



# Introduction

- Traditional approach to review of horizontal mergers:

Market power vs. efficiency gains

- Seminal papers:

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- Literature typically considers a single merger in isolation:
  1. No possibility of future mergers.
  2. No possibility of alternative mergers today.
- Our first paper, *Dynamic Merger Review* (JPE, forthcoming), has addressed the first point.
- This paper, *Merger Policy with Merger Choice*, addresses the second point.

## Merger Policy with Merger Choice

- Optimal policy when firms can choose *which* merger to propose.
- **Simplest possible setting:** Single target (firm 0), several potential acquirers. At most one merger can be proposed to the antitrust authority. No dynamics.
- **Main result:** Antitrust authority adopts a minimum CS-standard that is increasing in the size of the merging firms.
- Provides a justification for discriminating between mergers based on naive computation of post-merger Herfindahl index (over and above apparent effect on CS).

- Related papers:
  - Lyons (*Mimeo*, 2002). Identifies issue: When choosing between mergers, interests of firms and antitrust authority not perfectly aligned.
  - Armstrong and Vickers (*Econometrica*, 2010). Abstract model that considers same issue. All projects (mergers) ex ante identical. In-

# The Model

- Homogeneous-goods Cournot model with constant returns to scale.

**Assumption 1** For any  $Q > 0$  such that  $P(Q) > 0$ :

(i)  $P'(Q) < 0$ ;

(ii)  $P'(Q) + QP''(Q) < 0$ ;

(iii)  $\lim_{Q \rightarrow \infty} P(Q) = 0$ .

- Assumption implies that there exists a unique equilibrium. Unique equilibrium is stable.
- $K$  potential mergers,  $M_1$  to  $M_K$

- Firms 1 to  $K$  ordered by pre-merger marginal costs:  $c_1 > c_2 > \dots > c_K$ .
- There may be other firms in the industry.
- Merger:  $M_k = (k, \bar{c}_k)$ , where  $\bar{c}_k \in [l, h_k]$  is post-merger marginal cost.
  - Feasibility and cost is stochastic, and independent across mergers.  
Set of realized feasible mergers is  $F$

- Pre-merger equilibrium:

$$\{q_i^0\}_{i=0}^N, Q^0, CS^0, \{p_i^0\}_{i=0}^N.$$

- Equilibrium after merger  $M_k$ :

$$\{q_i(M_k)\}_{i=1}^N, Q(M_k), CS(M_k), \{p_i(M_k)\}_{i=1}^N.$$

- Induced change in CS:

$$CS(M_k) - CS^0.$$

- Change in bilateral profit of merger partners:

$$\pi_k(M_k) - [\pi_k^0 + \pi_k^0].$$



- **Antitrust policy:** Commitment to approval set  $A = \{M_k : \tau_k \leq A_k\} \cup M_0$ .
  - At most one merger can be evaluated.
  - No randomization.
  - Null merger  $M_0$  is always in this set.
  -

- For now:

- Define:

$$M(F, A) = \arg \max_{M_k} E_F [CS(M_k, F, A)].$$

- Antitrust authority solves:

$$\max_A E_F [CS(M(F, A))].$$

- **Sequence of moves:**

1. Antitrust authority commits to approval set  $A$ .
2. Firms learn realization of merger possibilities.
3. Bargaining between firms as to what merger to propose. (Offer game.)
4. Antitrust authority approves/rejects proposed merger (if any).
5. Cournot competition.

## Analysis: Preliminaries

**Lemma 1** Suppose merger  $M_k$  is CS-neutral. Then

1. the merger causes no changes in the output of any nonmerging firm  $i \notin \{0, k\}$  nor in the joint output of the merging firms 0 and  $k$ ;
2. the merged firm's margin at the pre- and post-merger price  $P(Q)$  equals the sum of the merging firms' pre-merger margins:

$$P(Q) - \bar{c}_k = [P(Q) - c_0] + [$$

**Lemma 2** *A reduction in post-merger marginal cost  $\bar{c}_k$  causes:*

- 1. aggregate output  $Q(M_k)$  and consumer surplus  $CS(M_k)$  to increase;*
- 2. the induced change in the merging firms' bilateral profit,  $\pi(M_k)$ , to rise.*

- There is systematic bias in firms' proposal incentives relative to interests of consumers:

