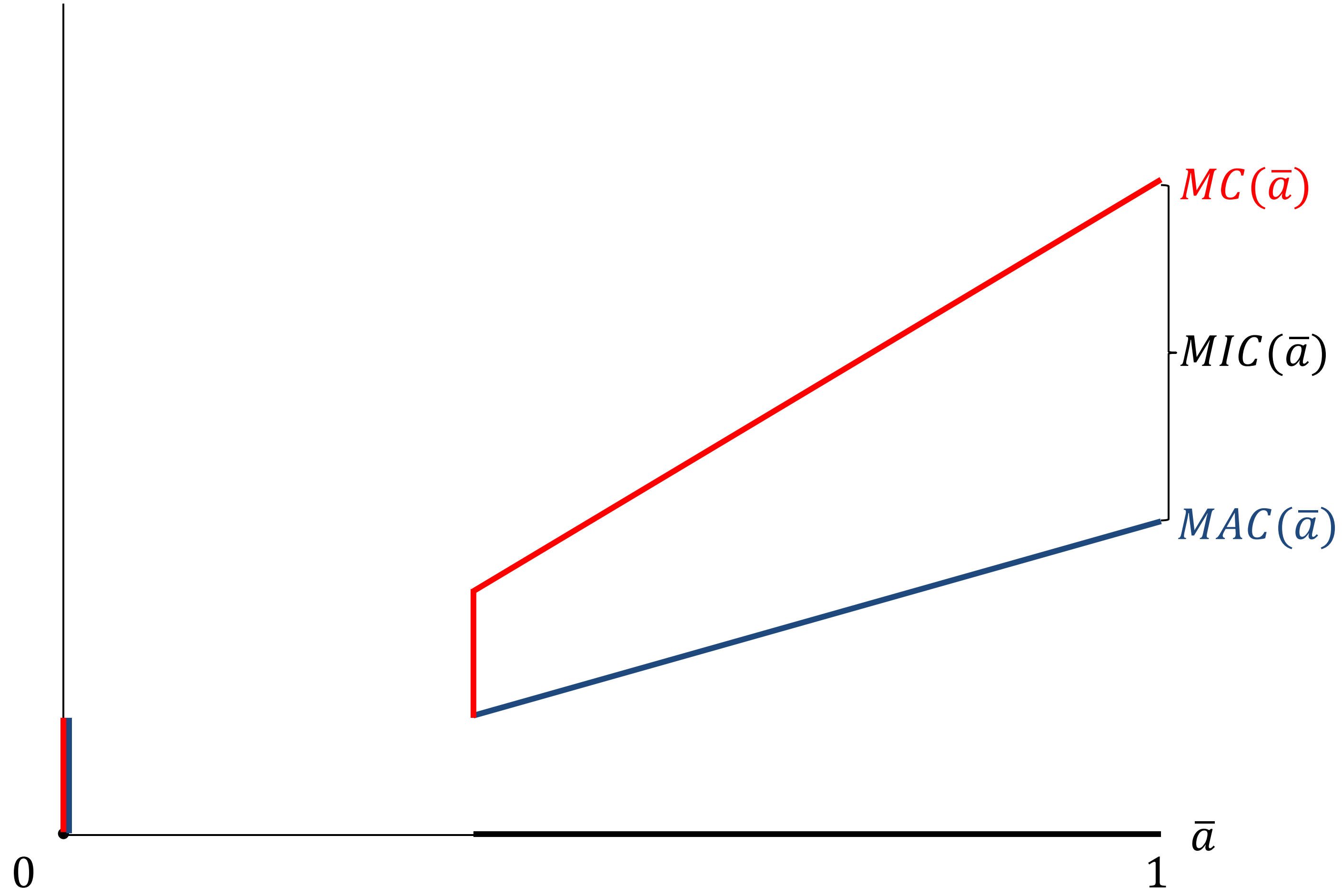

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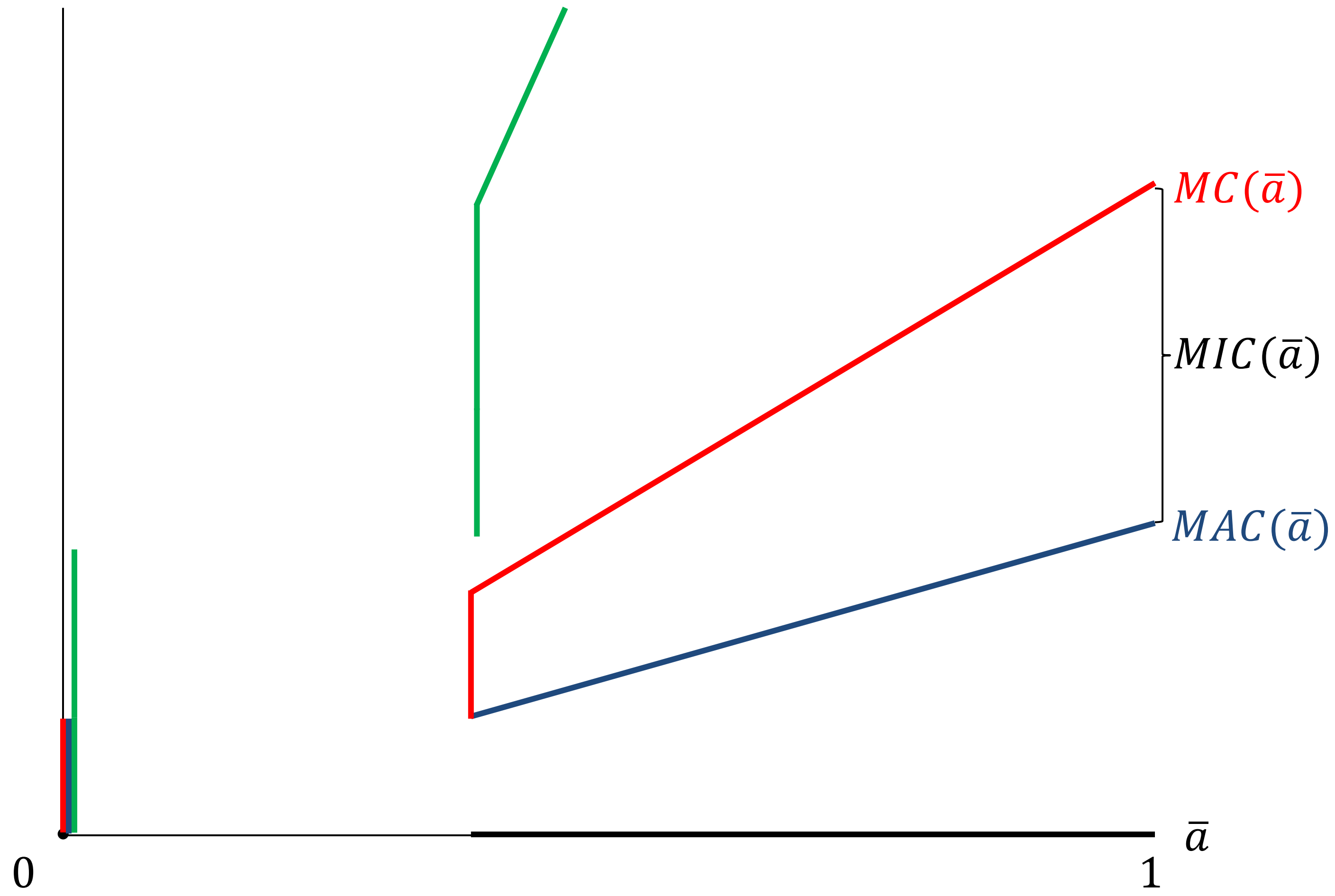

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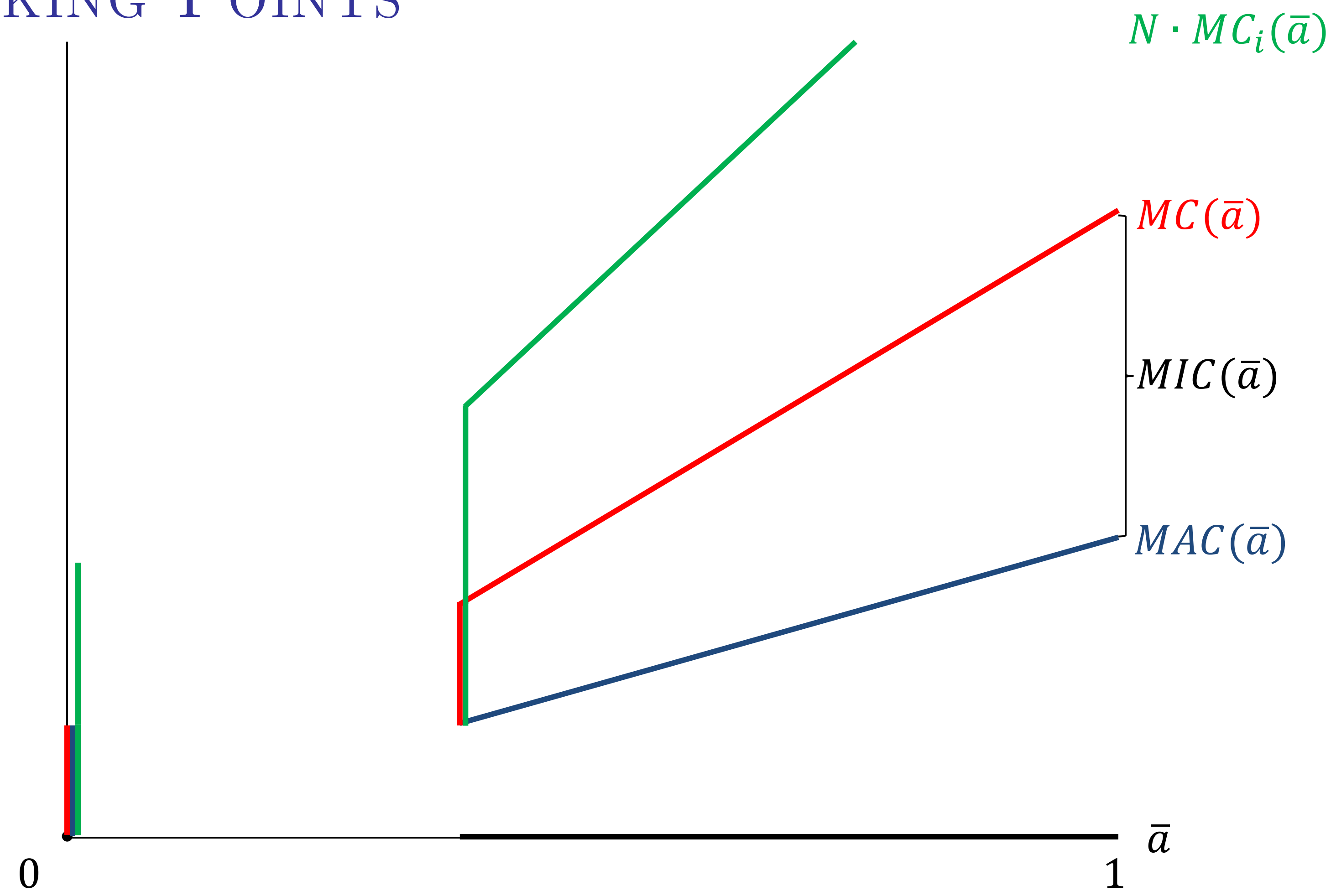
"Sticking Points"



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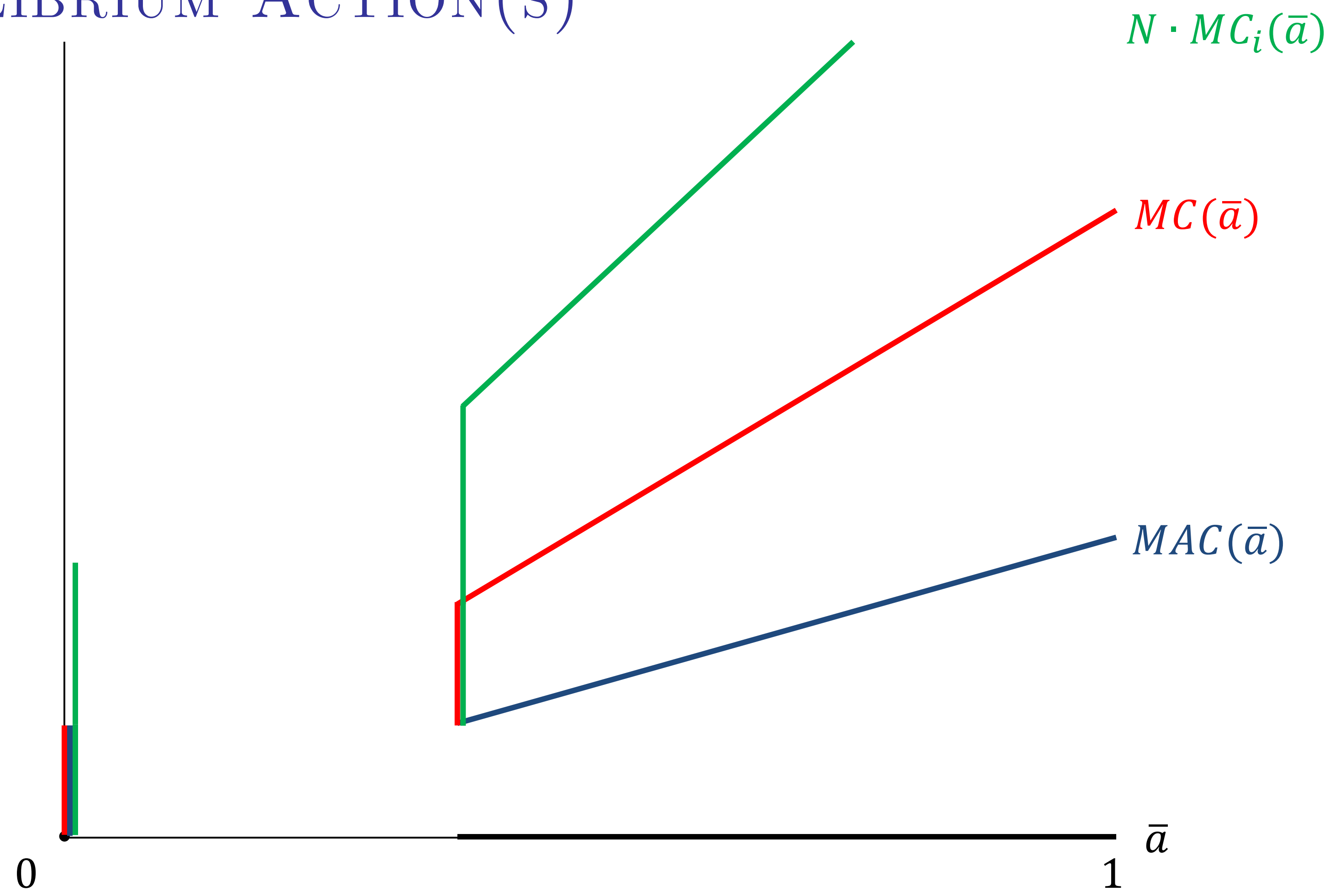
Equilibrium Action(s)



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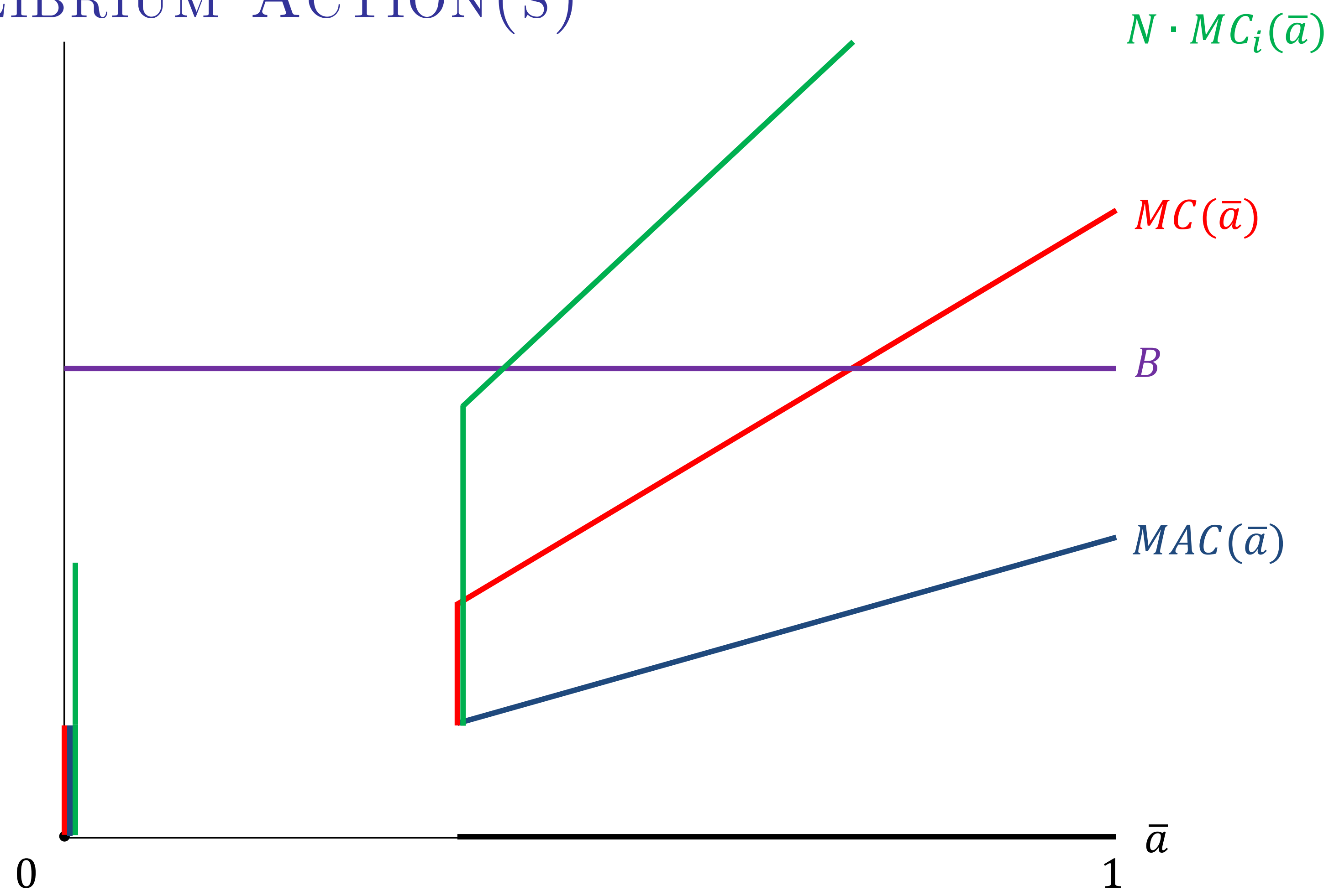

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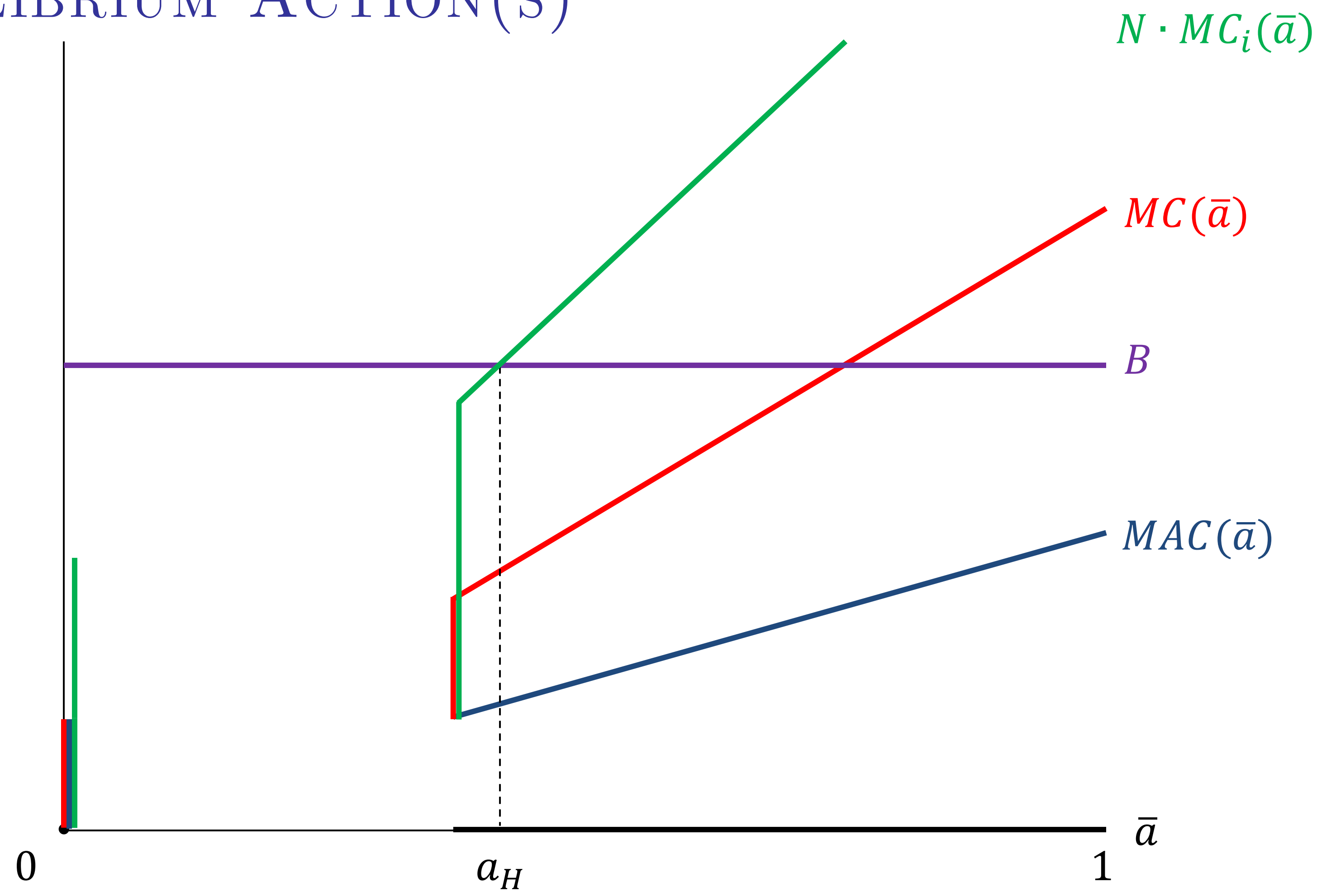