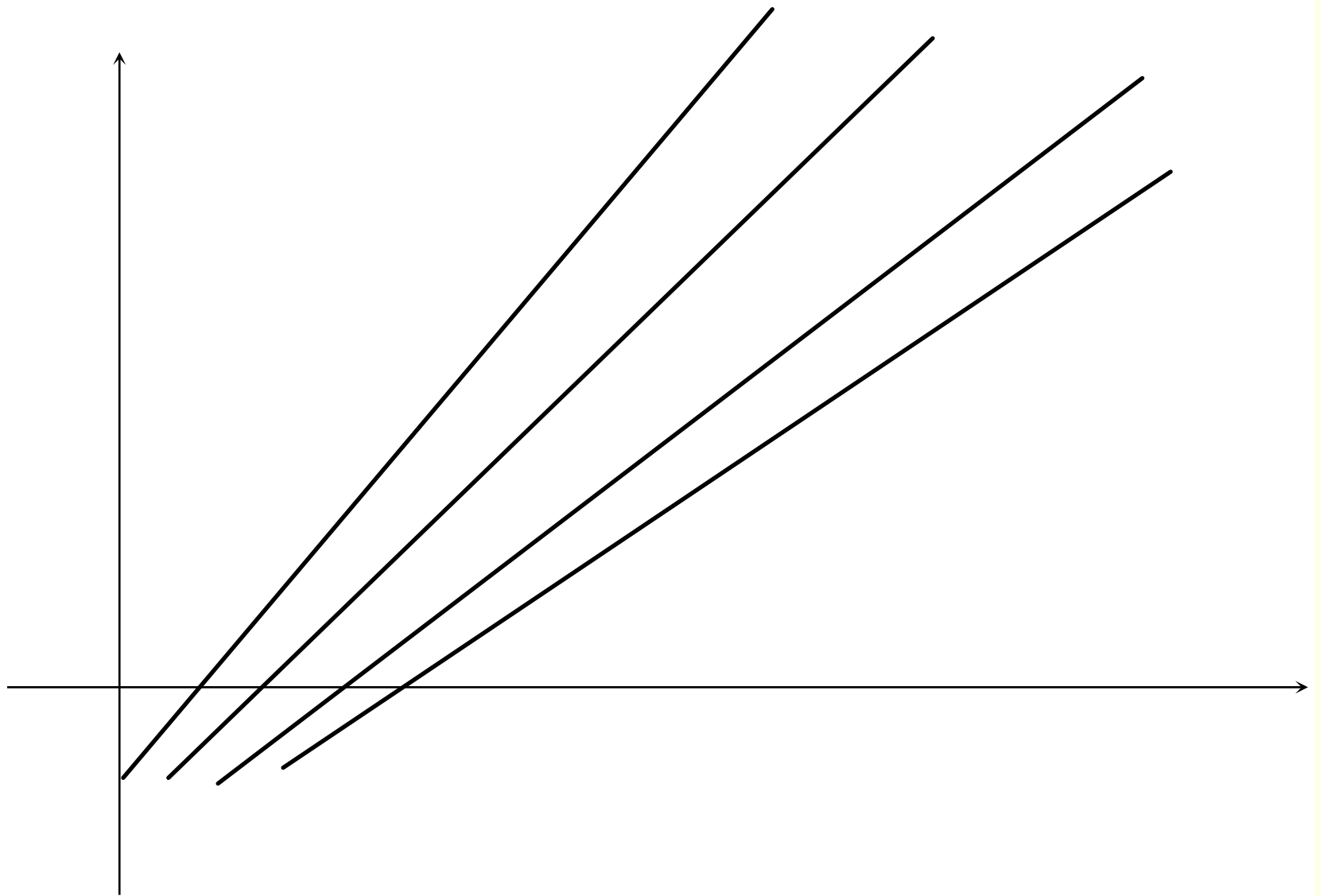
**Lemma 3** Suppose two mergers,  $M_j$  and  $M_k$ , with  $k > j \geq 1$ , induce the same non-negative change in consumer surplus,  $CS(M_j) = CS(M_k) = 0$ . Then the larger merger  $M_k$  induces a greater increase in the merging firms' bilateral profit:  $\pi(M_k) > \pi(M_j) = 0$ .

- Idea:

- For any CS-neutral merger  $M_i$ ,

$$\pi(M_i) = (P(Q^0) - c_0)q_i^0 + (P(Q^0) - c_i)q_0^0.$$

- Extends to any CS-nondecreasing merger.