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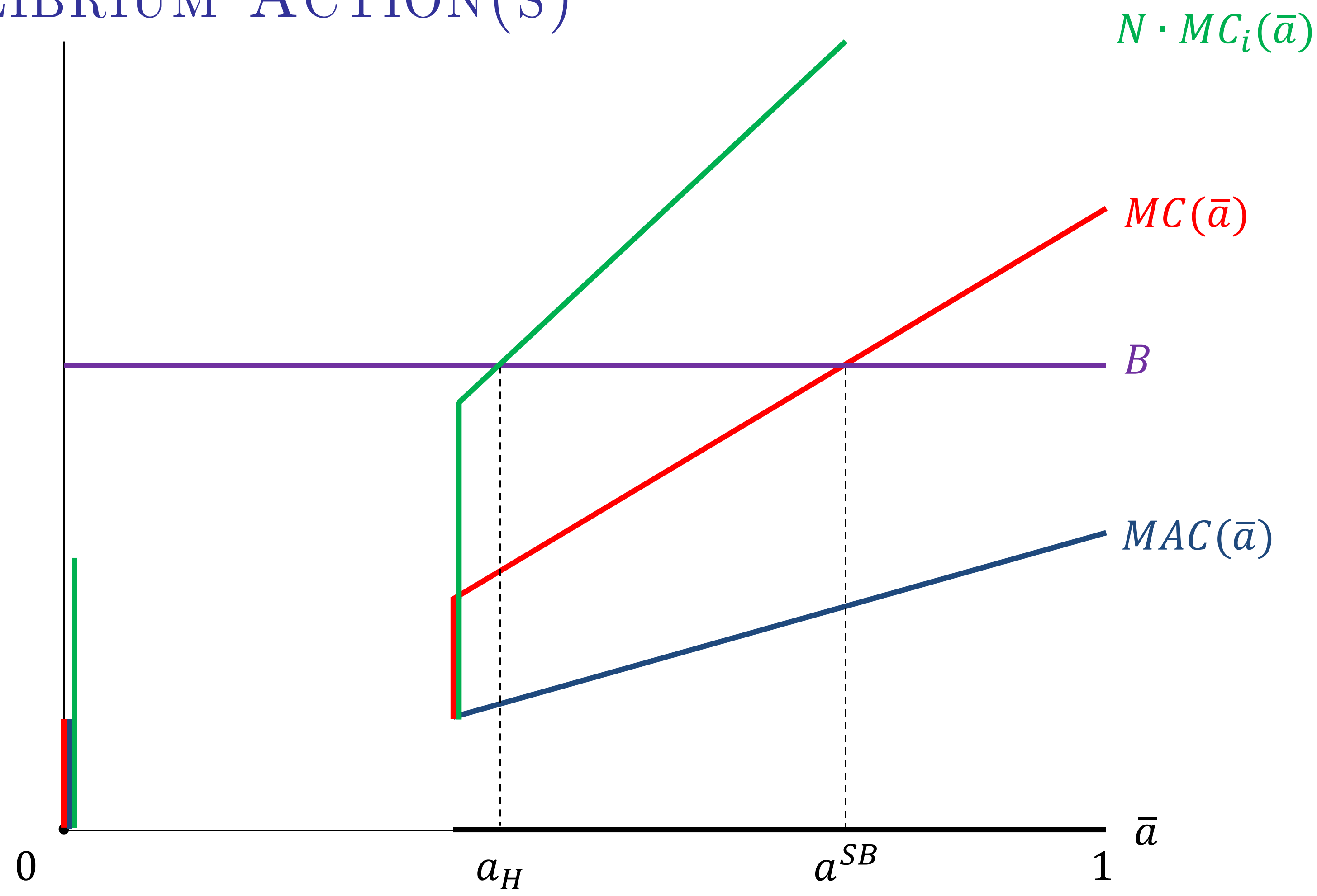

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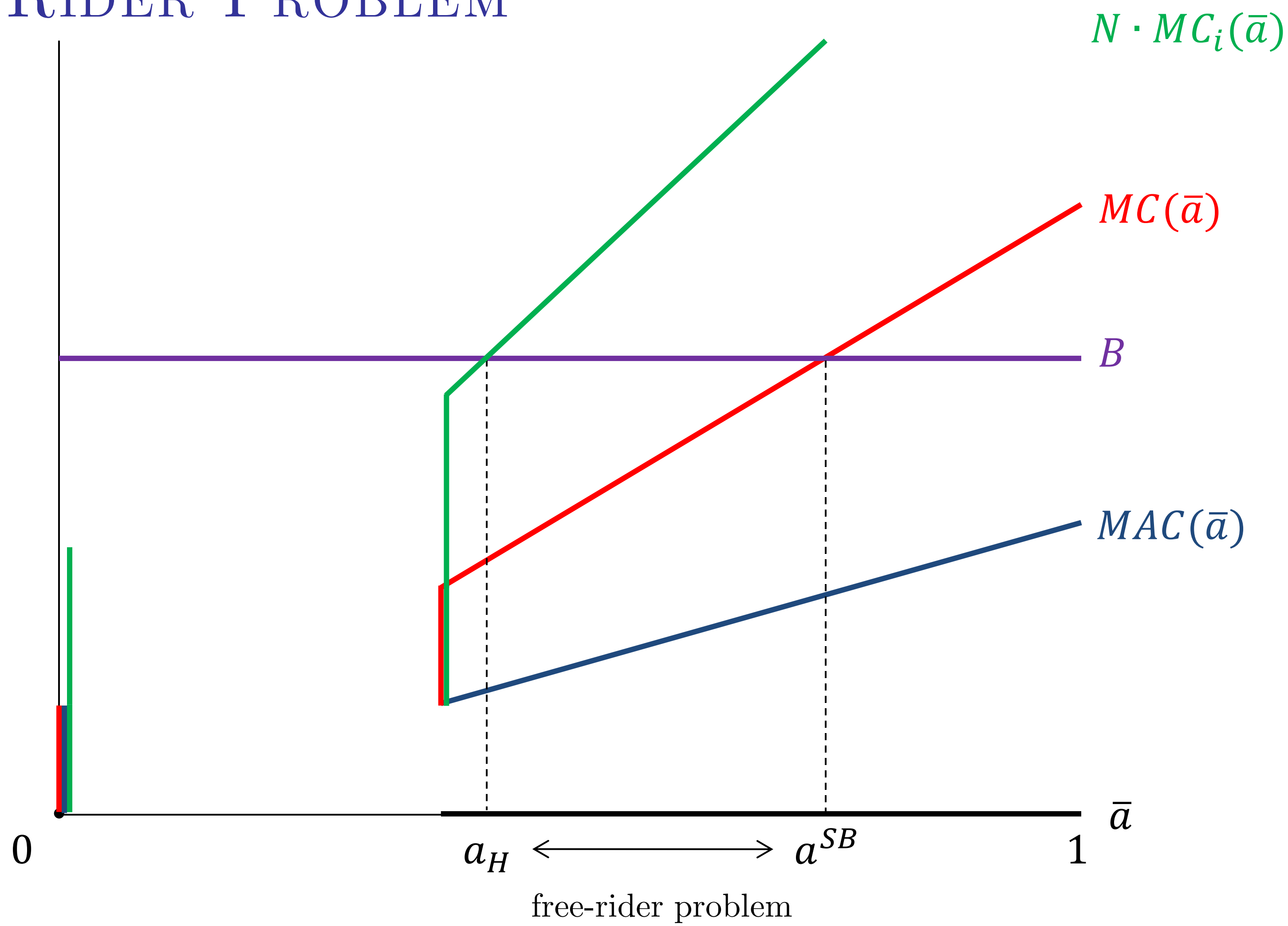
Free-Rider Problem



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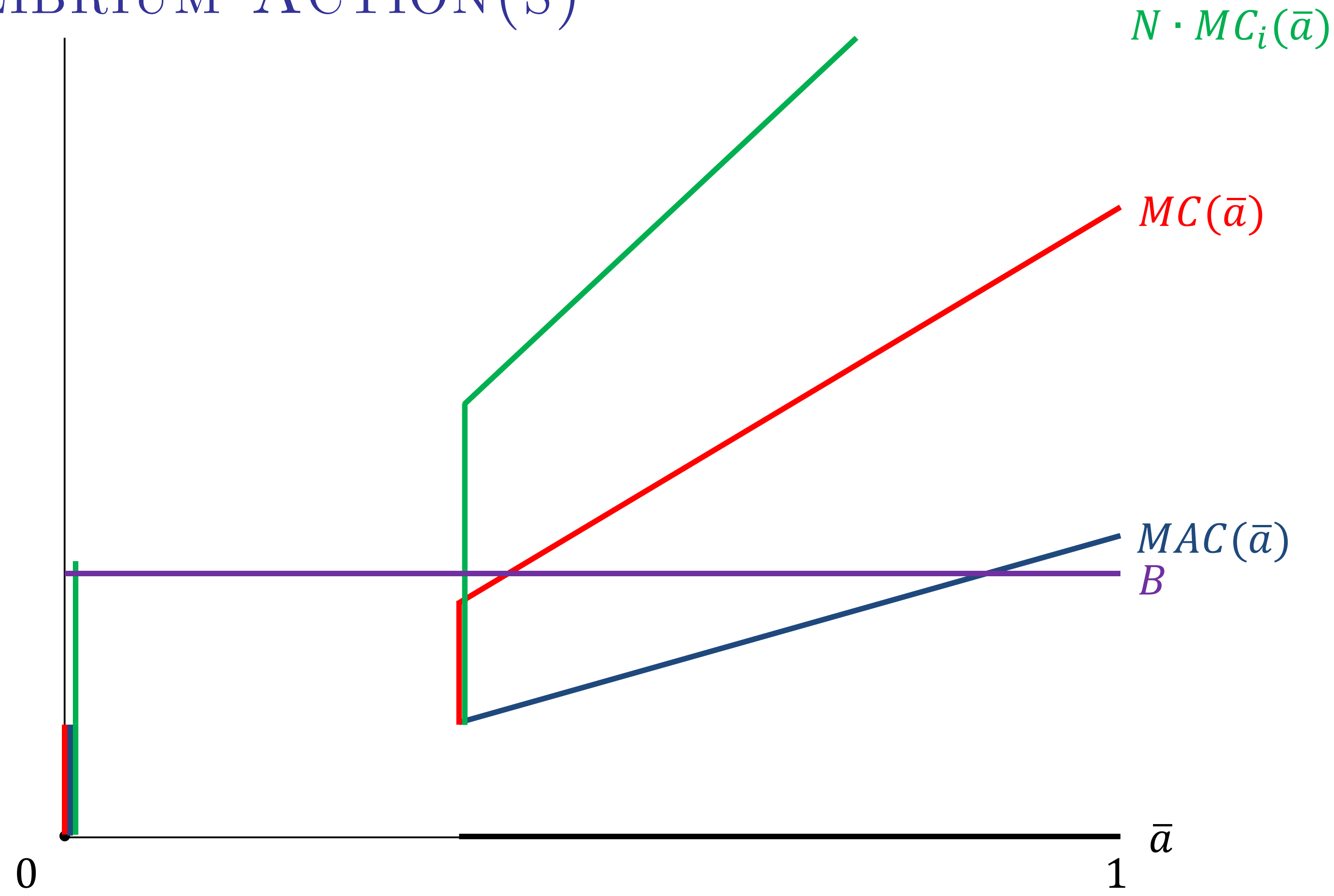

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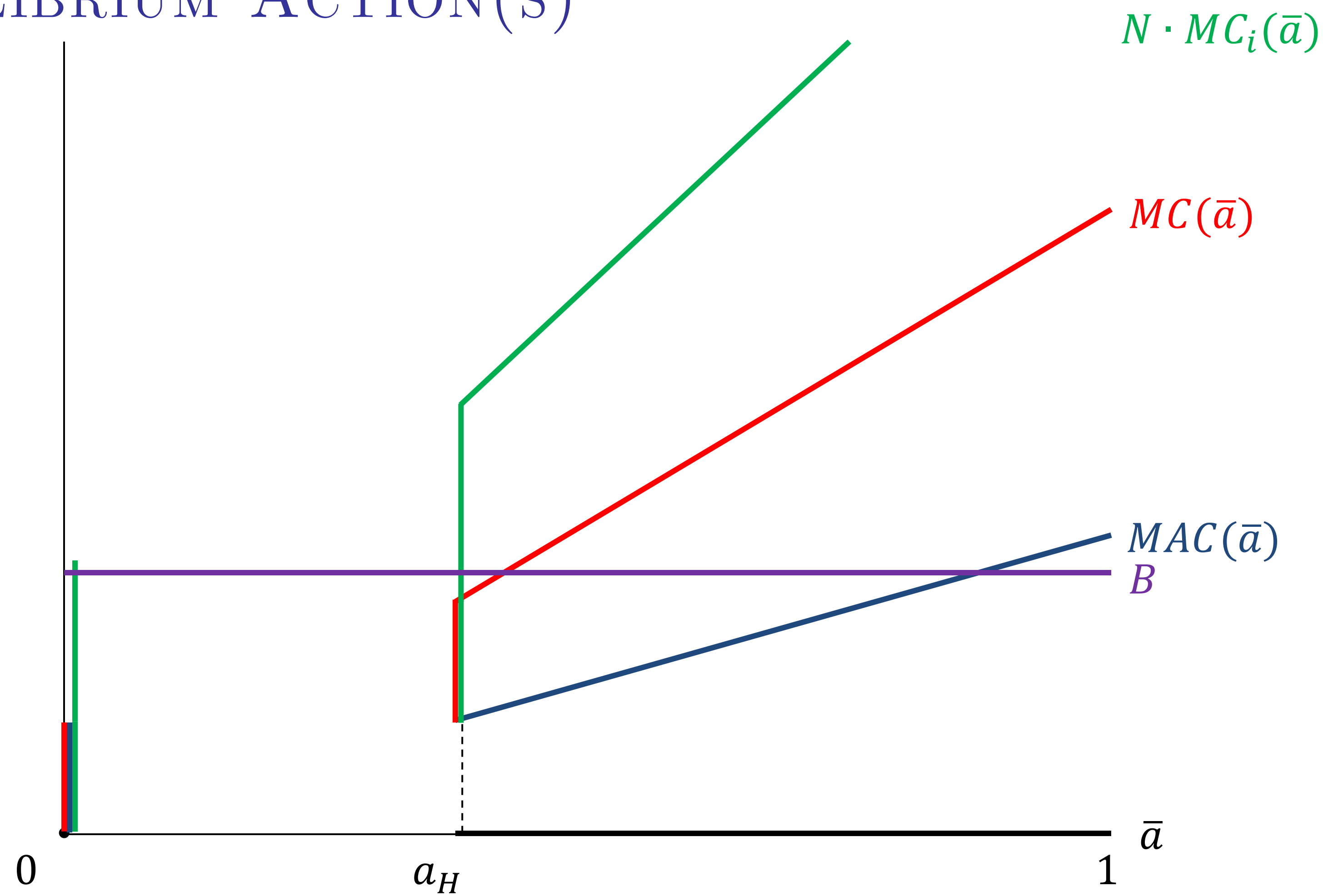

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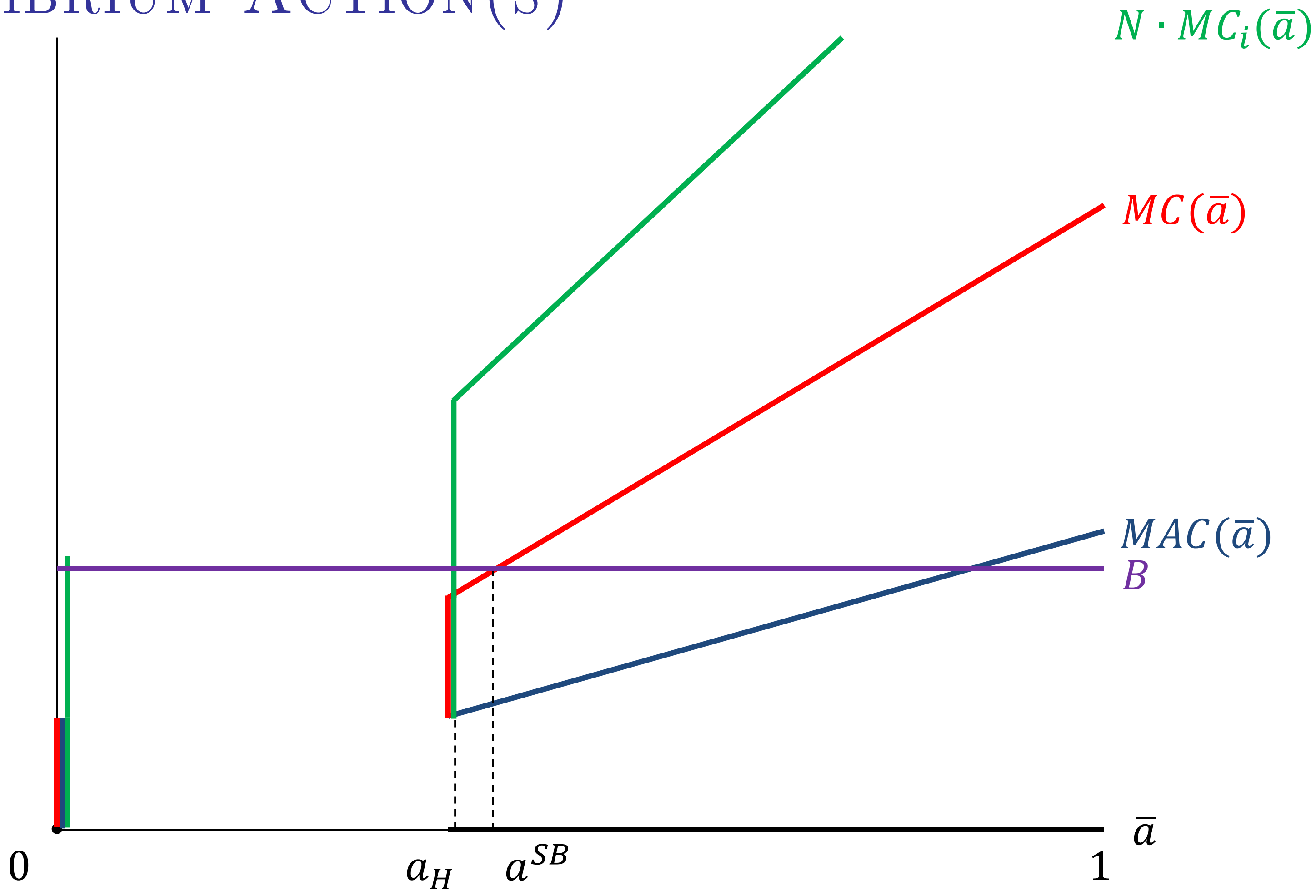

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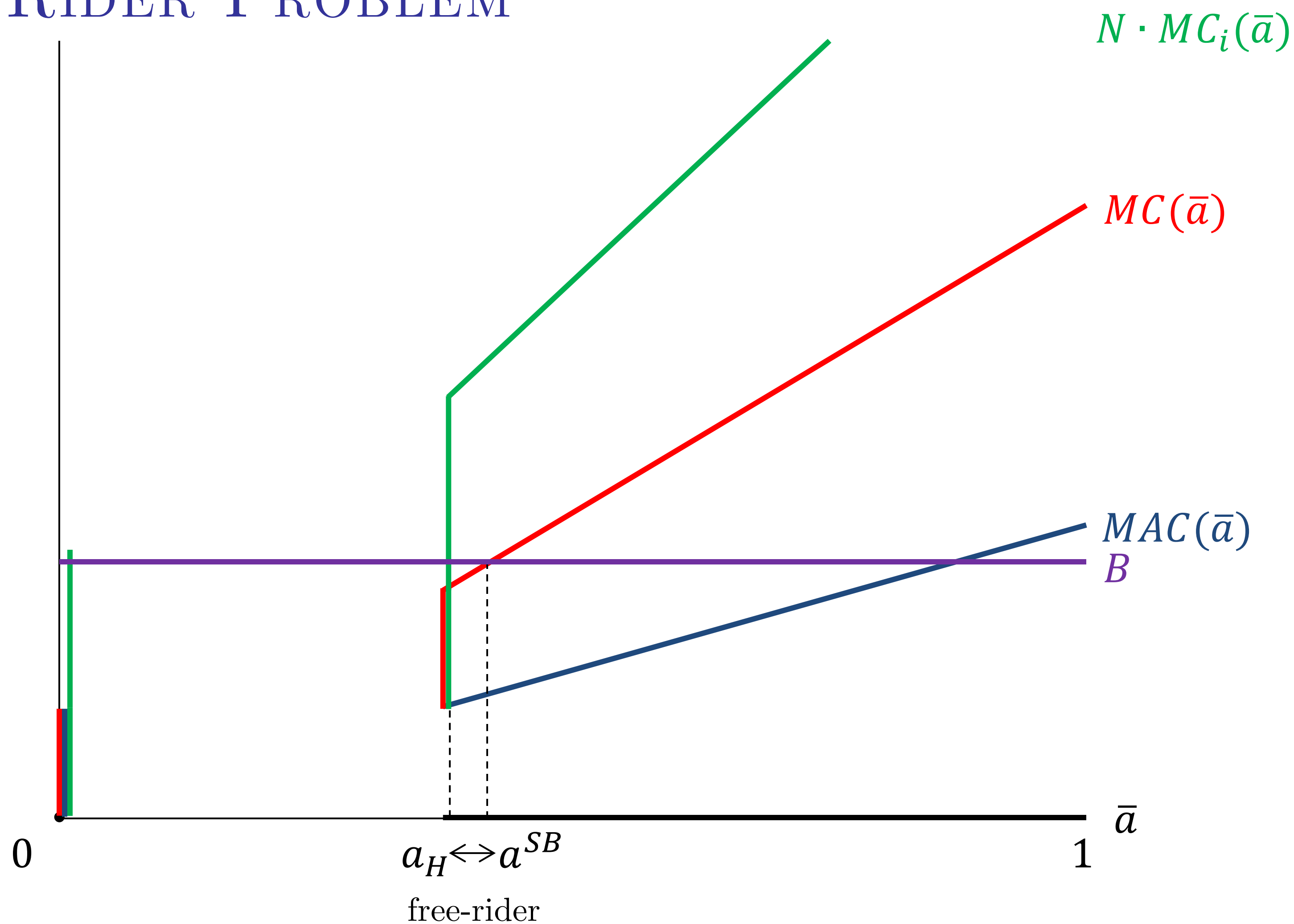