- To obtain that reduction in post-merger marginal cost increases aggregate profit (analog of Lemma 2, part (2)), one needs to impose additional structure. Holds, for instance, if pre-merger marginal cost differences are not too large.
- Analog of Lemma 3:

**Lemma 3** Suppose two mergers,  $M_j$  and  $M_k$ , with  $k > j - 1$ , induce the same non-negative change in consumer surplus,  $CS(M_j) = CS(M_k)$

## Main Result

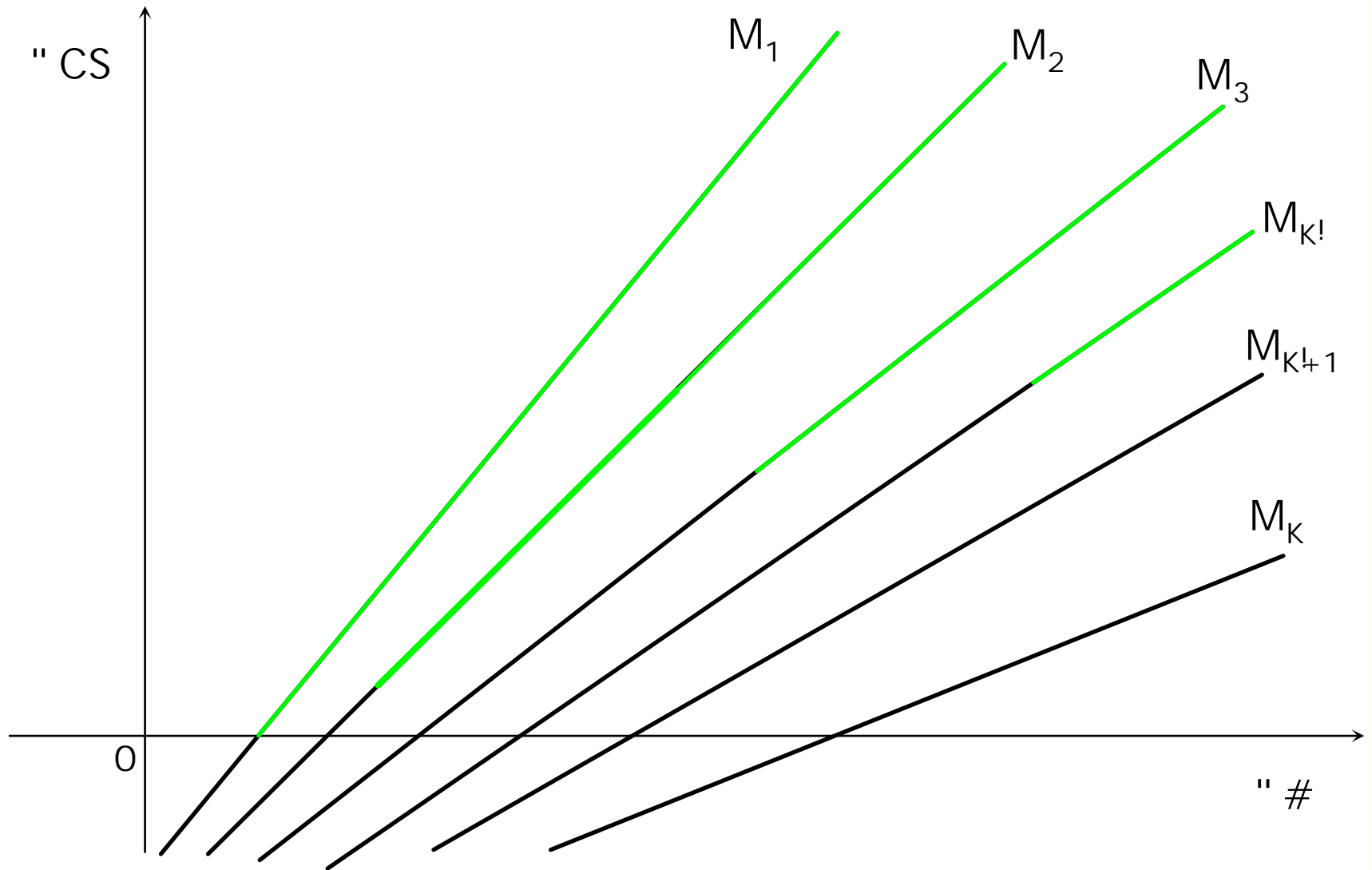
- Let:

$$\begin{aligned} \underline{CS}_k &= \min\{CS(M_k) : M_k \in A\} \\ \overline{CS}_k &= \min\{CS(M_k) : M_k \notin A\} \end{aligned}$$

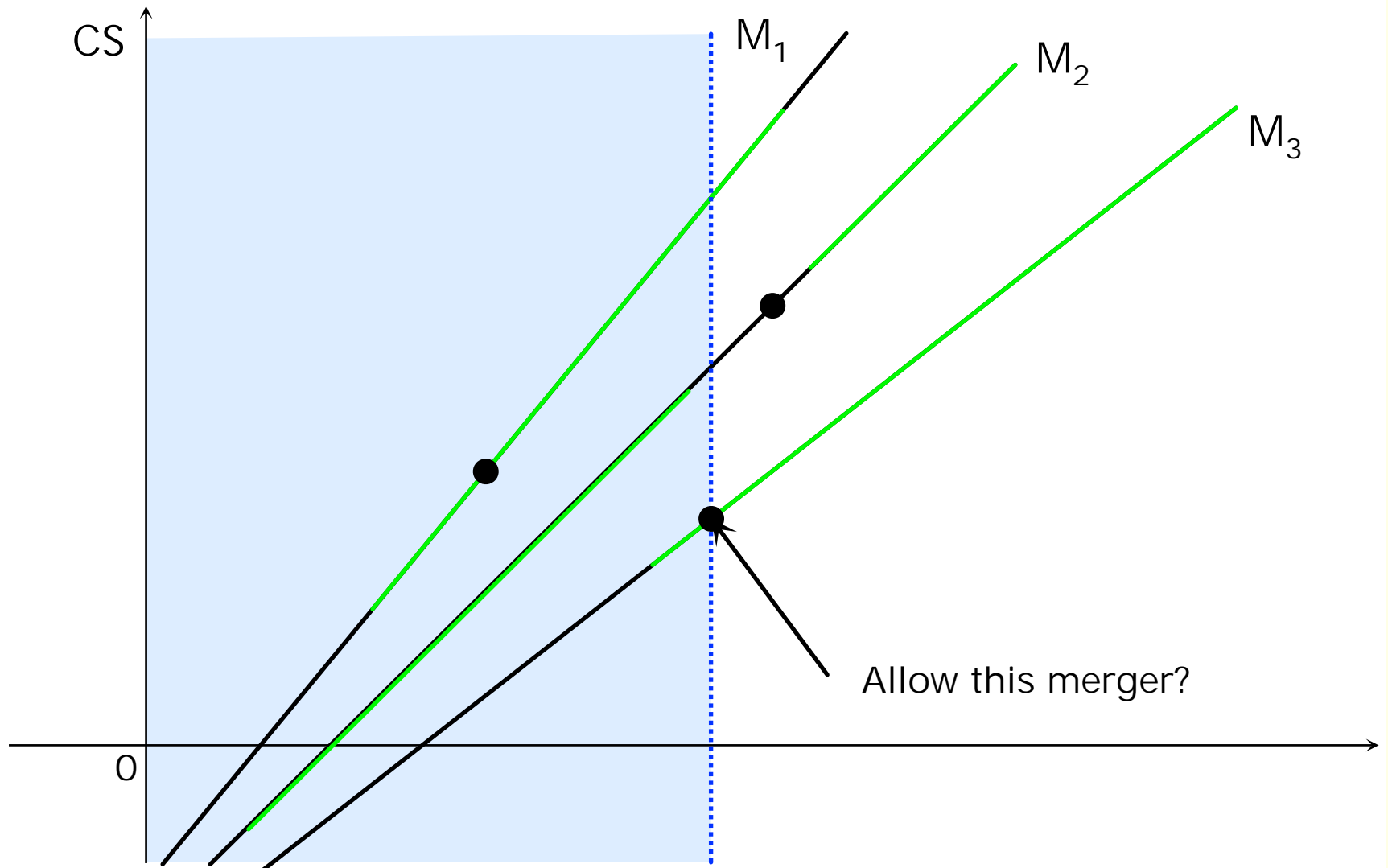
**Proposition 1** Any optimal approval policy  $A$  approves the smallest merger  $M_1$  if and only if it is CS-nondecreasing, approves only mergers  $\{1, \dots, K\}$  with positive probability ( $K$  may equal  $K$ ) and satisfies:

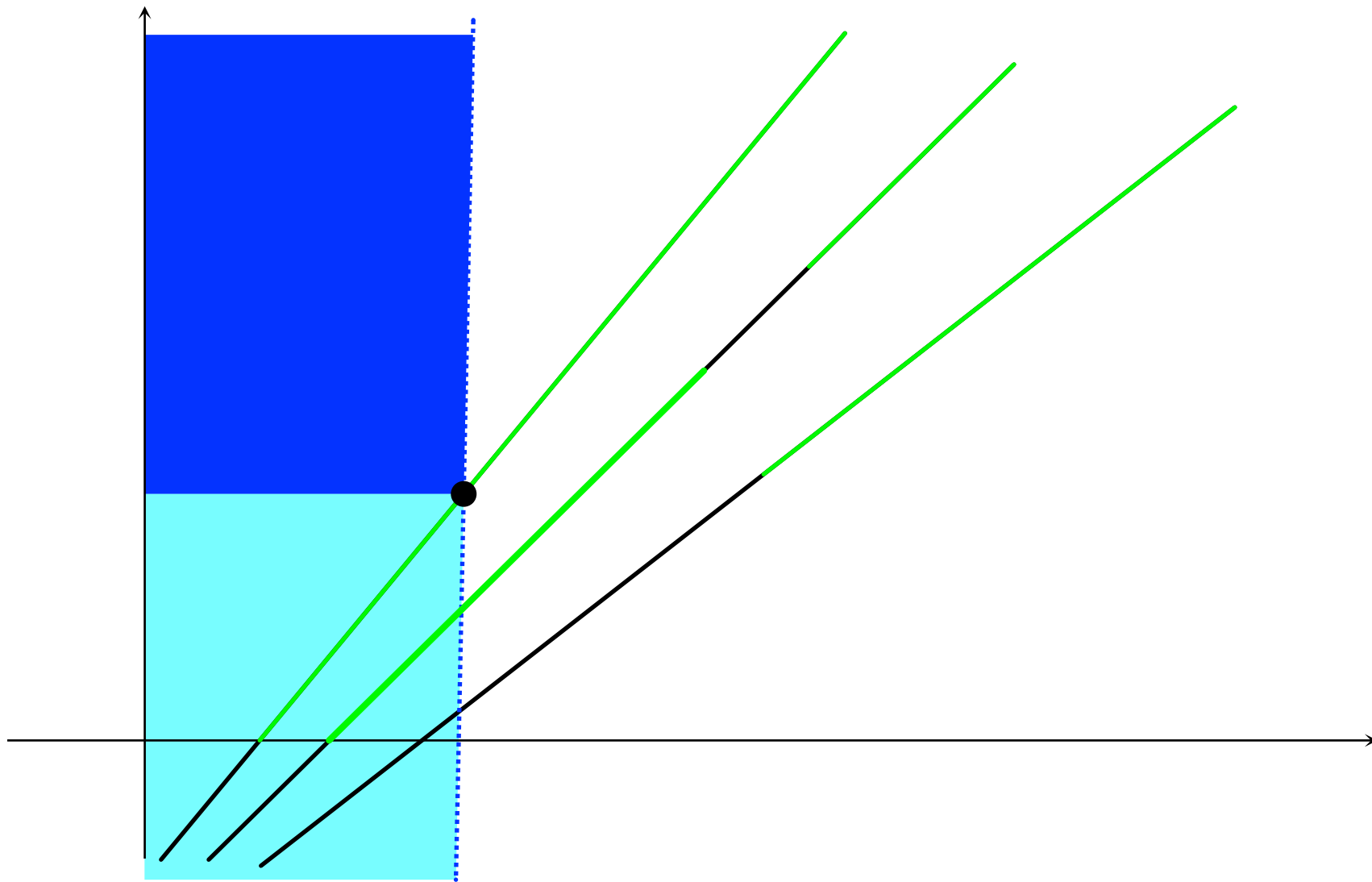
$$0 = \overline{CS}_K$$

Proposition 1: The lowest allowable CS-level is increasing with merger size.