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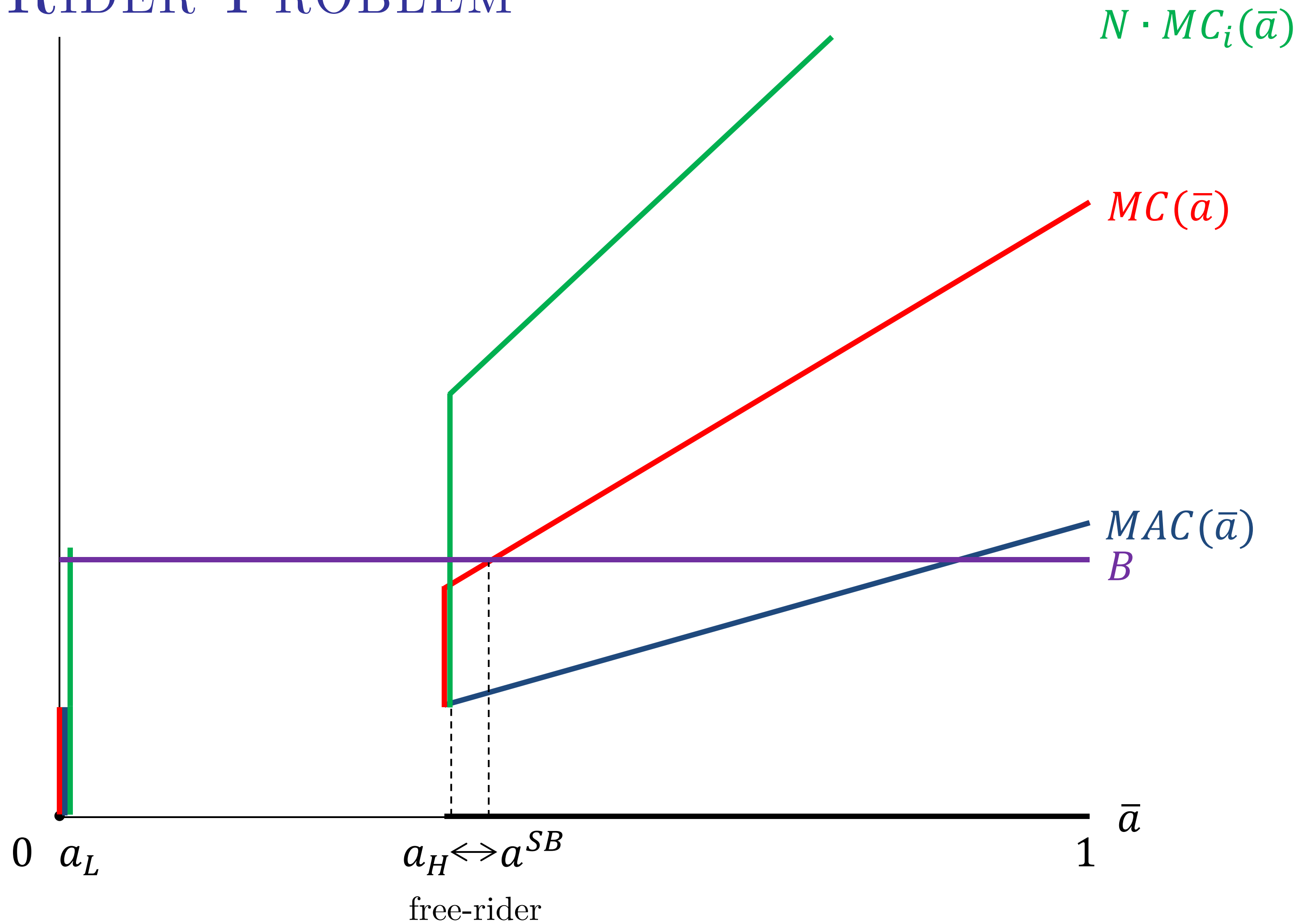

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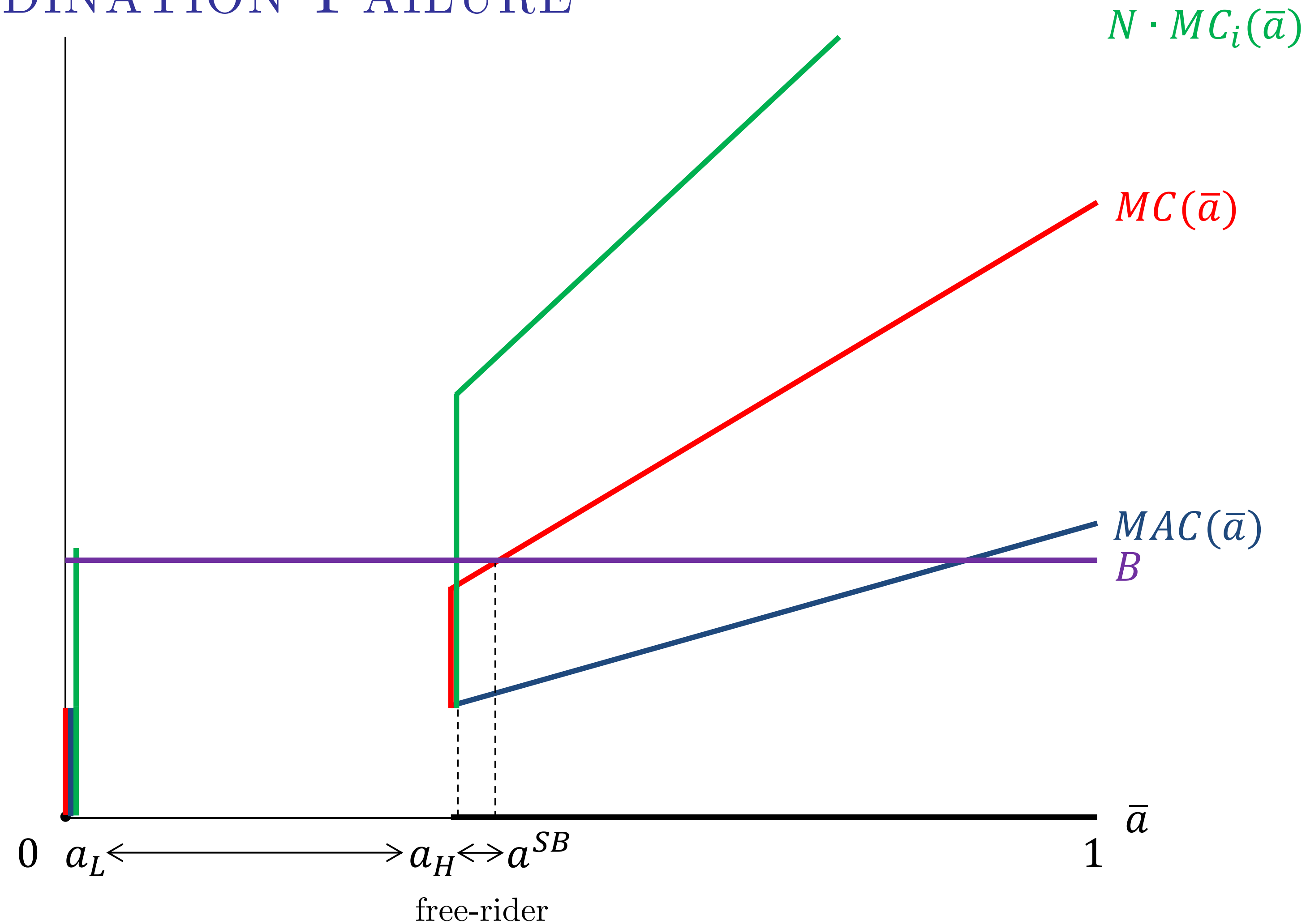

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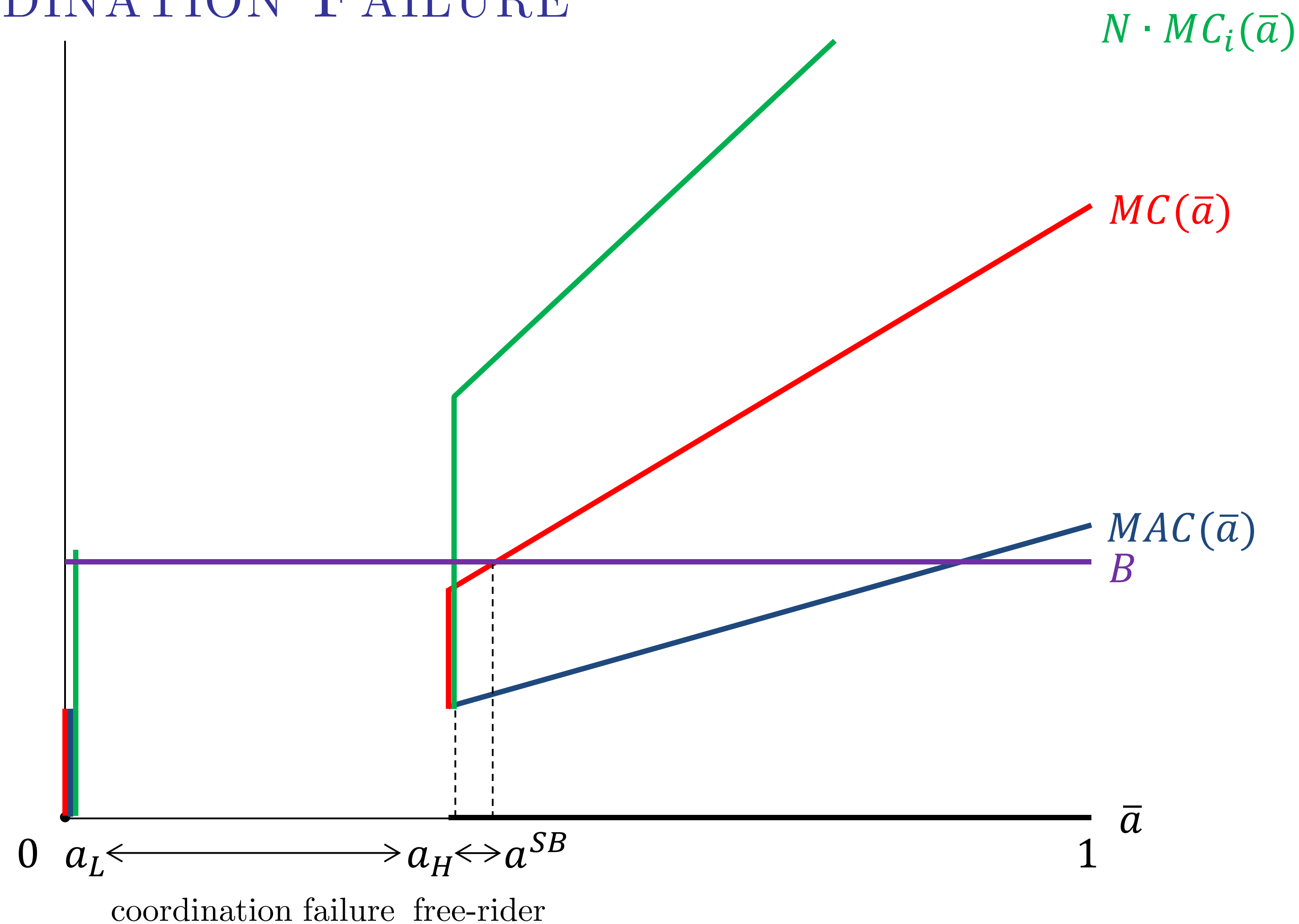

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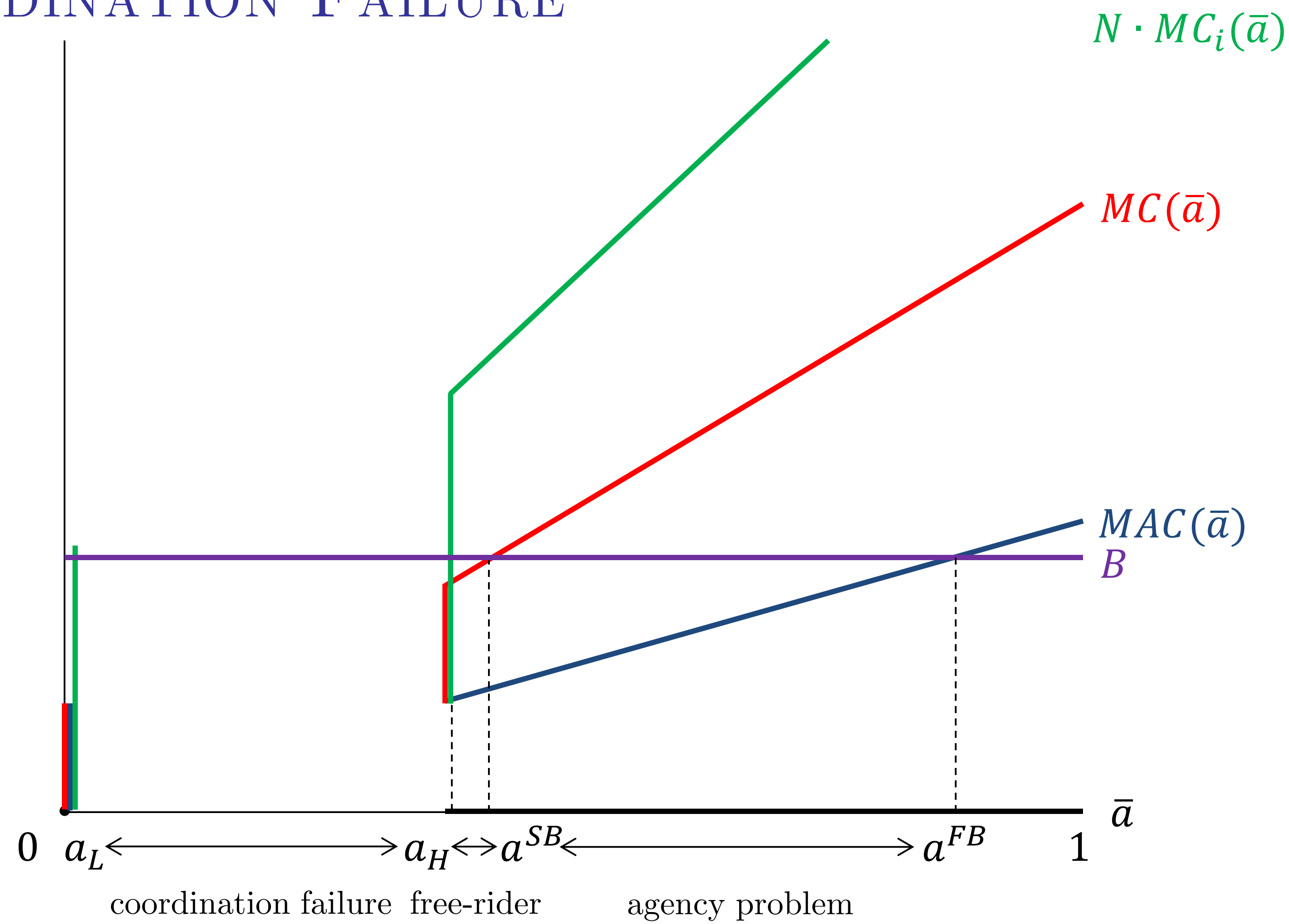

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Results

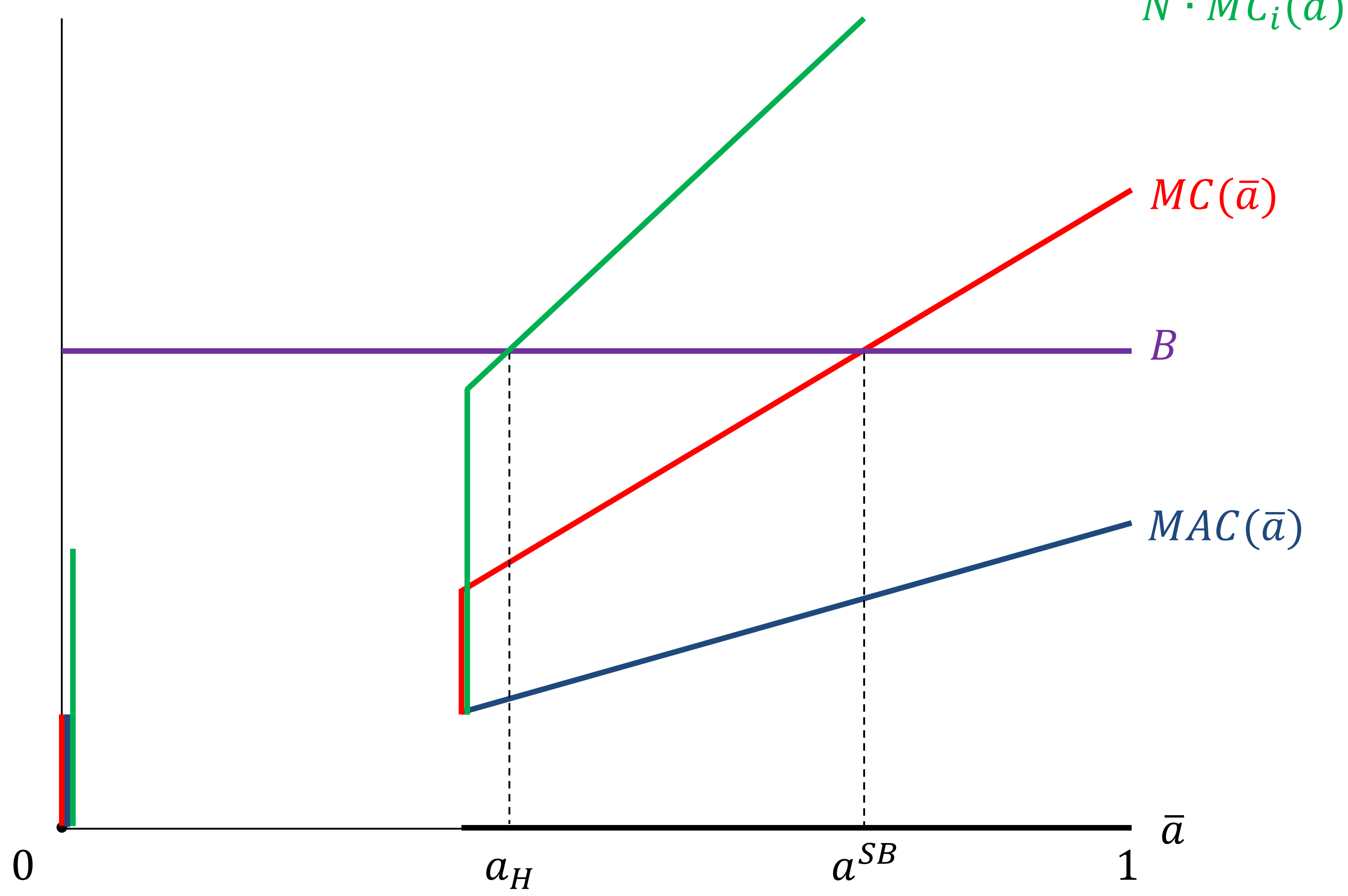
Distortions are more severe than in standard agency models

Two types of distortions: free-rider problems and coordination failures

Coordination failures may occur when there are “sticking points”

Both types of distortions are worse when there are more payers

Distortions Worse with Higher N



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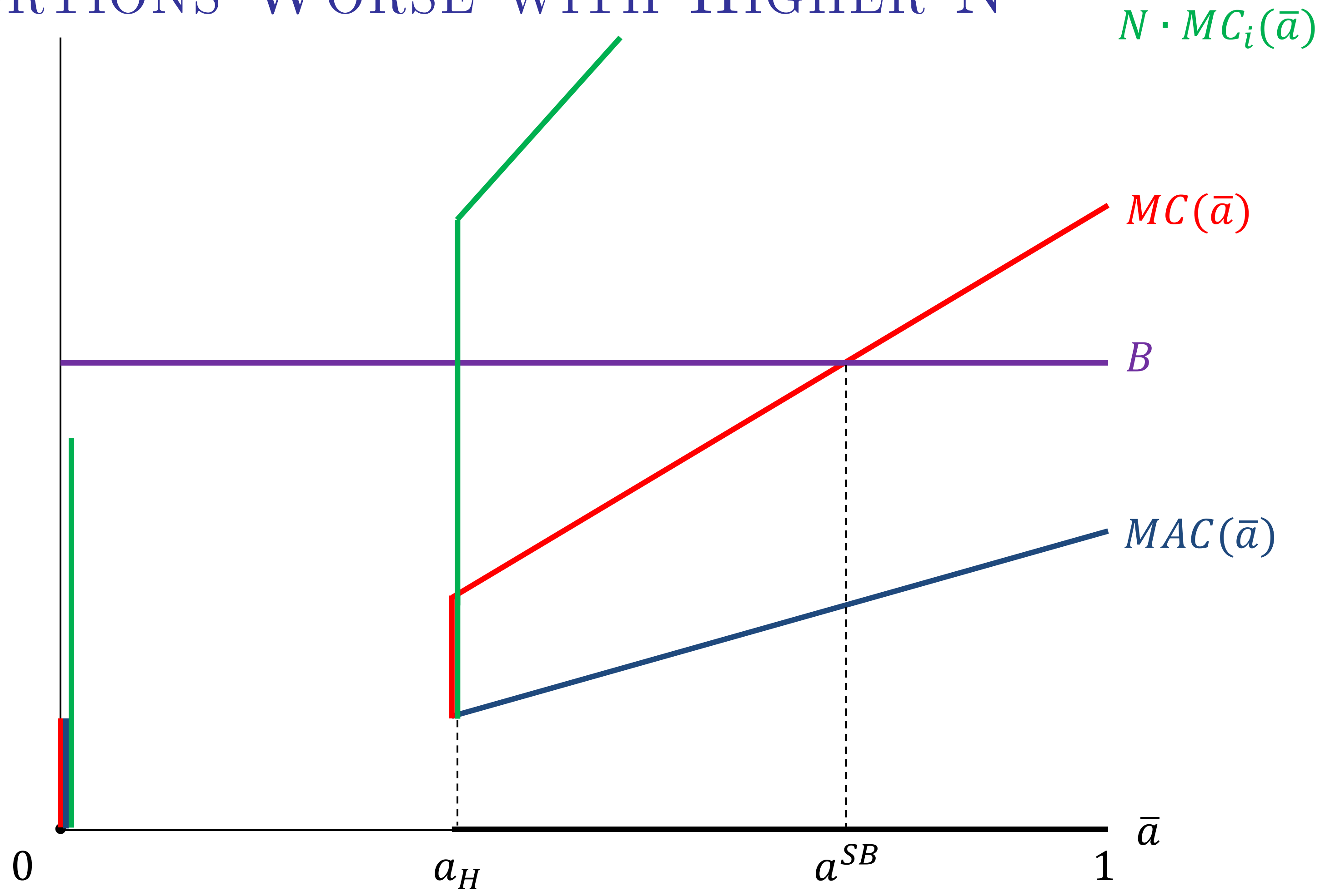