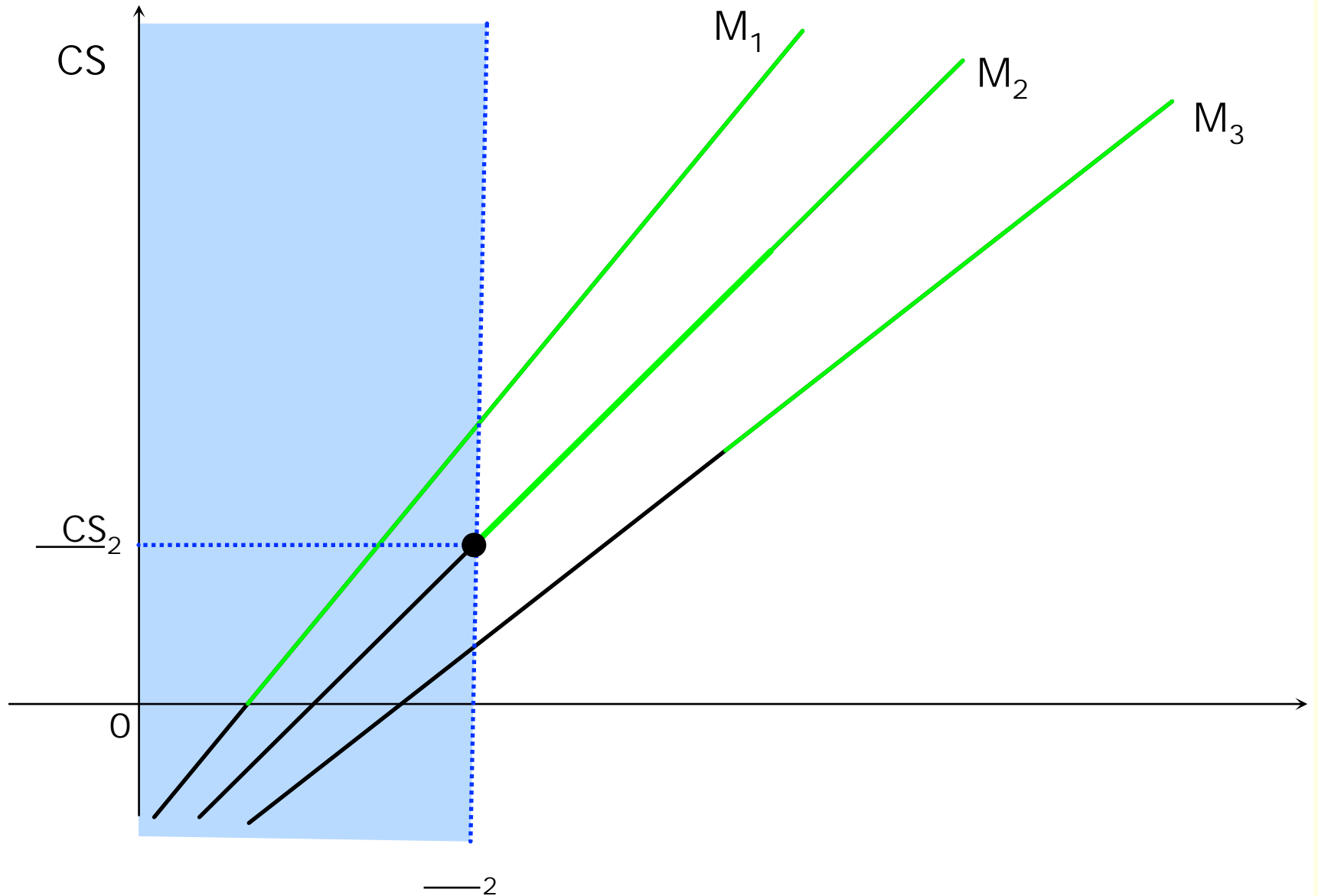


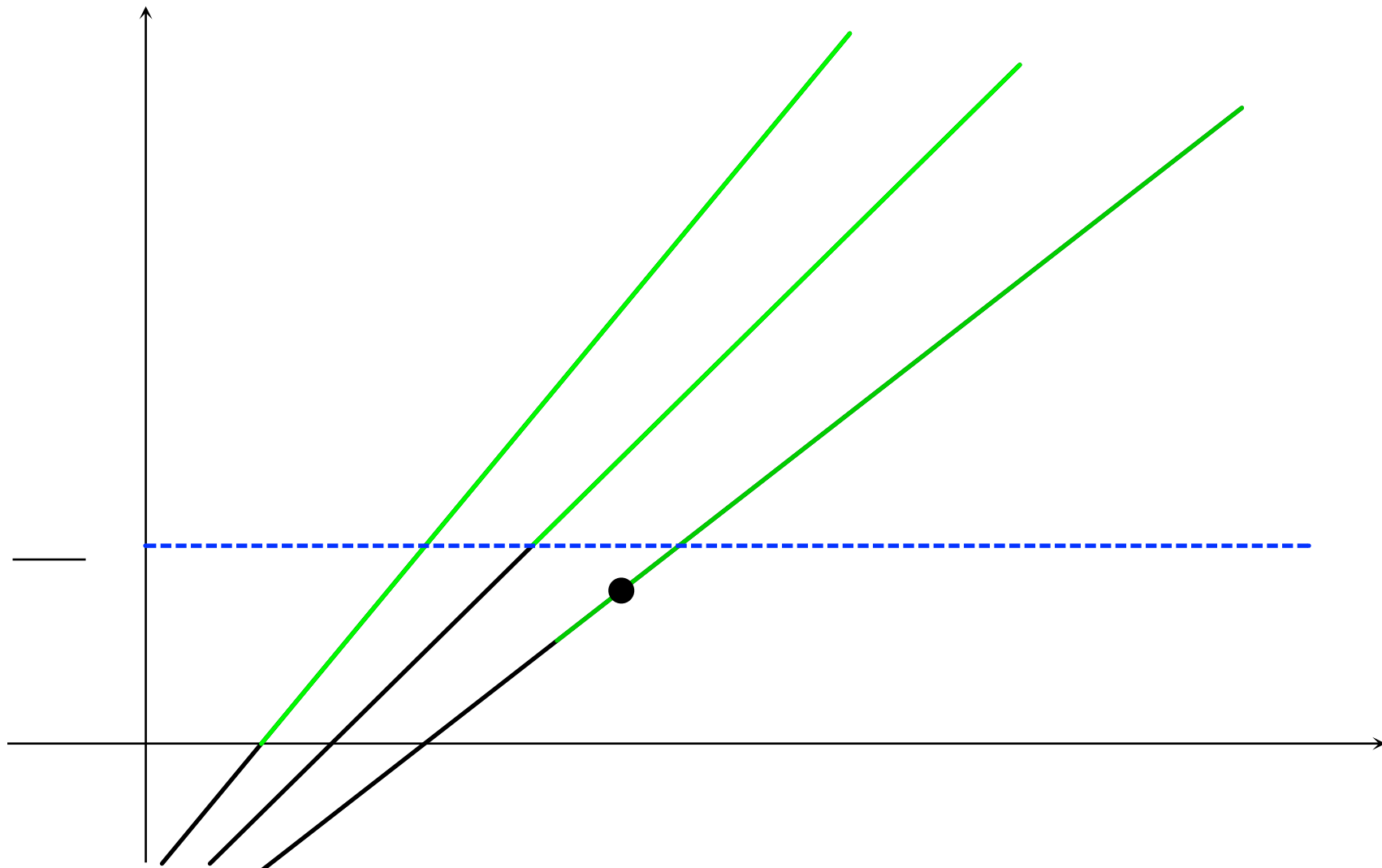
Note: Disapproval matters only when a merger is most profitable among feasible and allowable mergers.





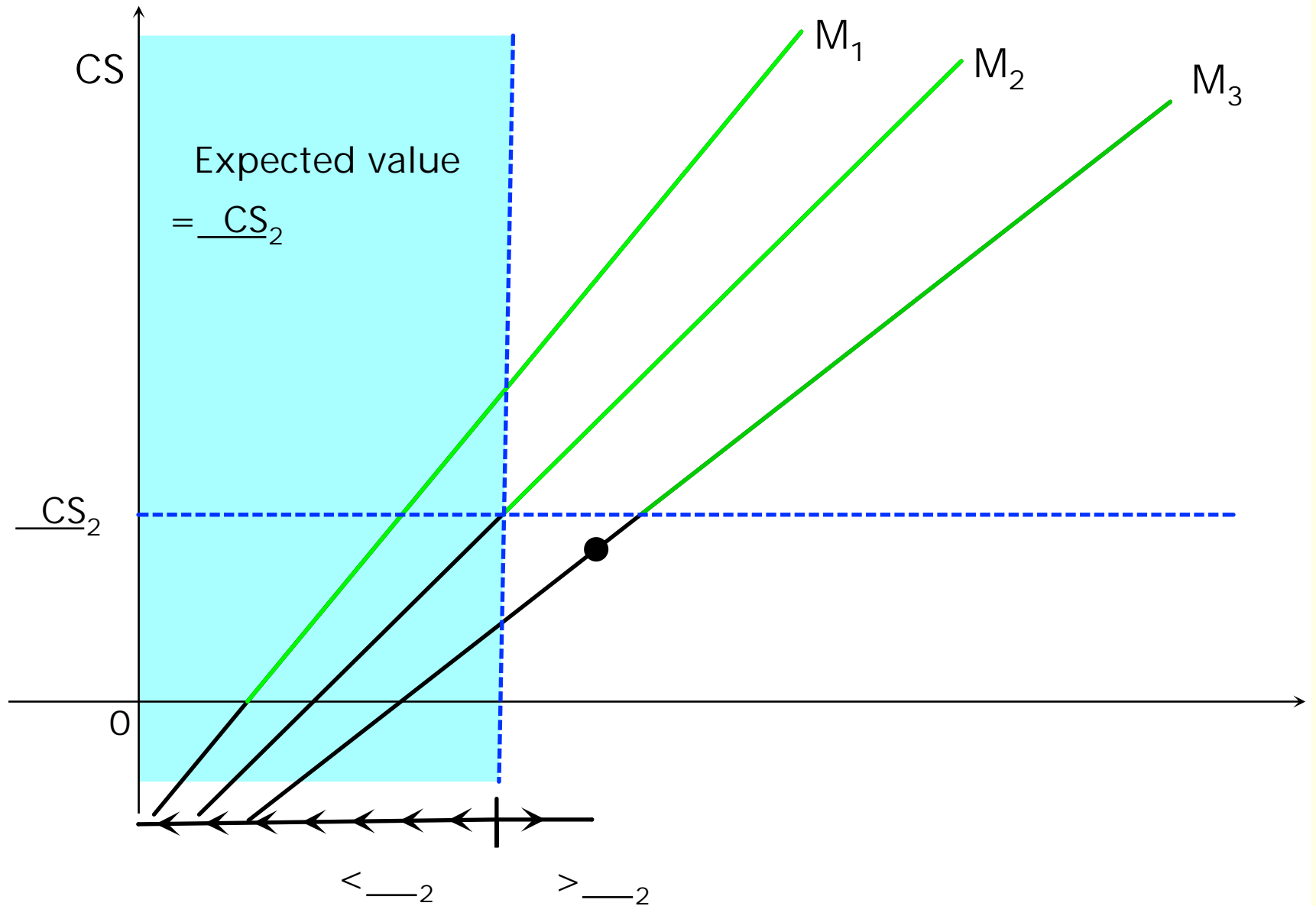
The lowest allowable CS-level for  $M_k$ ,  $\underline{CS}_k$ , equals the expected CS-level of the next most profitable allowable merger.