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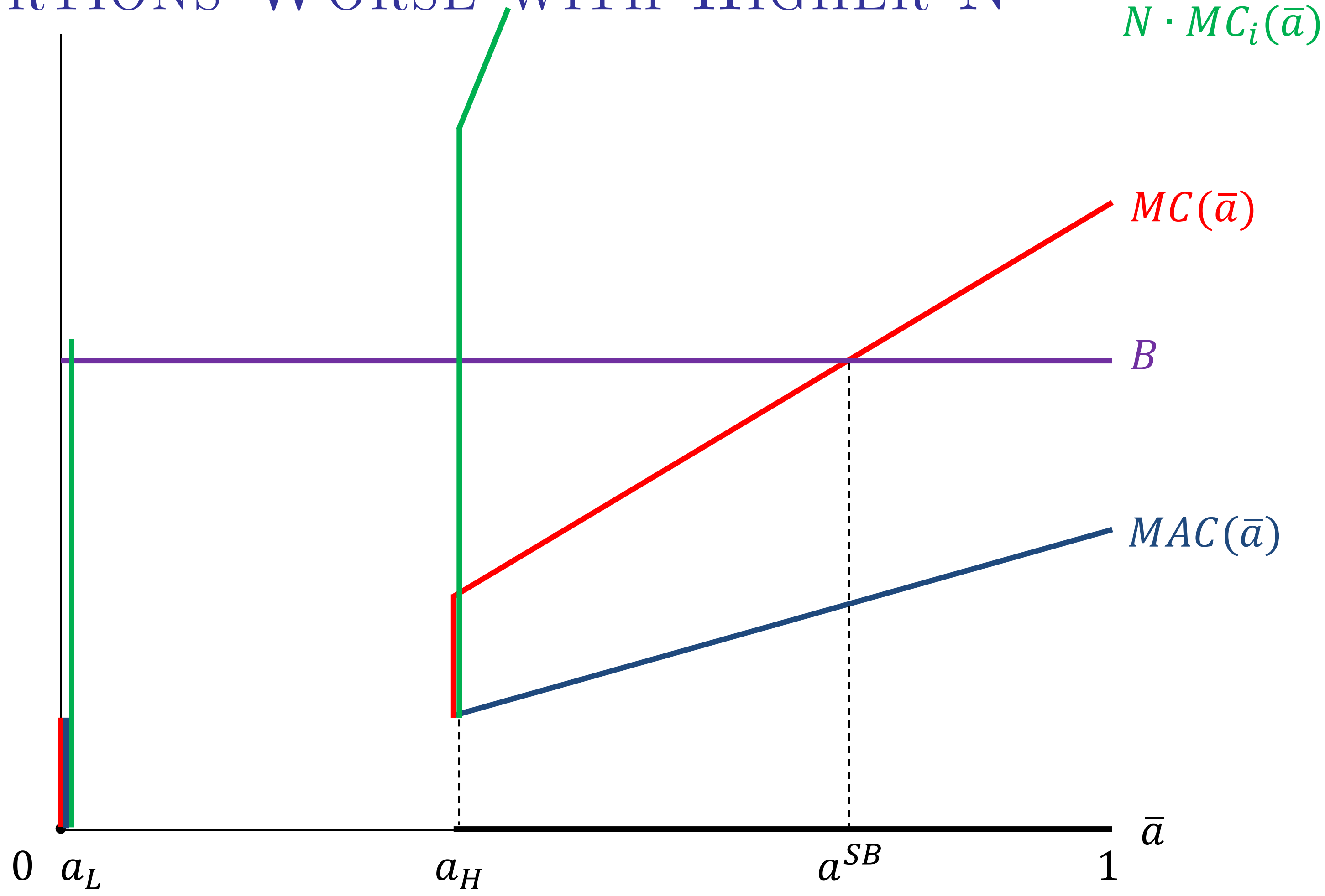

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Agenda

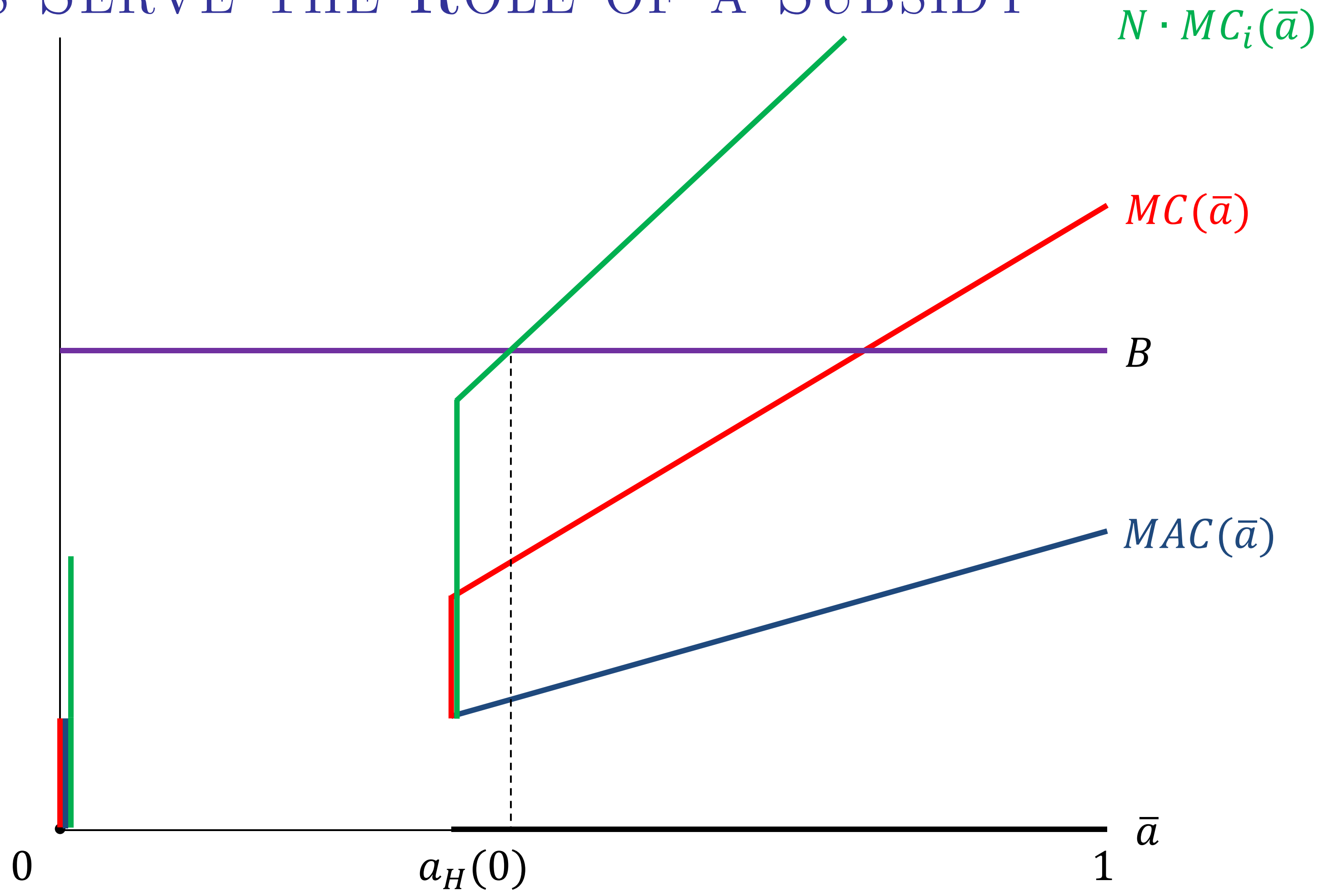
- The Model
- Single-Payer Problem
- Multiple-Payer Problem
- ACO Interventions
- General Results
- Conclusion

ACO Interventions

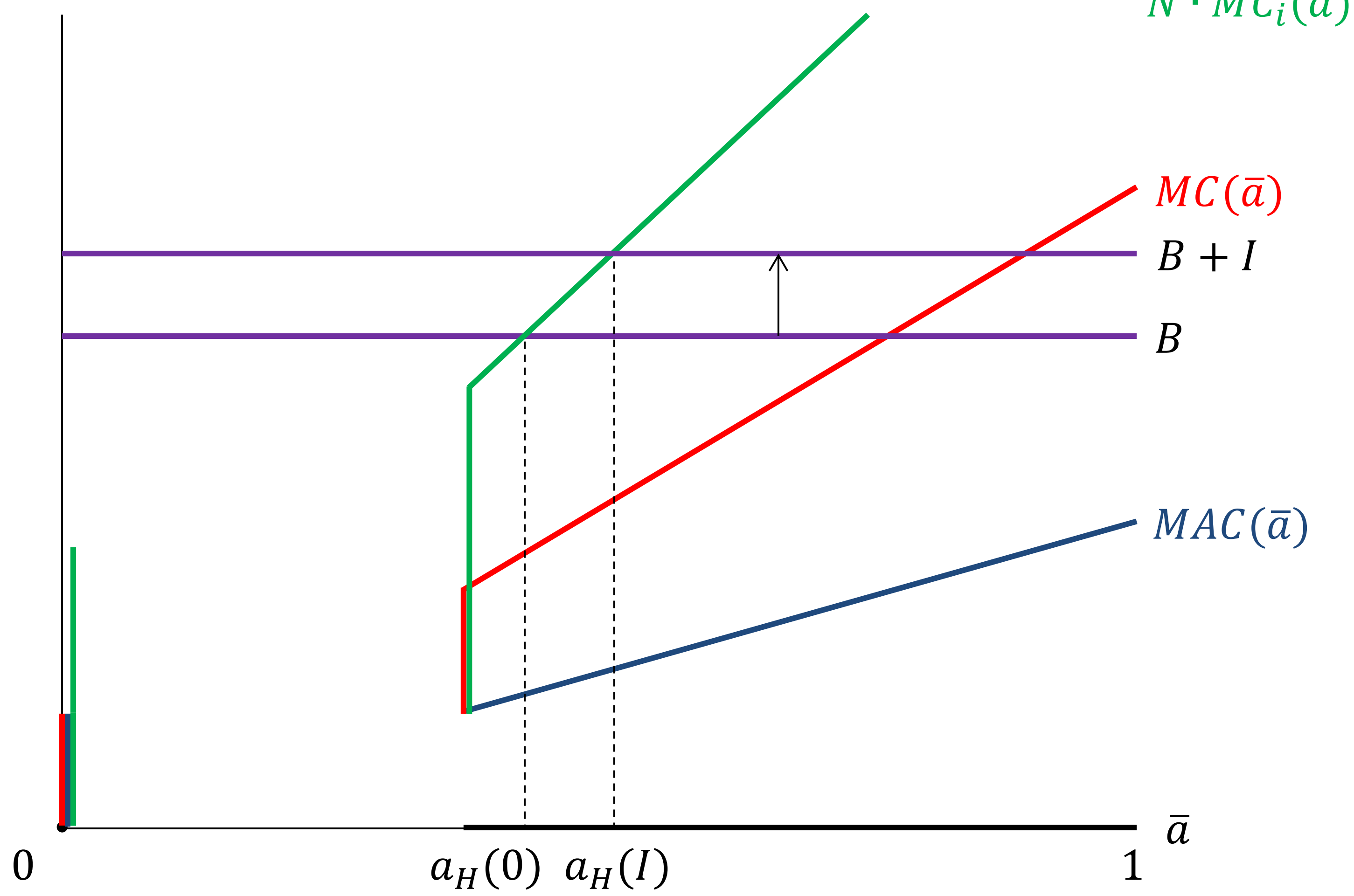
Direct intervention I paid to provider if there is success

Equilibrium actions $A^*(I)$. How does $A^*(0)$ compare to $A^*(I)$?

ACOs Serve the Role of a Subsidy



ACOs Might Increase Eqbm Action



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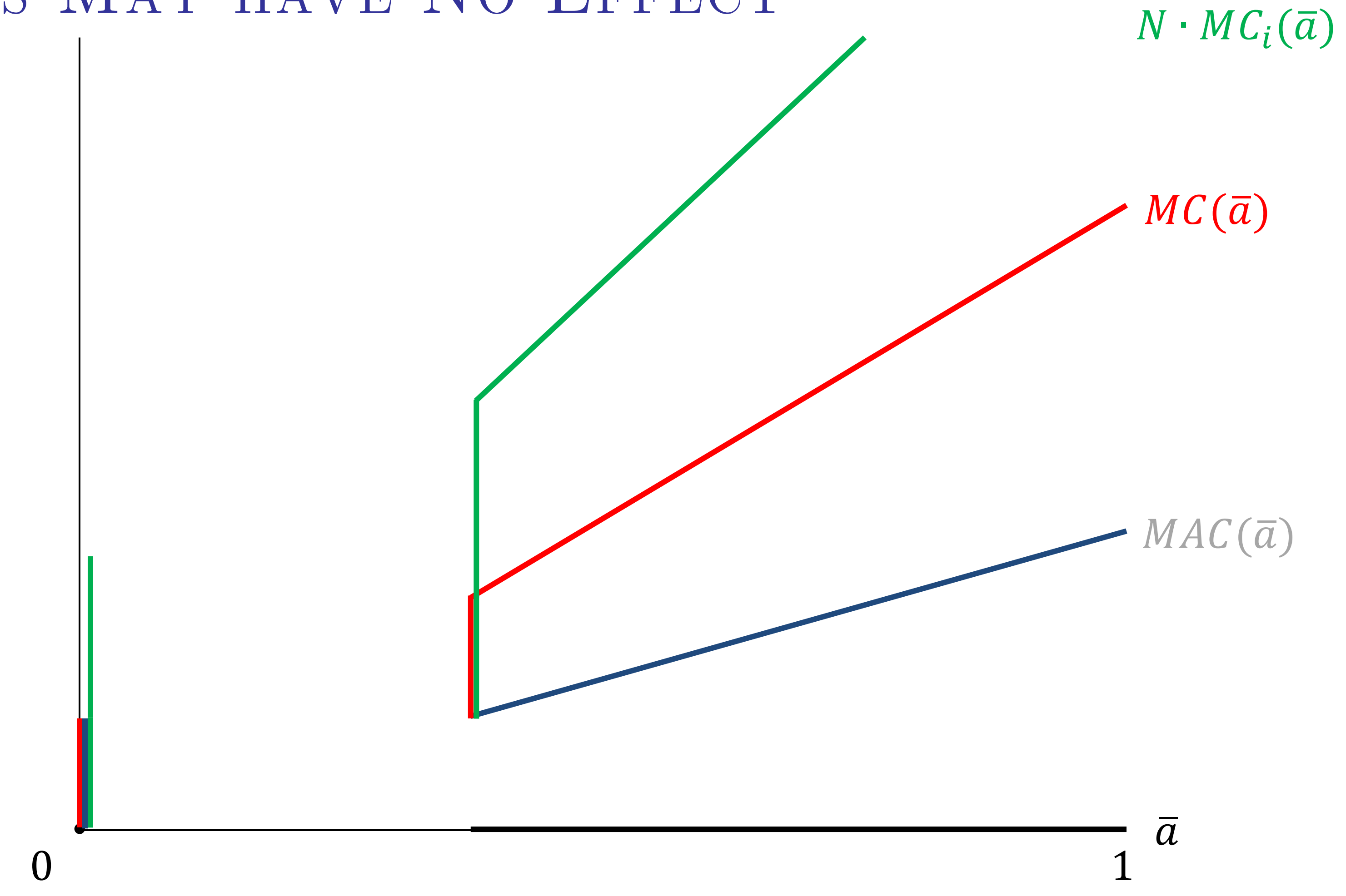

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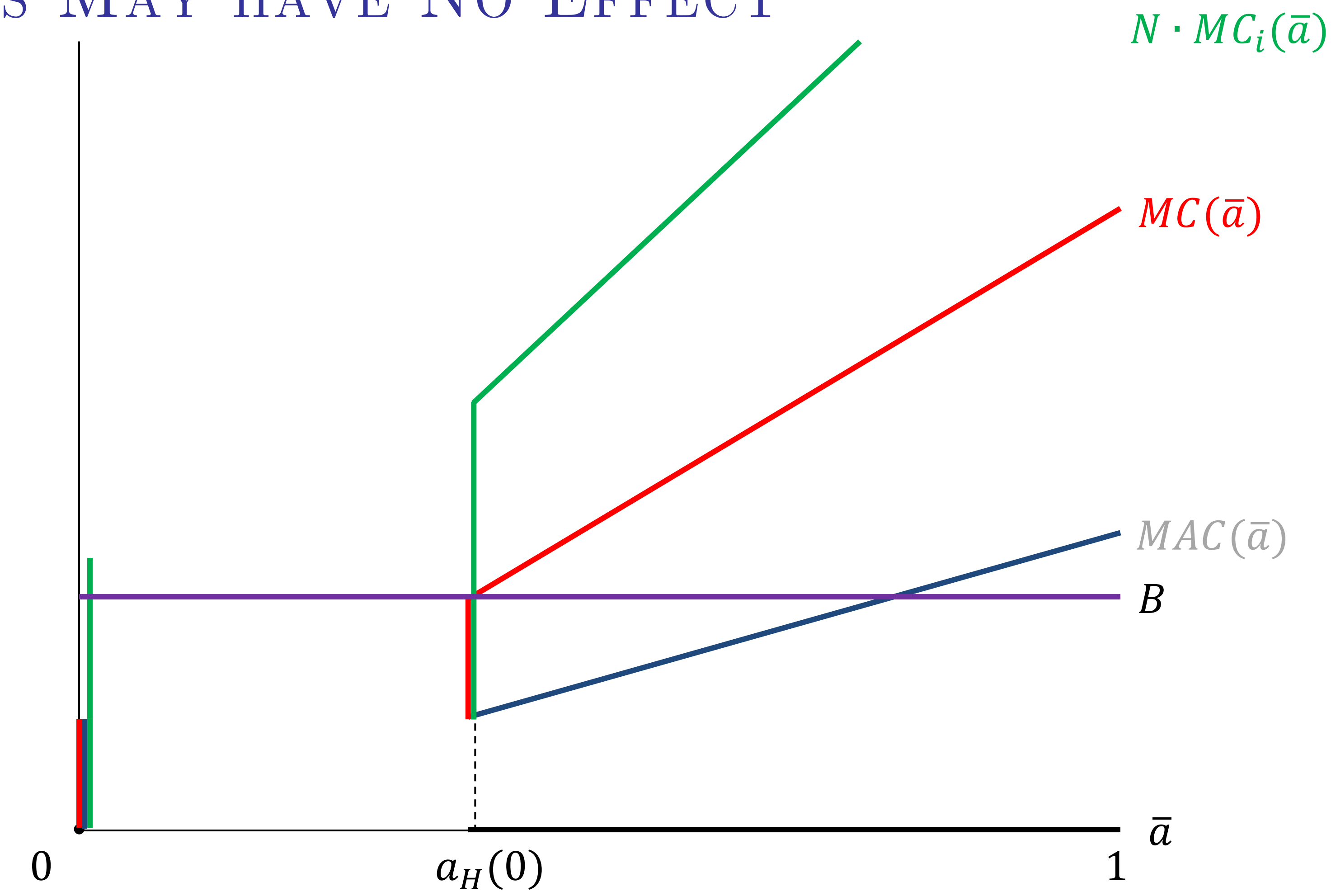

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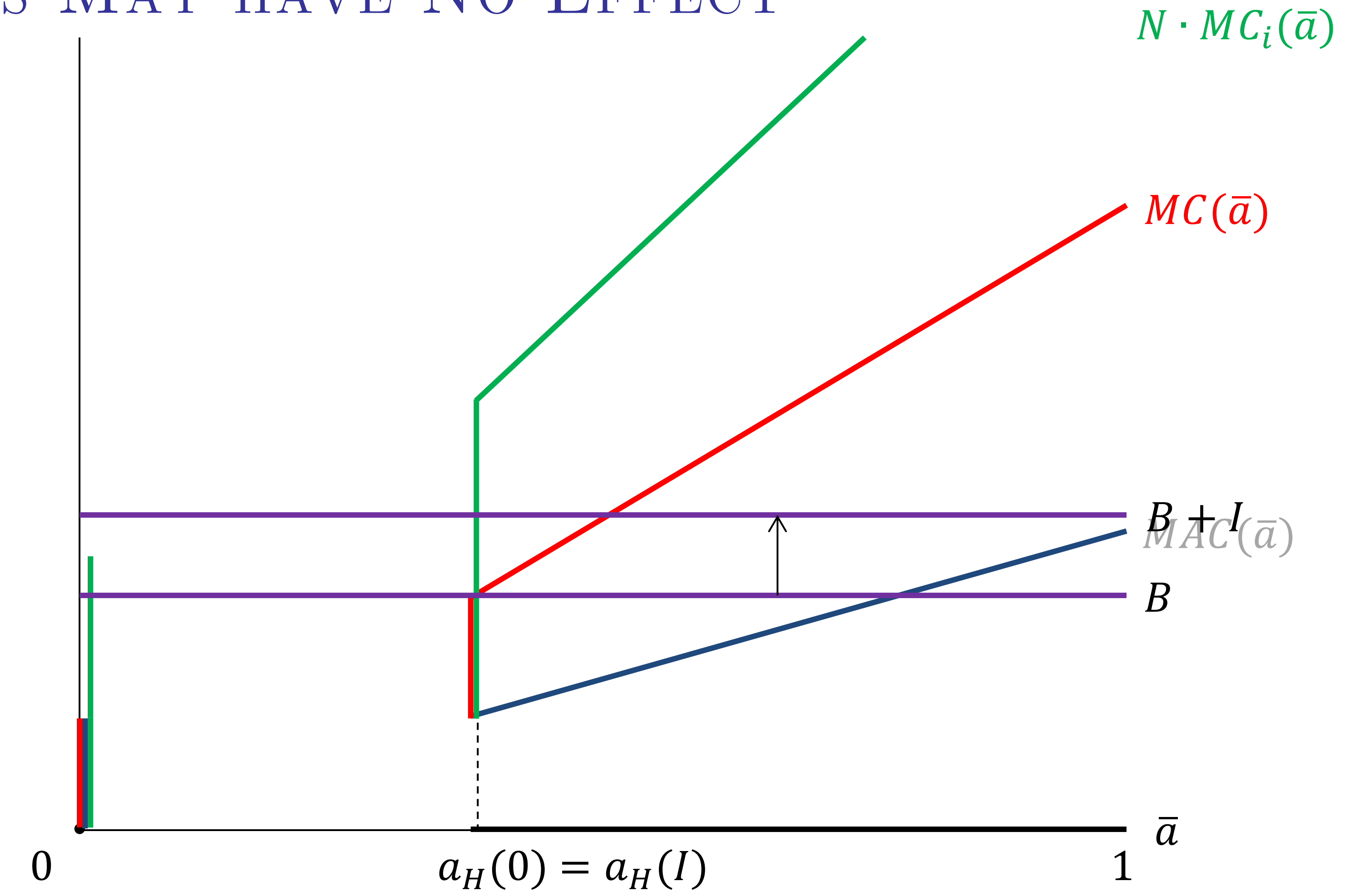
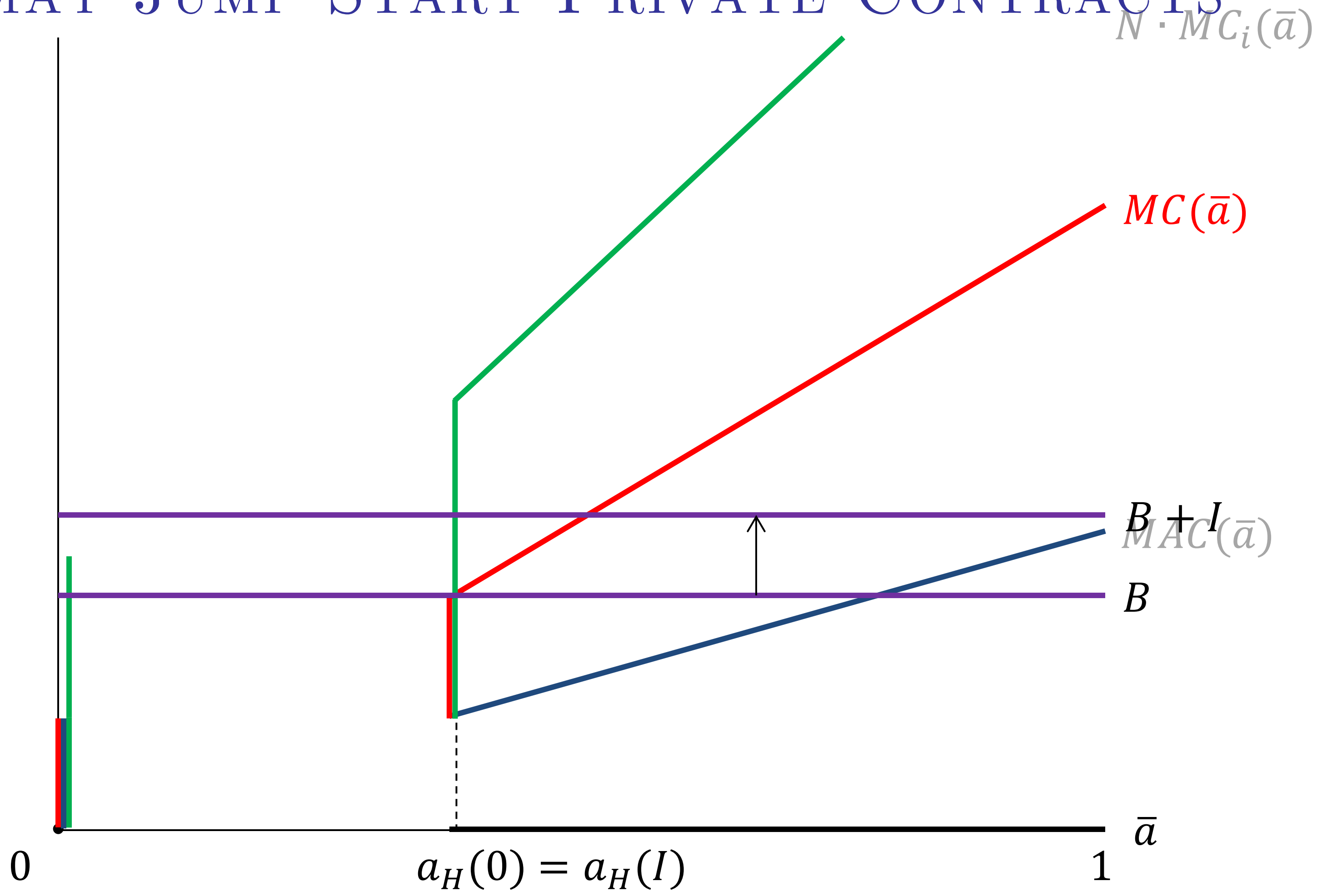


But may Jump Start Private Contracts



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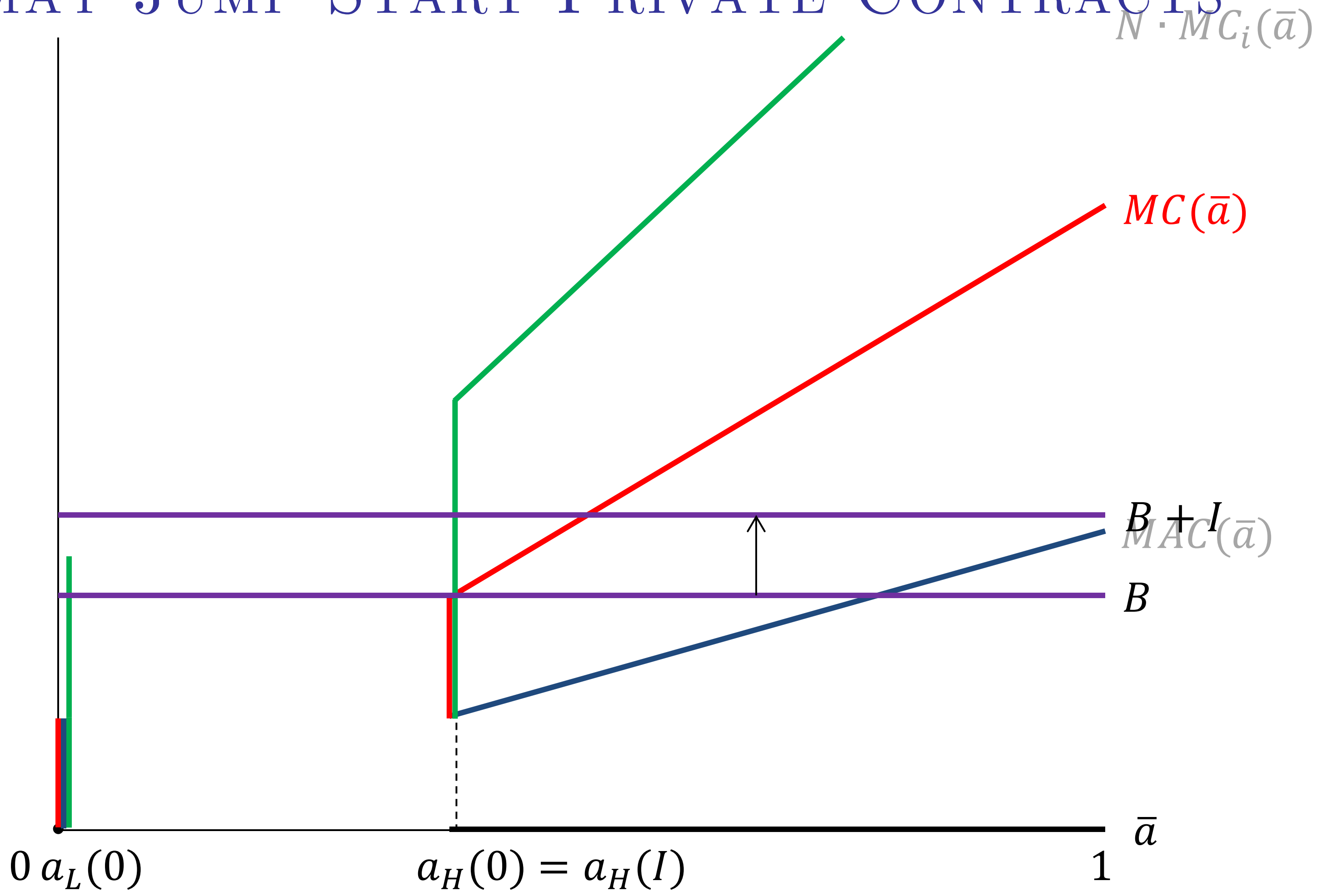

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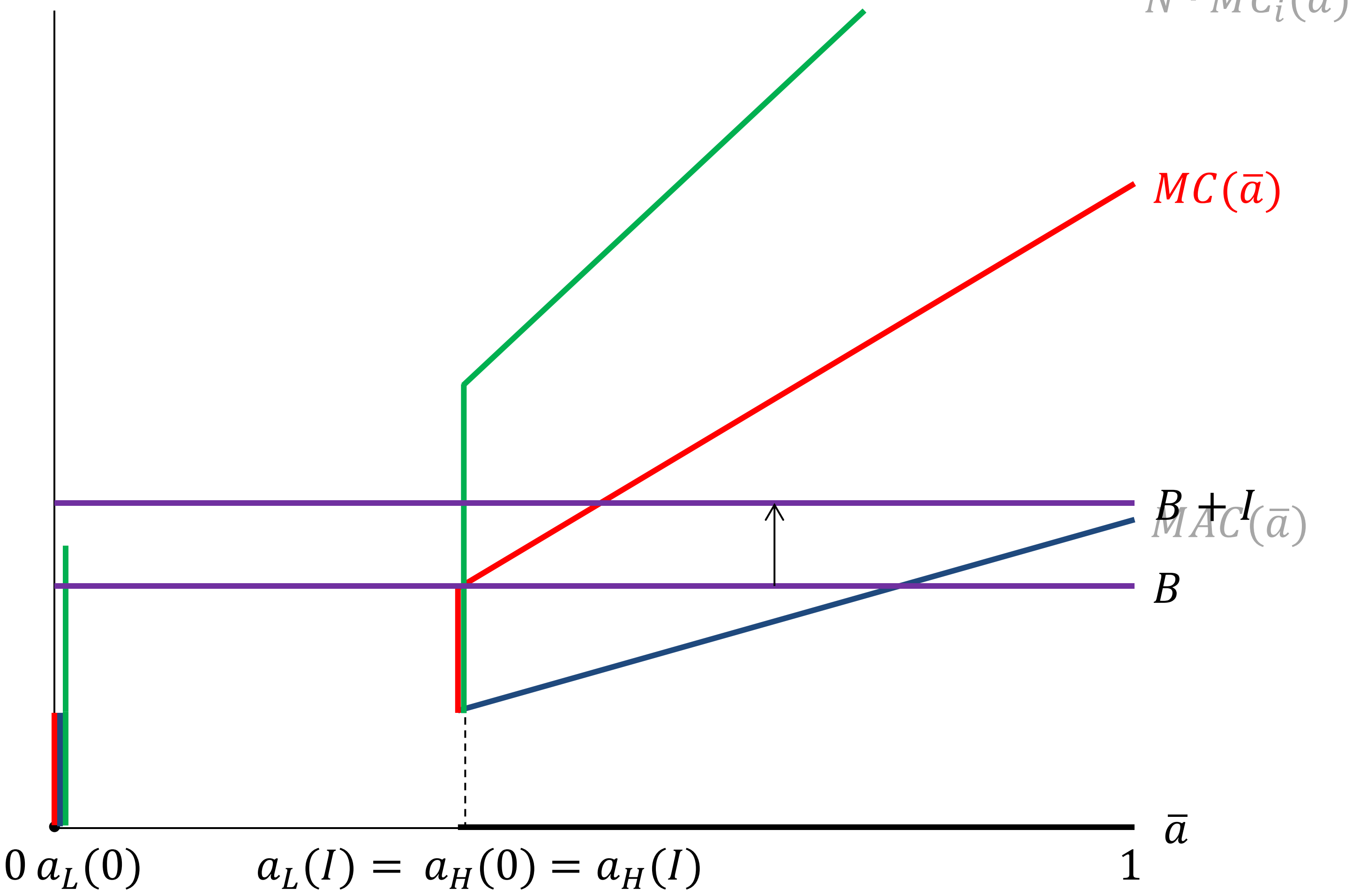
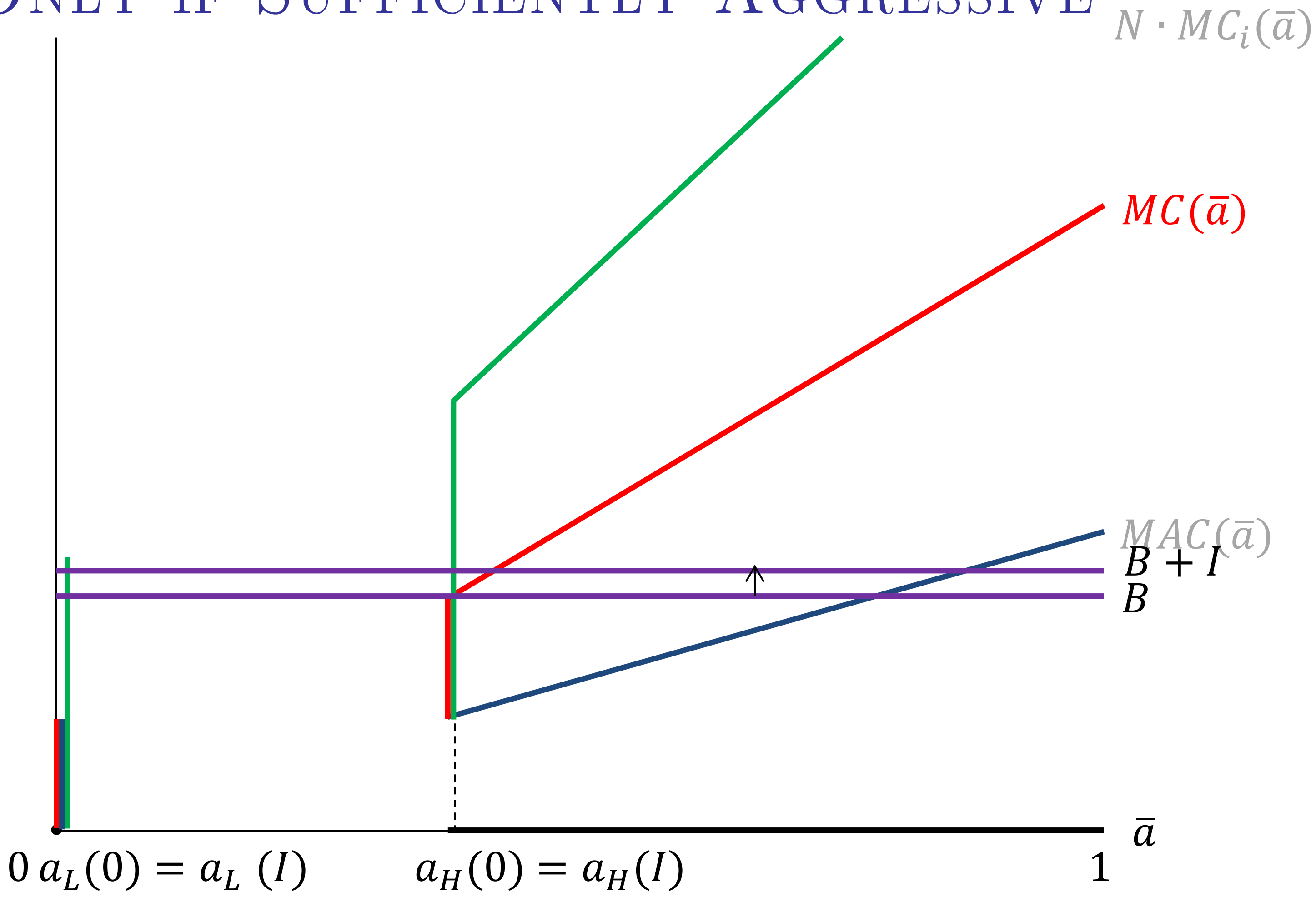


But Only if Sufficiently Aggressive



Results of ACO Interventions

ACO interventions serve as “subsidies” and “jump starts.” We find:

1. ACOs serve to subsidize invest but crowd out private contracts
2. If payers are stuck in inefficient eqbm, sufficiently large interventions can trigger positive changes in private contracts
3. But weak interventions will have no effect

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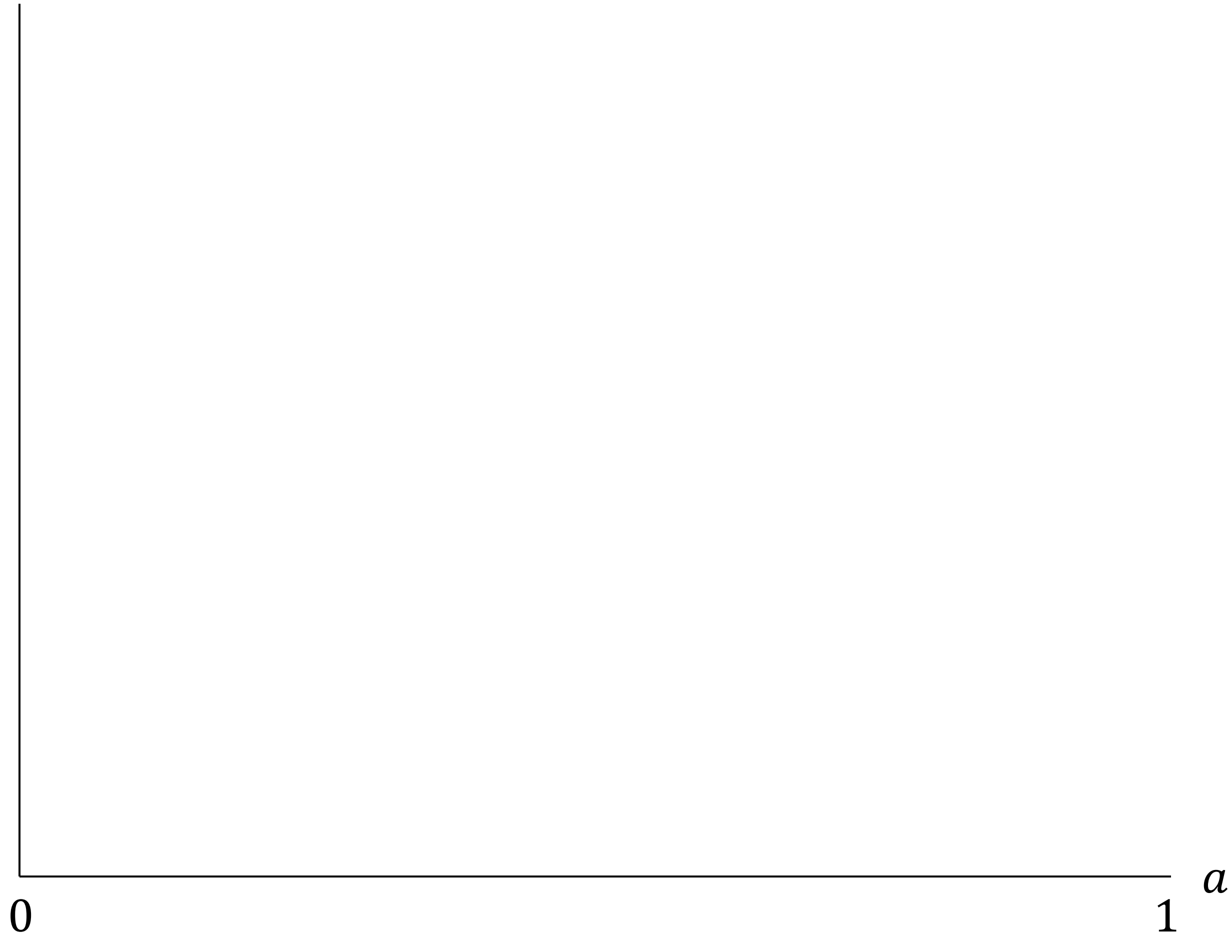
“Sticking Points”

The **convexification of c on** [0,1] is the largest convex function on [0,1] with $\tilde{c}(a) \leq c(a)$

Action $\hat{a}$ is **incentive-feasible** if $\tilde{c}(\hat{a}) = c(\hat{a})$. Denote by $\hat{a} \in A^{feas}$

There is a **sticking point** at action $\hat{a} < max\{a|a\hat{a} \in A^{feas}\}$ if $\tilde{c}$ is not differentiable at $\hat{a}$

“Sticking Points”



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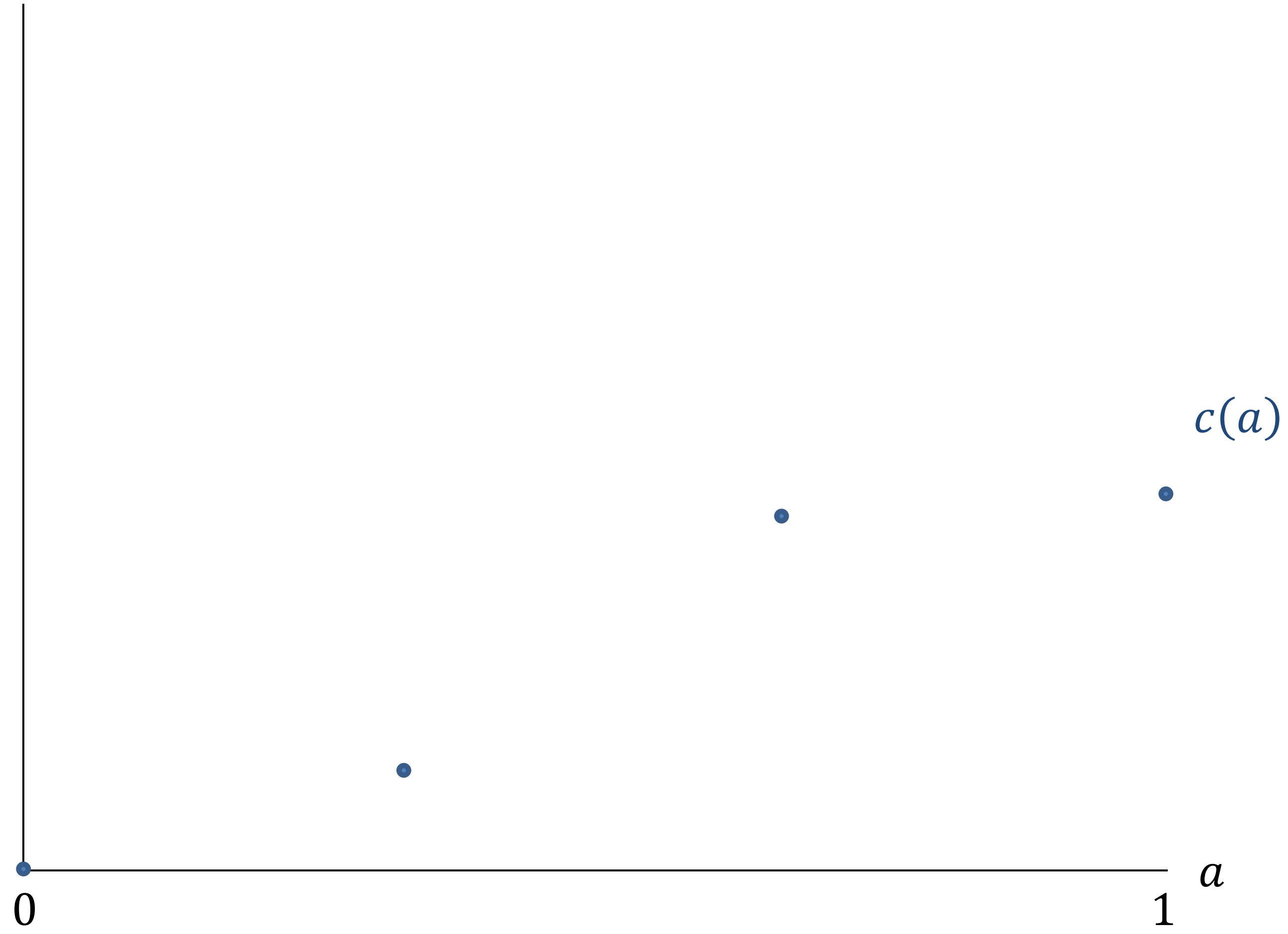

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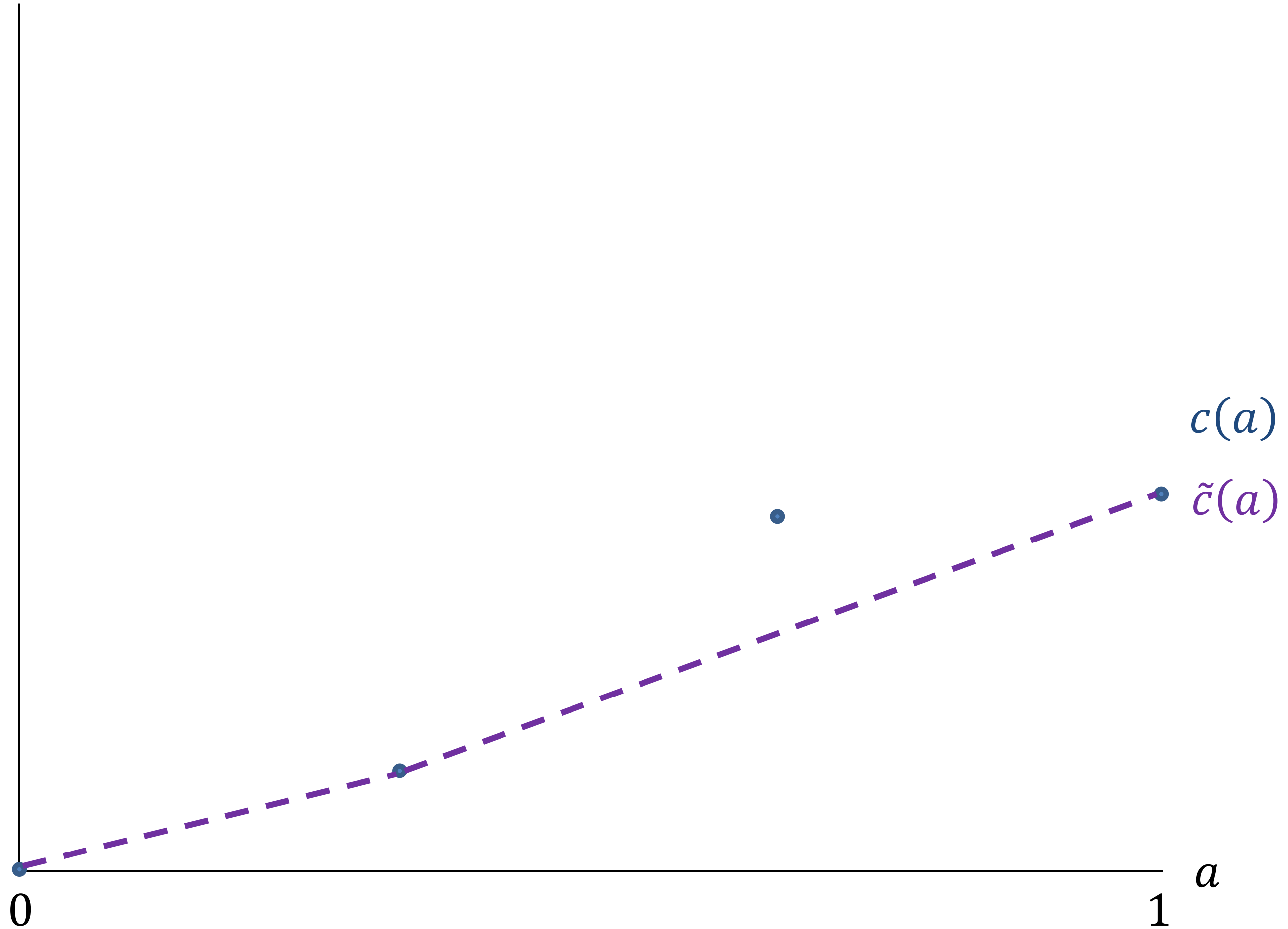

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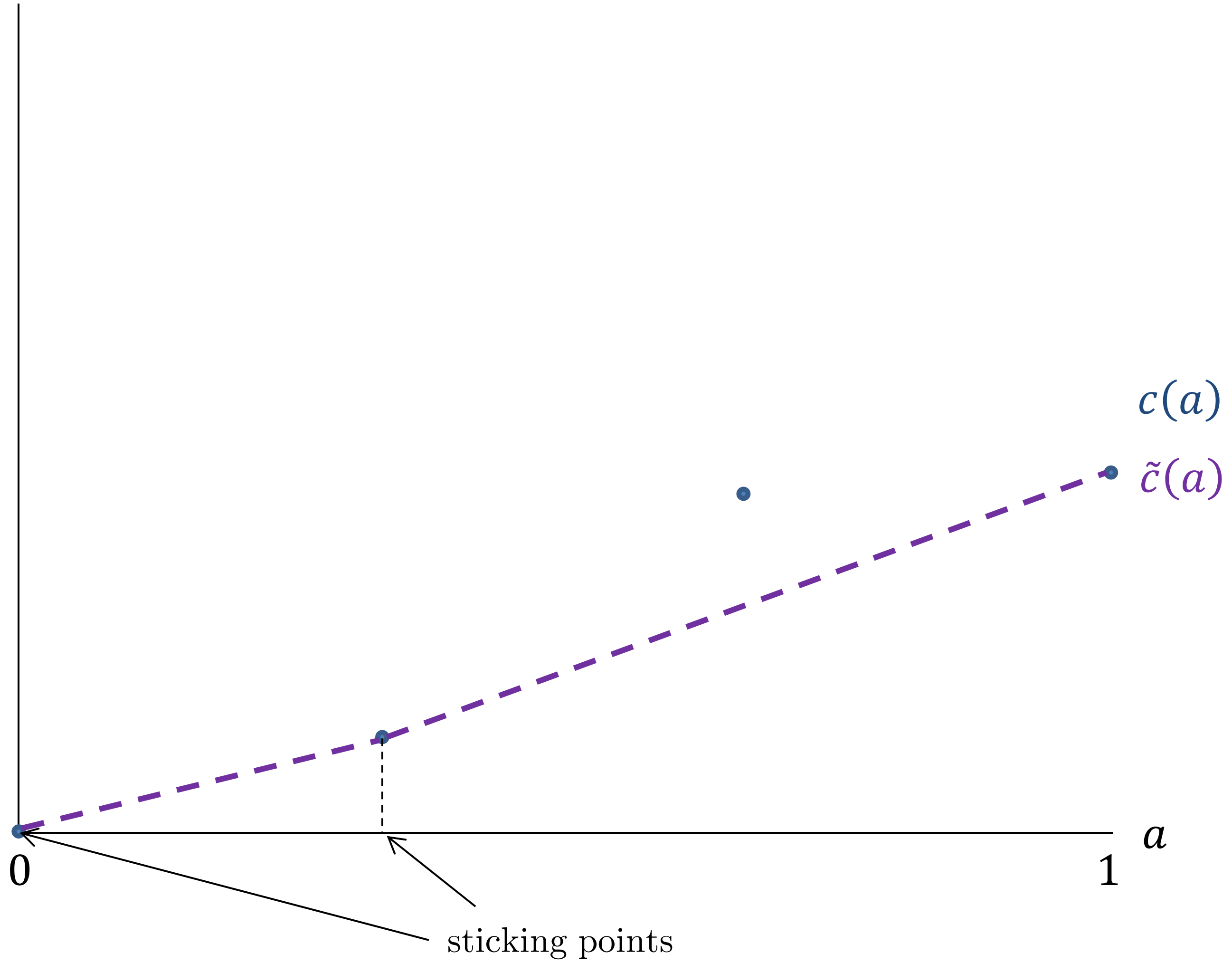

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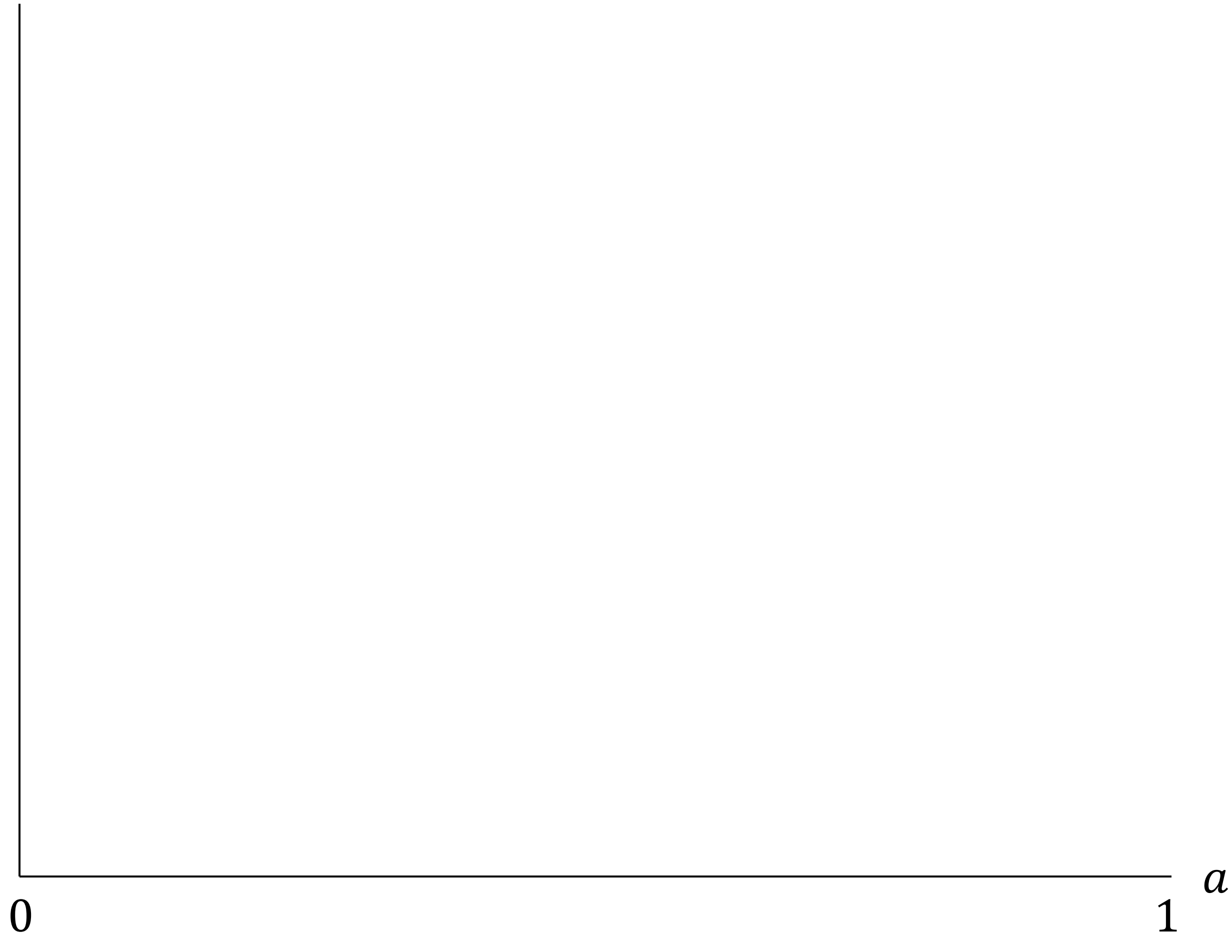

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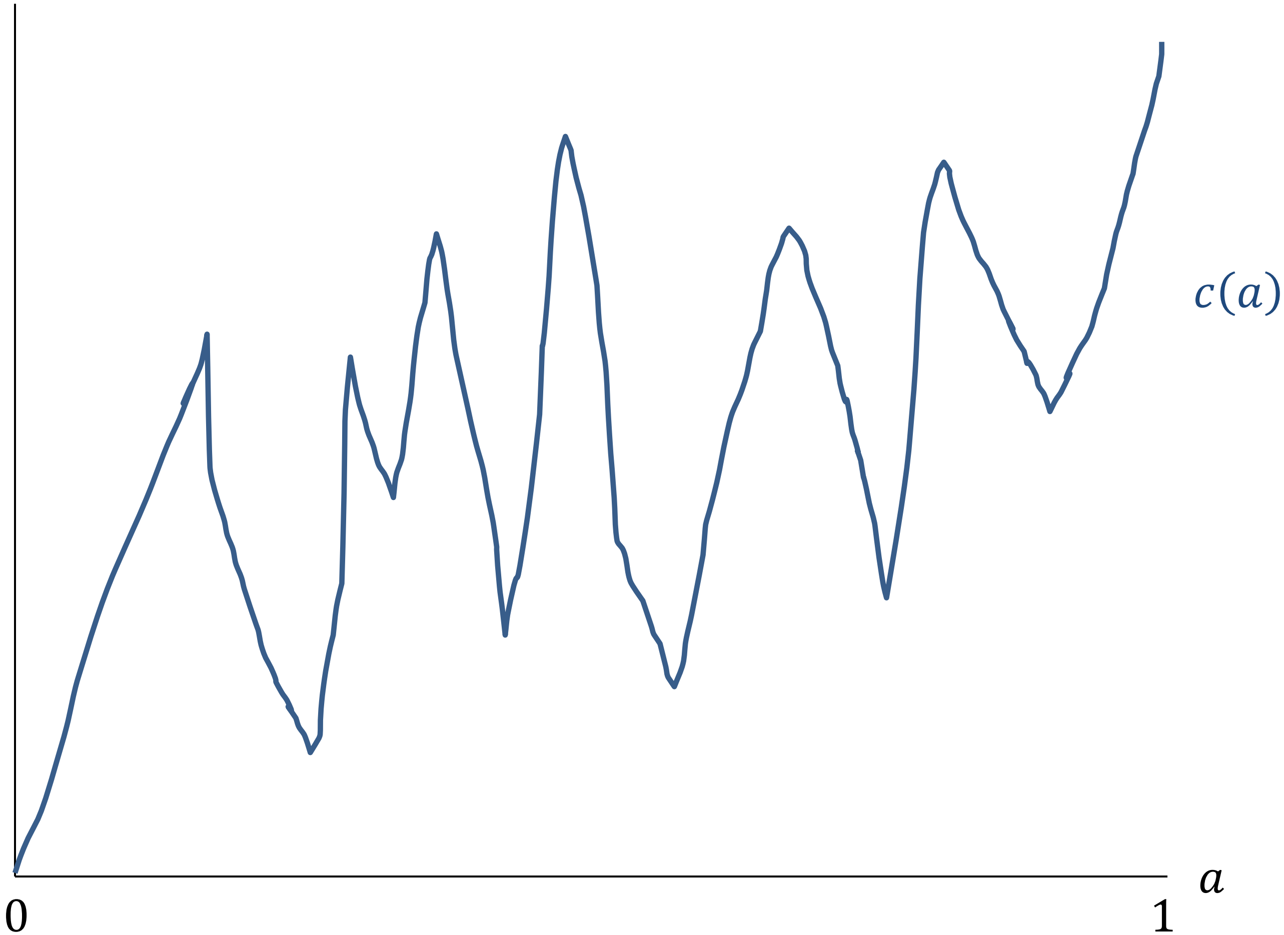

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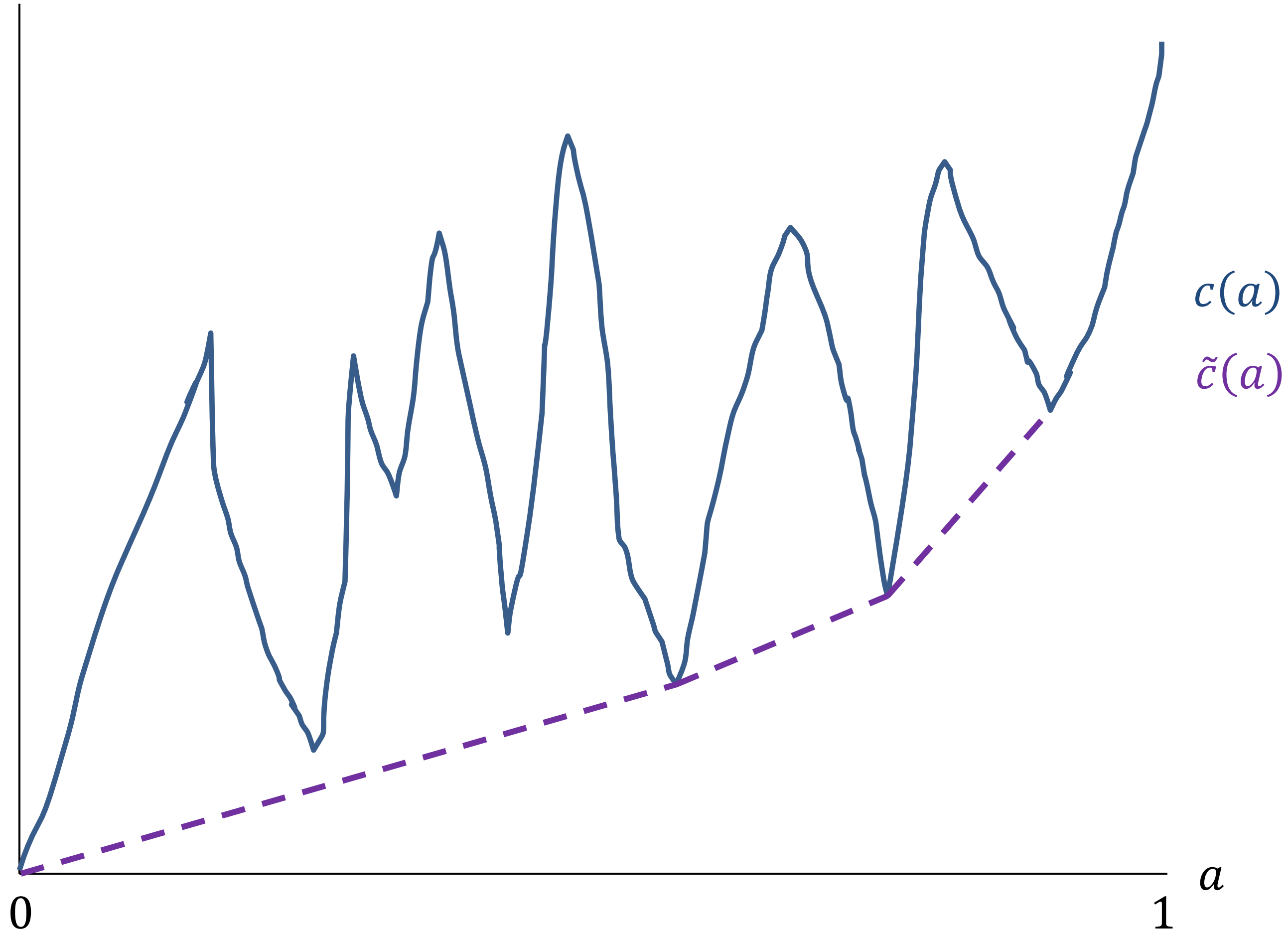

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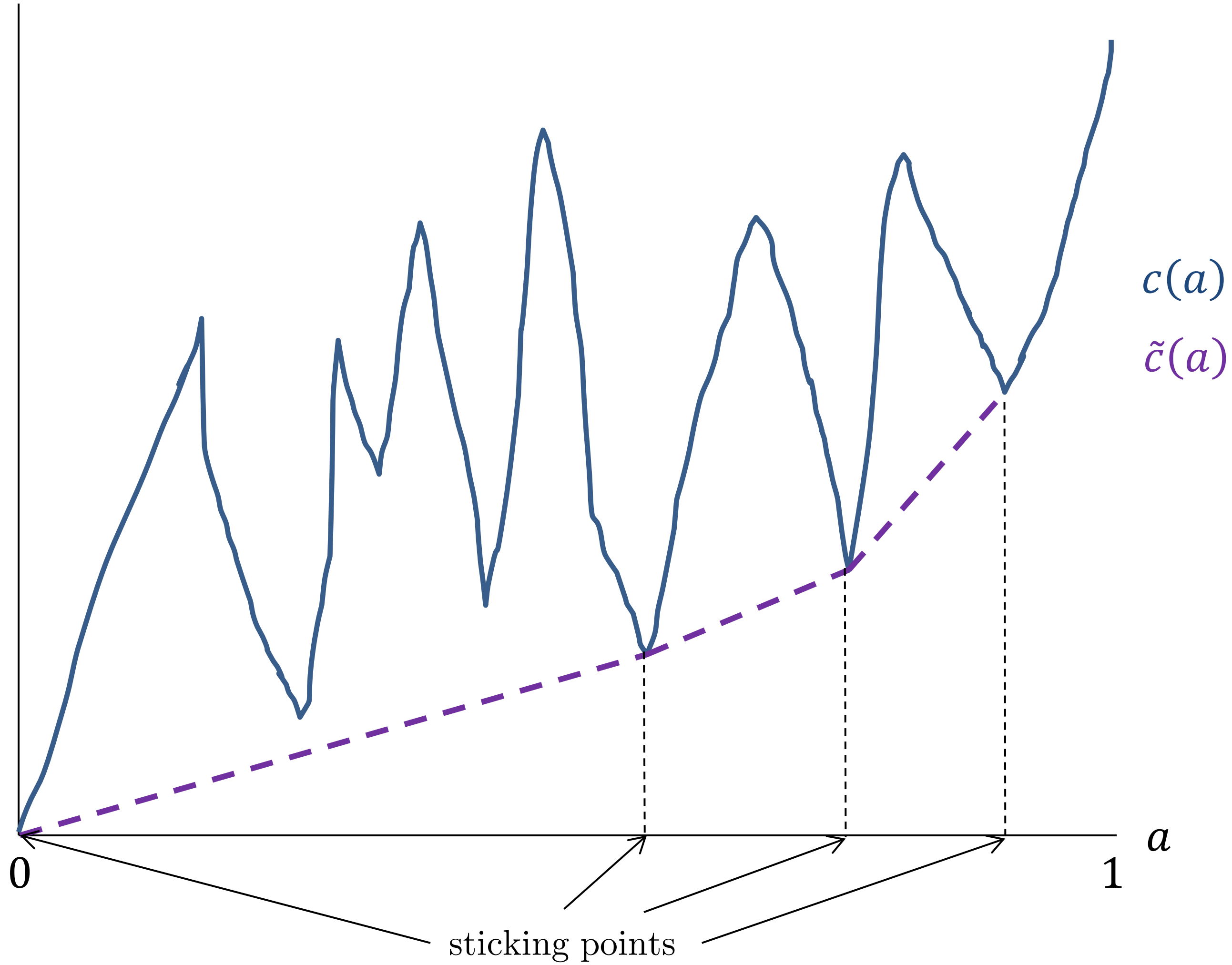

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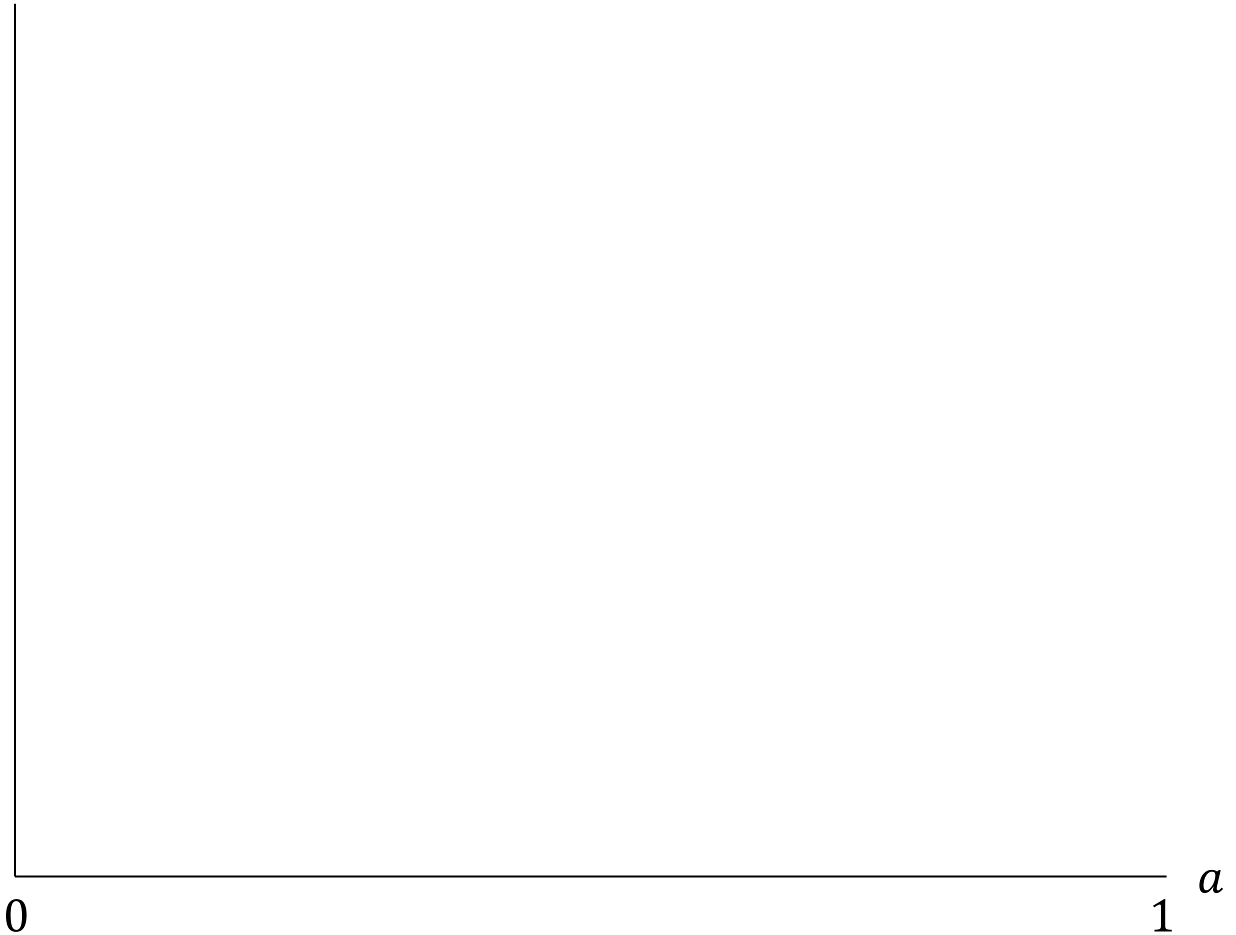

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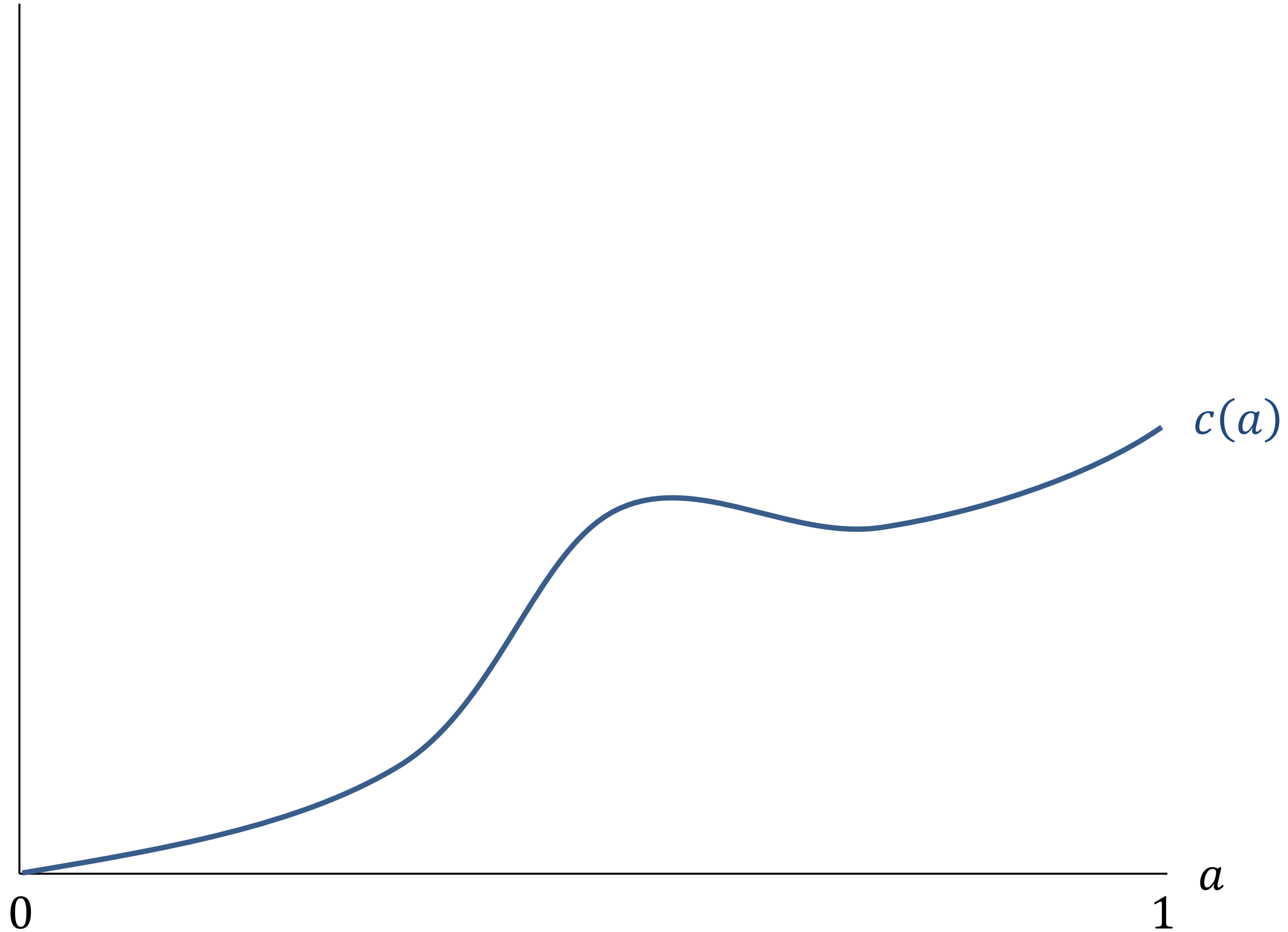

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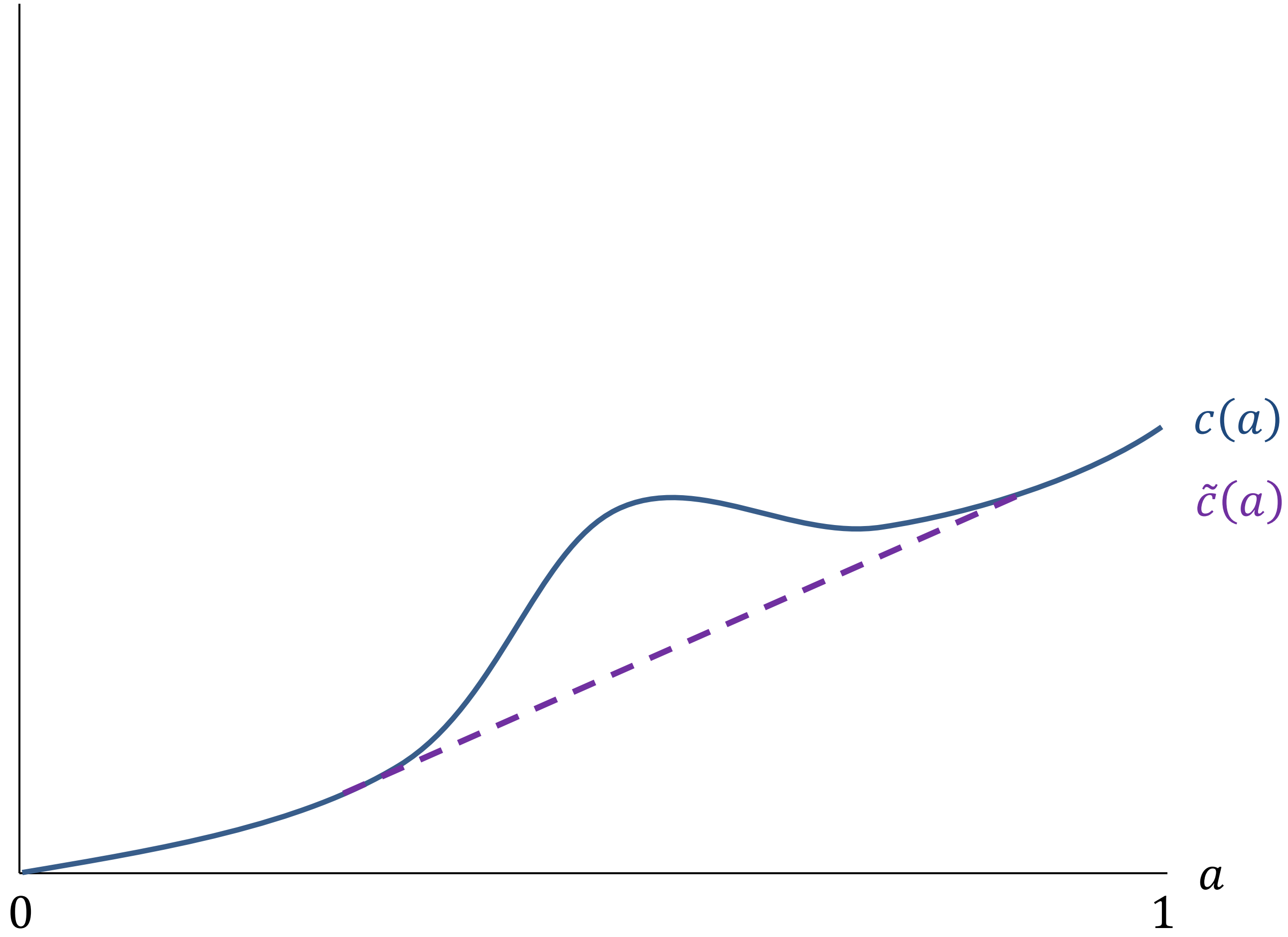
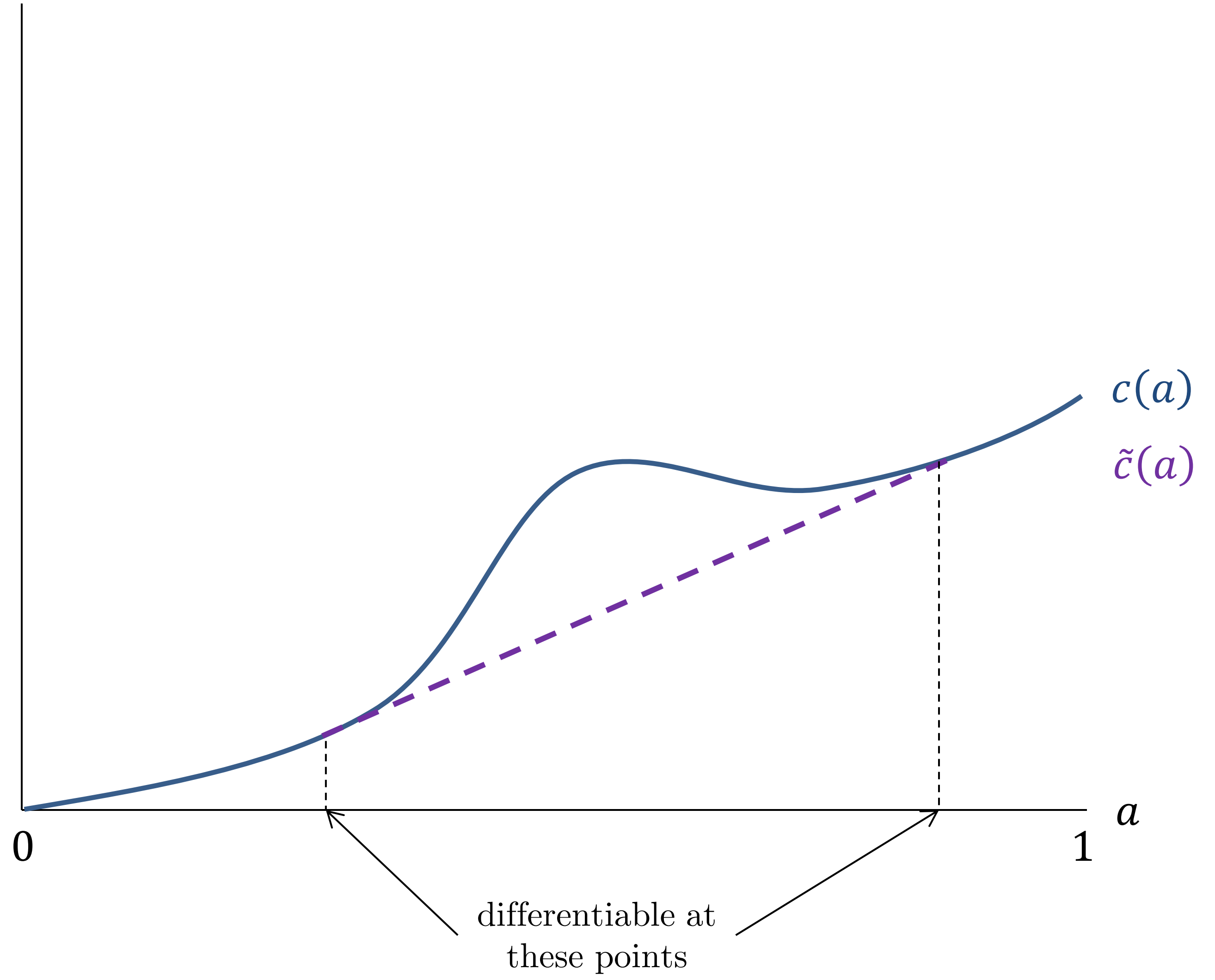


"Sticking Points" ≠ Nonconvexities



Characterization of Equilibrium Actions

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Theorem: The set of equilibrium actions is nonempty.

Two Conditions

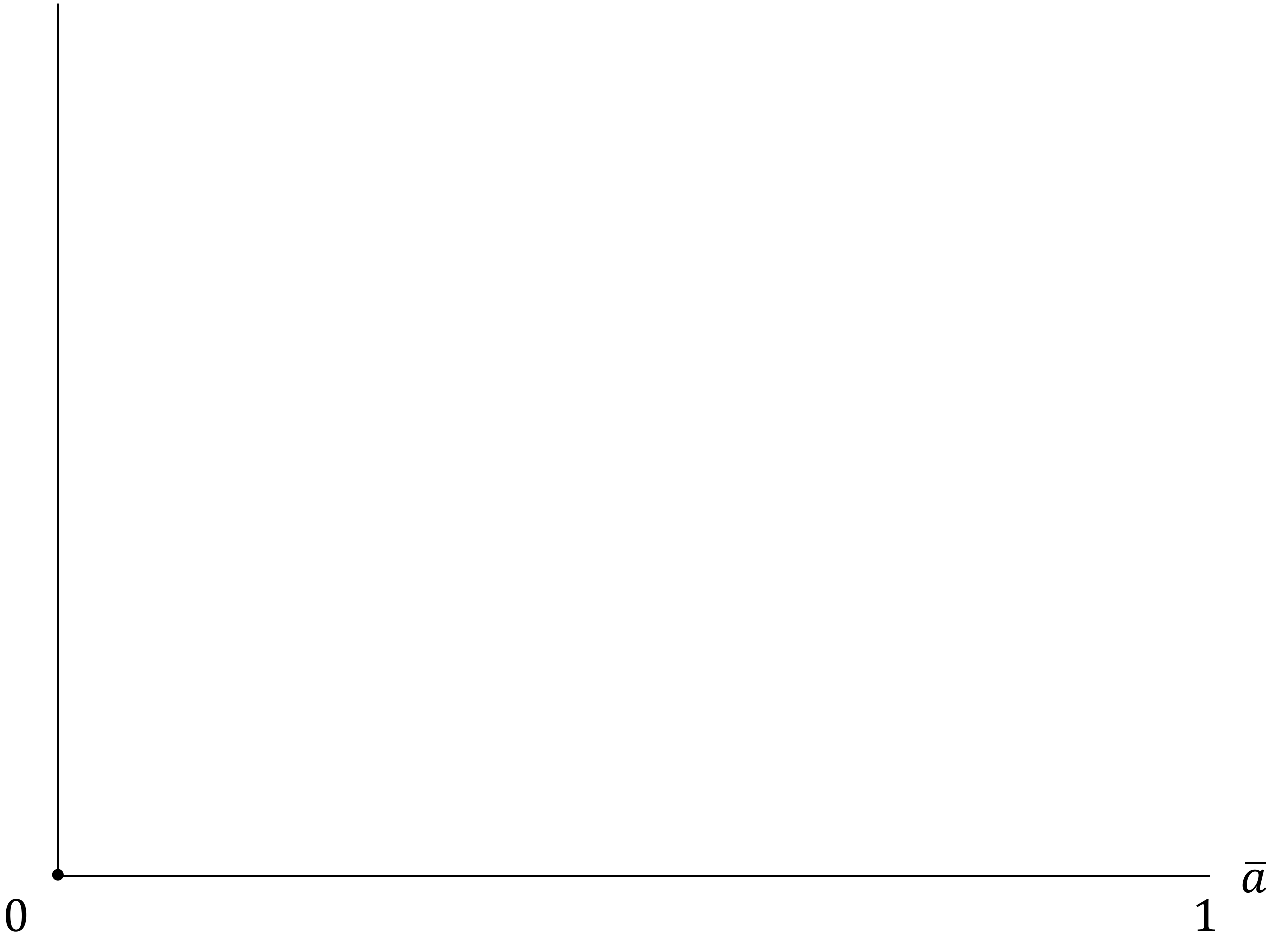
Condition CR (Convex Rents): The quantity

$$Z(a, a') = \frac{MAC^{-}(a) - MAC^{-}(a')}{a - a'}$$

is increasing in a, a' for all incentive-feasible a, a'.

Condition W (Well-Behaved): c is defined on $[0,1]$, is thrice-differentiable, $c'(0) = 0, c', c'' > 0$ for all $a > 0$, and $c''' \geq 0$.

Equilibrium Actions



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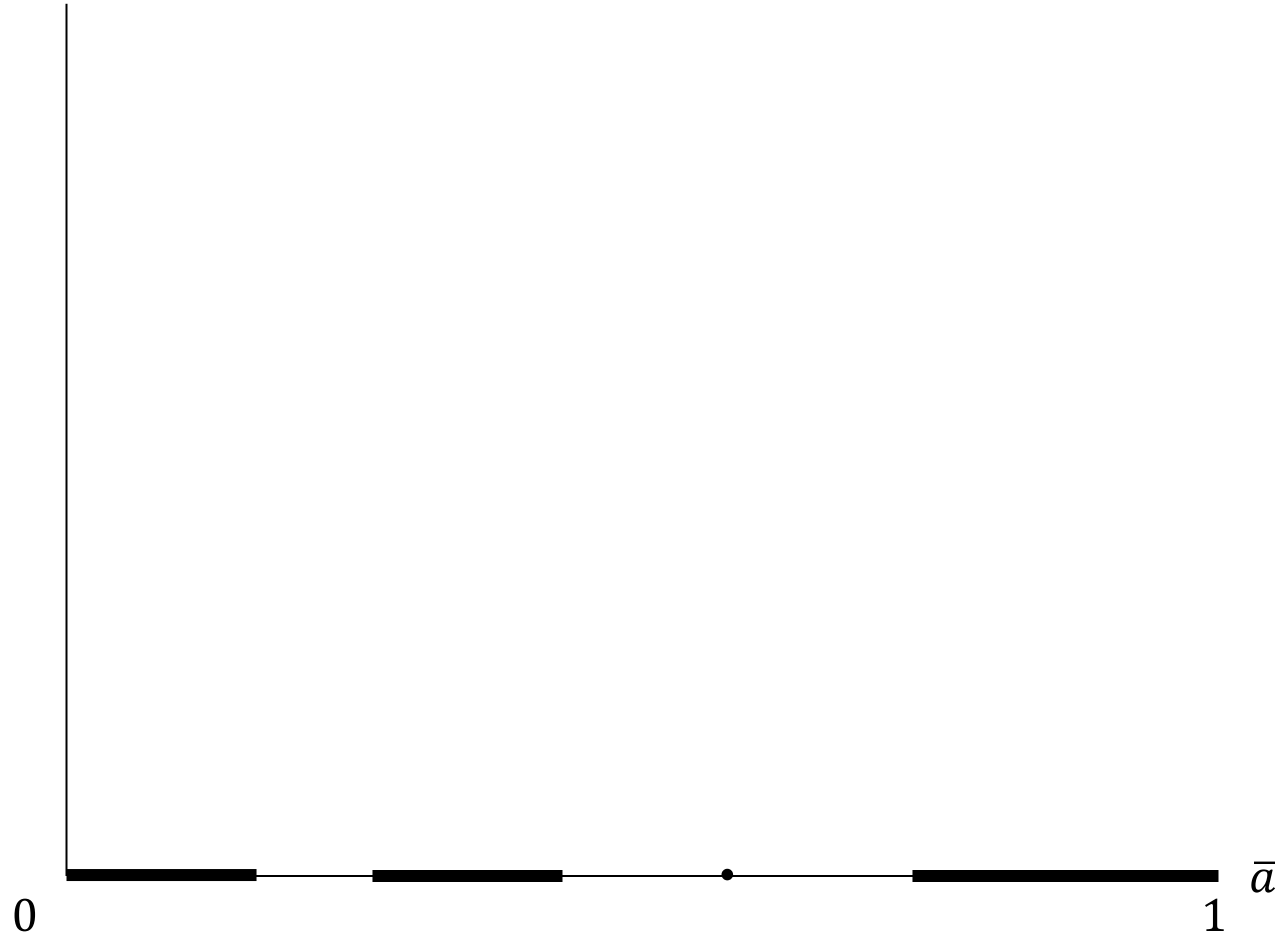

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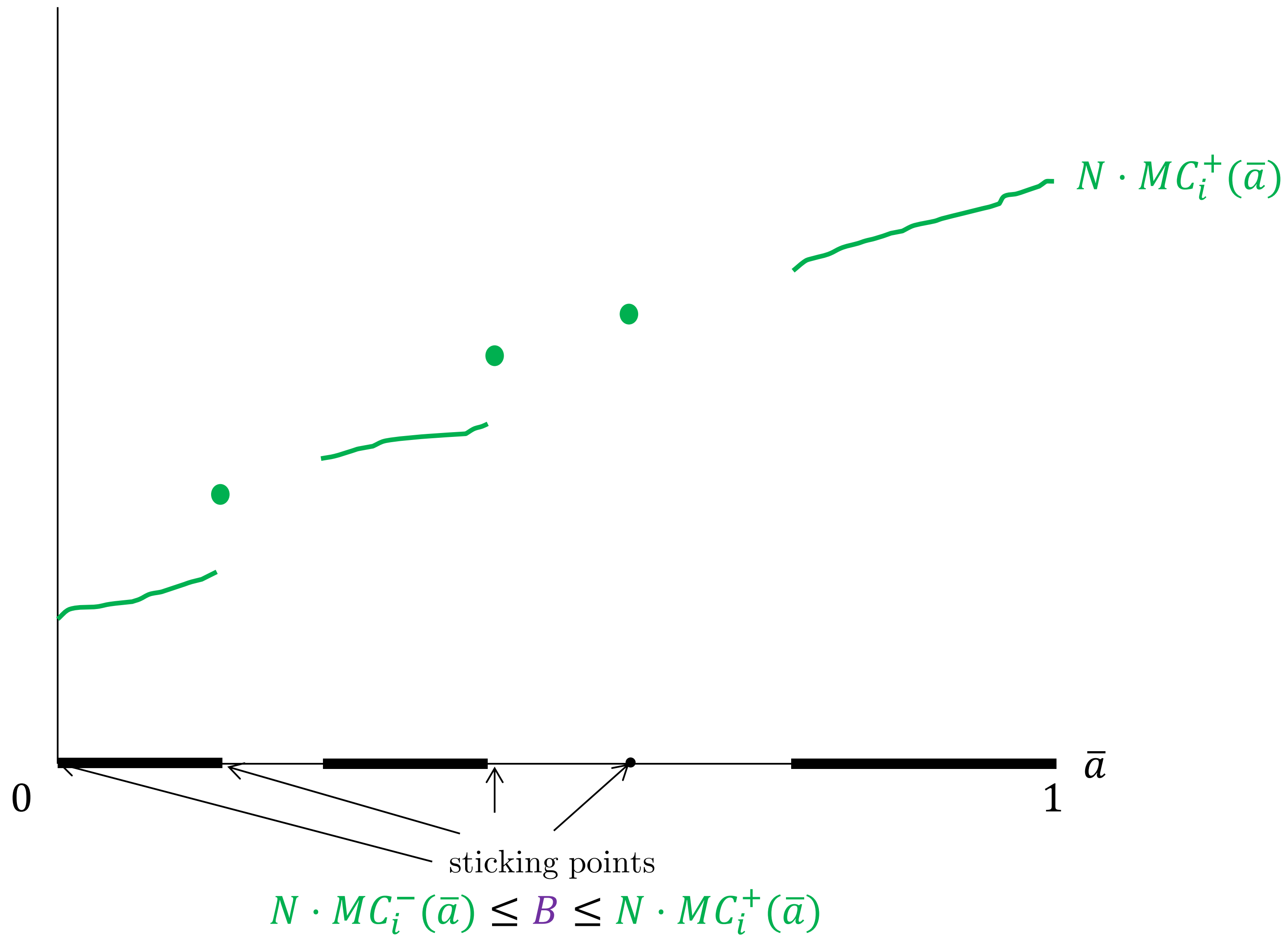

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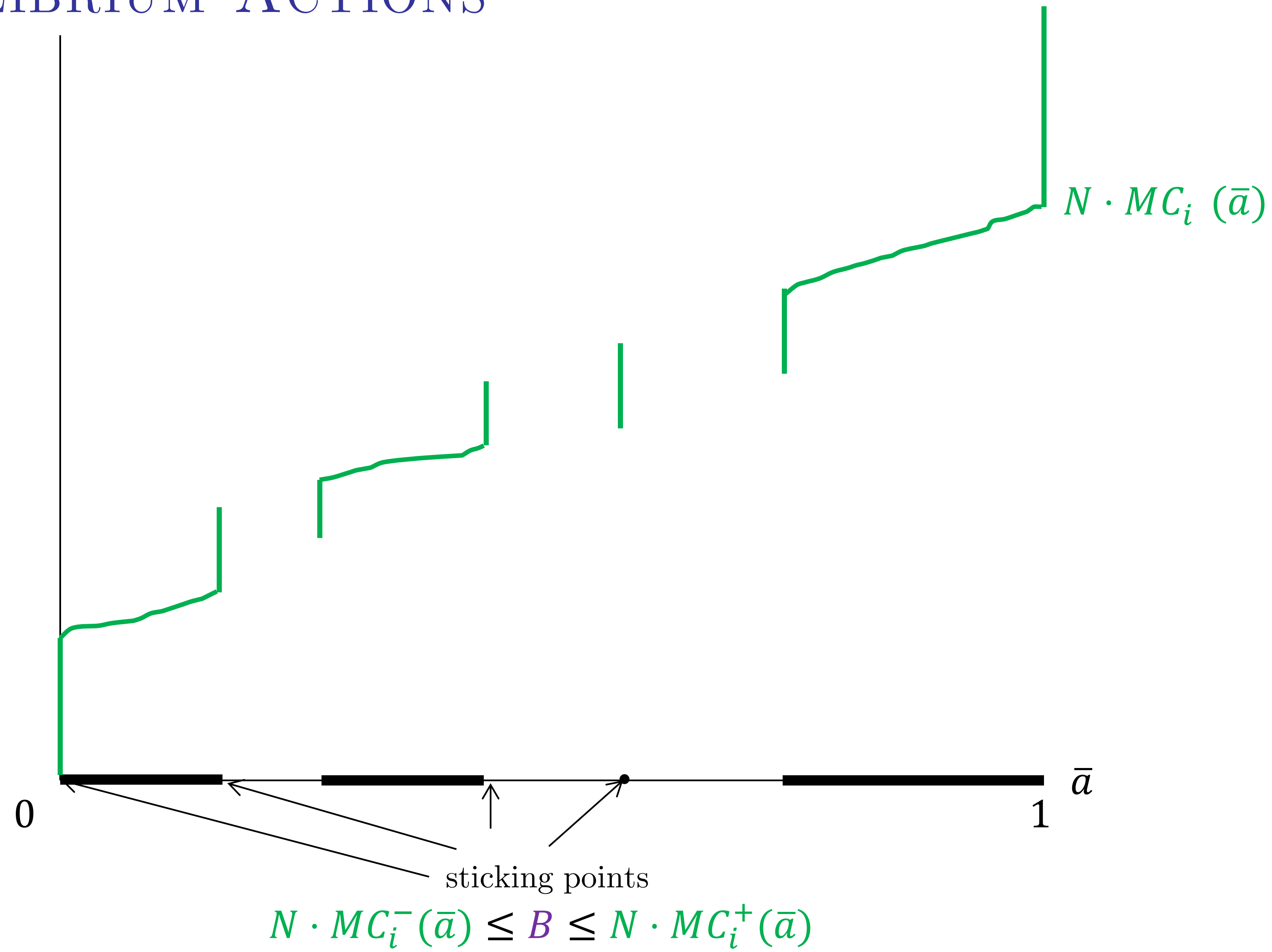
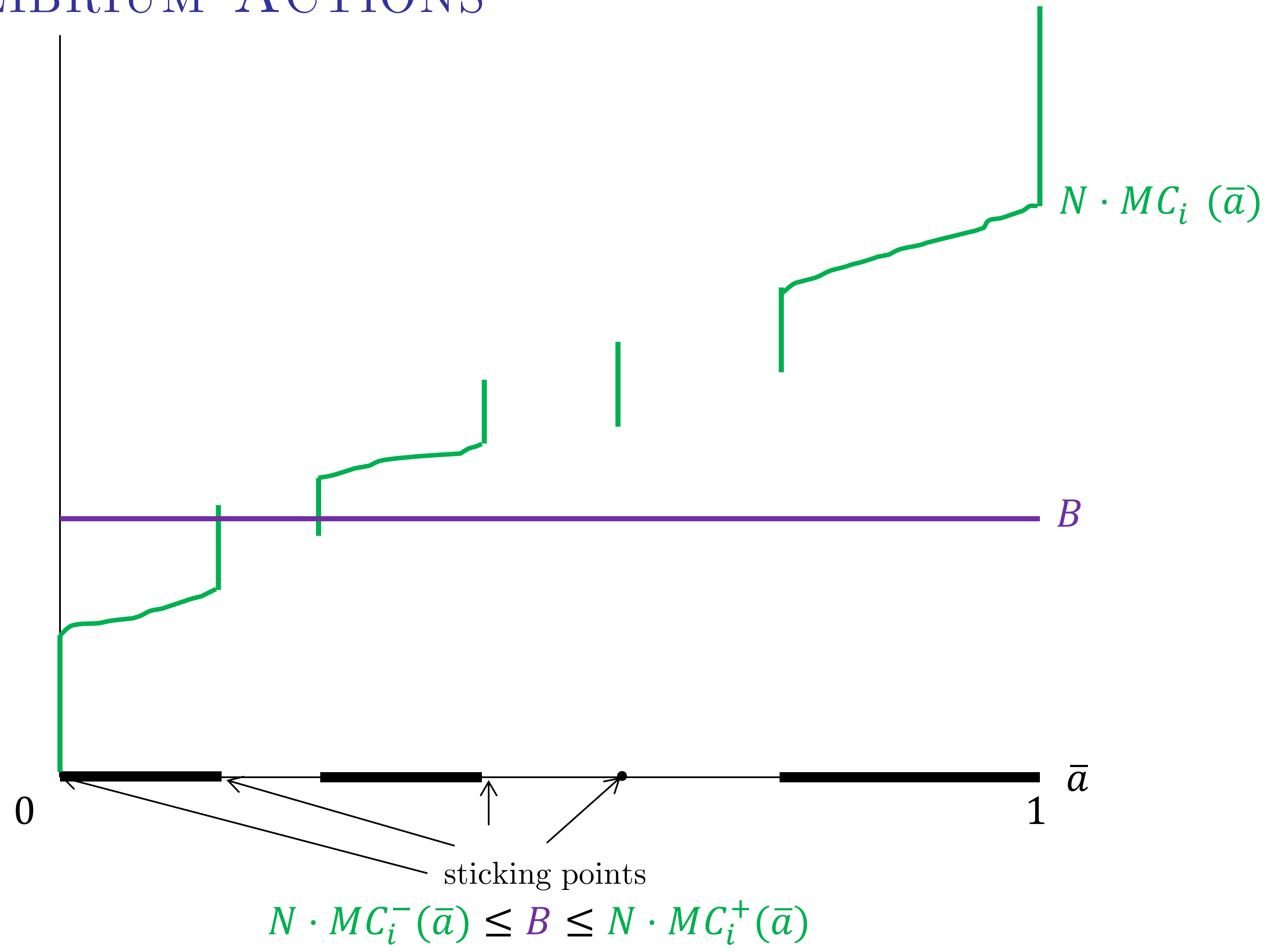
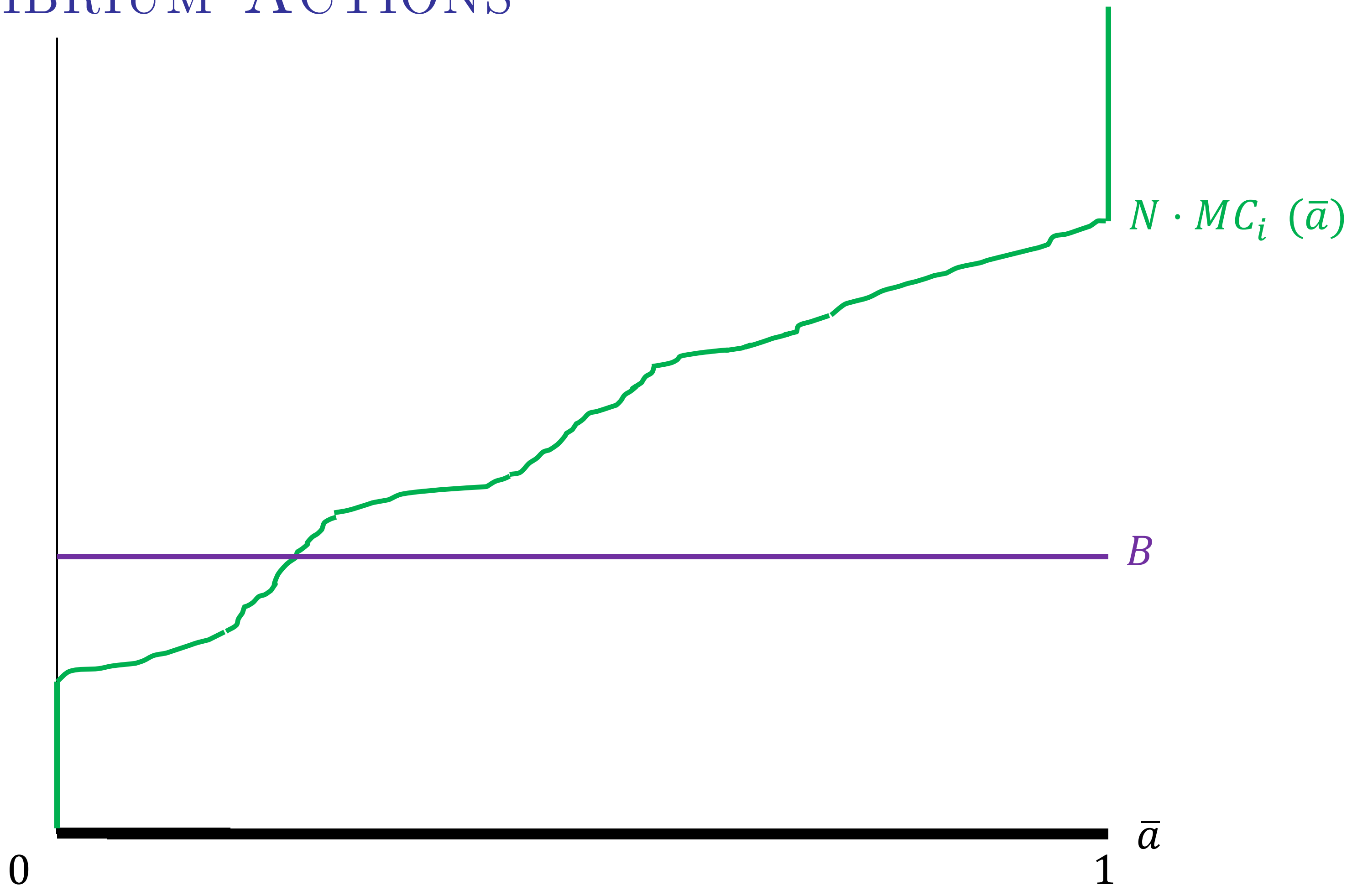


Equilibrium Actions



Equilibrium Actions



$$N \cdot MC_i^-(\bar{a}) \leq B \leq N \cdot MC_i^+(\bar{a})$$

"Sticking Points" Necessary and Sufficient

Proposition: Suppose Condition CR holds. The following are true:

1. If $a_L^* < a_H^*$, then there is a sticking point at some a^*;
2. If there is a sticking point at action $\hat{a}$, then there exists some B for which $a_L^* = \hat{a}$ and $a_H^* > \hat{a}$;
3. If Condition W holds, then $a_L^* = a_H^*$;
4. All equilibrium actions are bounded from above by a^{SB}.

Equilibrium Actions Pareto Rankable

Proposition: Suppose Condition CR holds. If there are multiple equilibrium actions, a^* and $a^{**} > a^*$, then:

1. There exists an equilibrium with action a^{**} that Pareto dominates an equilibrium with action a^*;
2. There does not exist an equilibrium with action a^* that Pareto dominates any equilibrium with action a^{**}.

Agenda

- The Model
- Single-Payer Problem
- Multiple-Payer Problem
- ACO Interventions
- General Results
- Conclusion

Conclusion

Theory of incentive contracts: identify conditions under which coordination failures arise. This aspect has not been explored.

Application to healthcare:

1. We model persistent inefficiencies in U.S. healthcare as resulting from common-agency problems.
2. The effects of policy initiatives depends on the types of actions being contracted for and whether there are coordination failures.