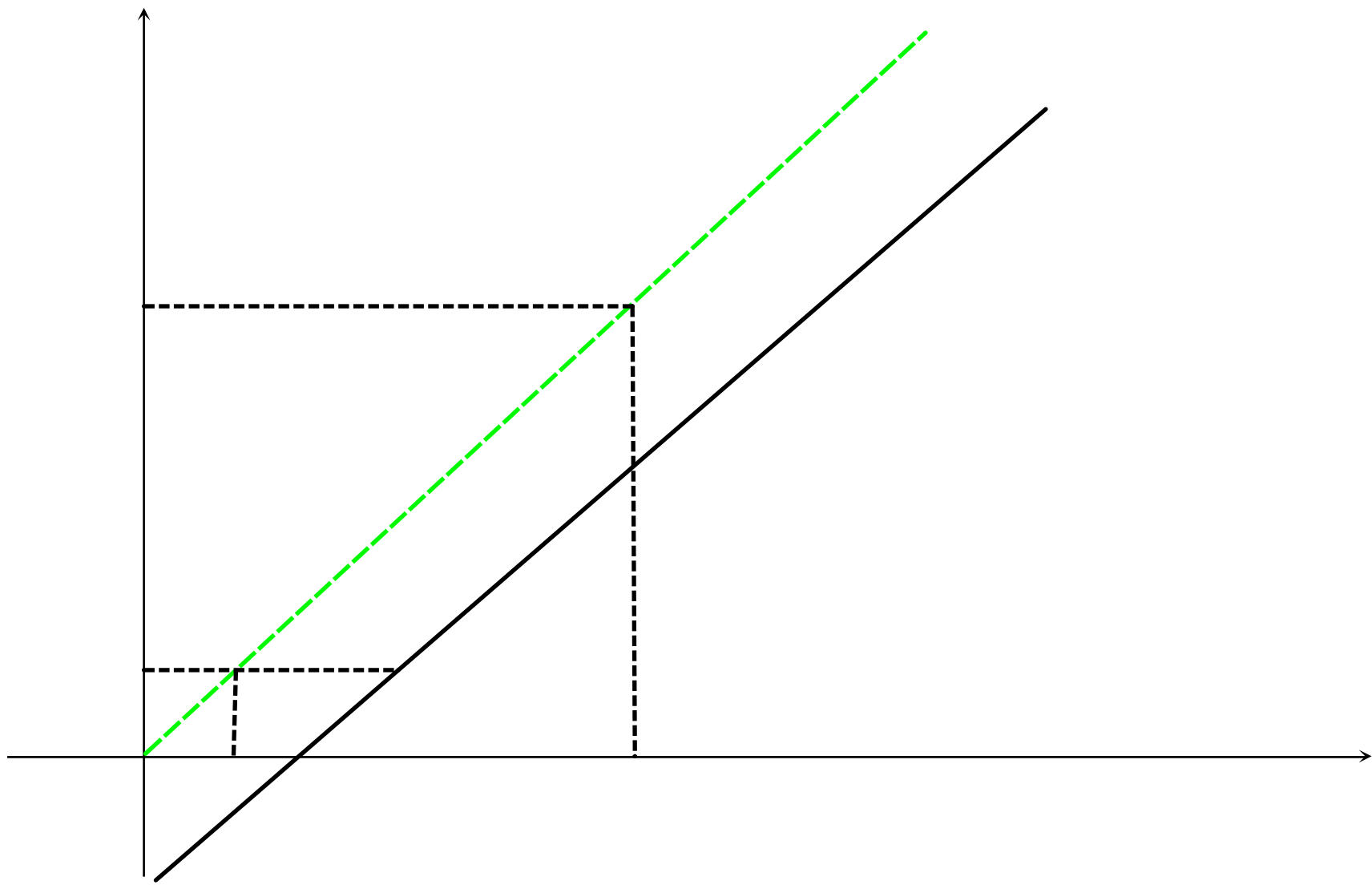






Now instead reject  $M_3$  if the change in CS less than (or equal to)  $\underline{CS}_2$ .



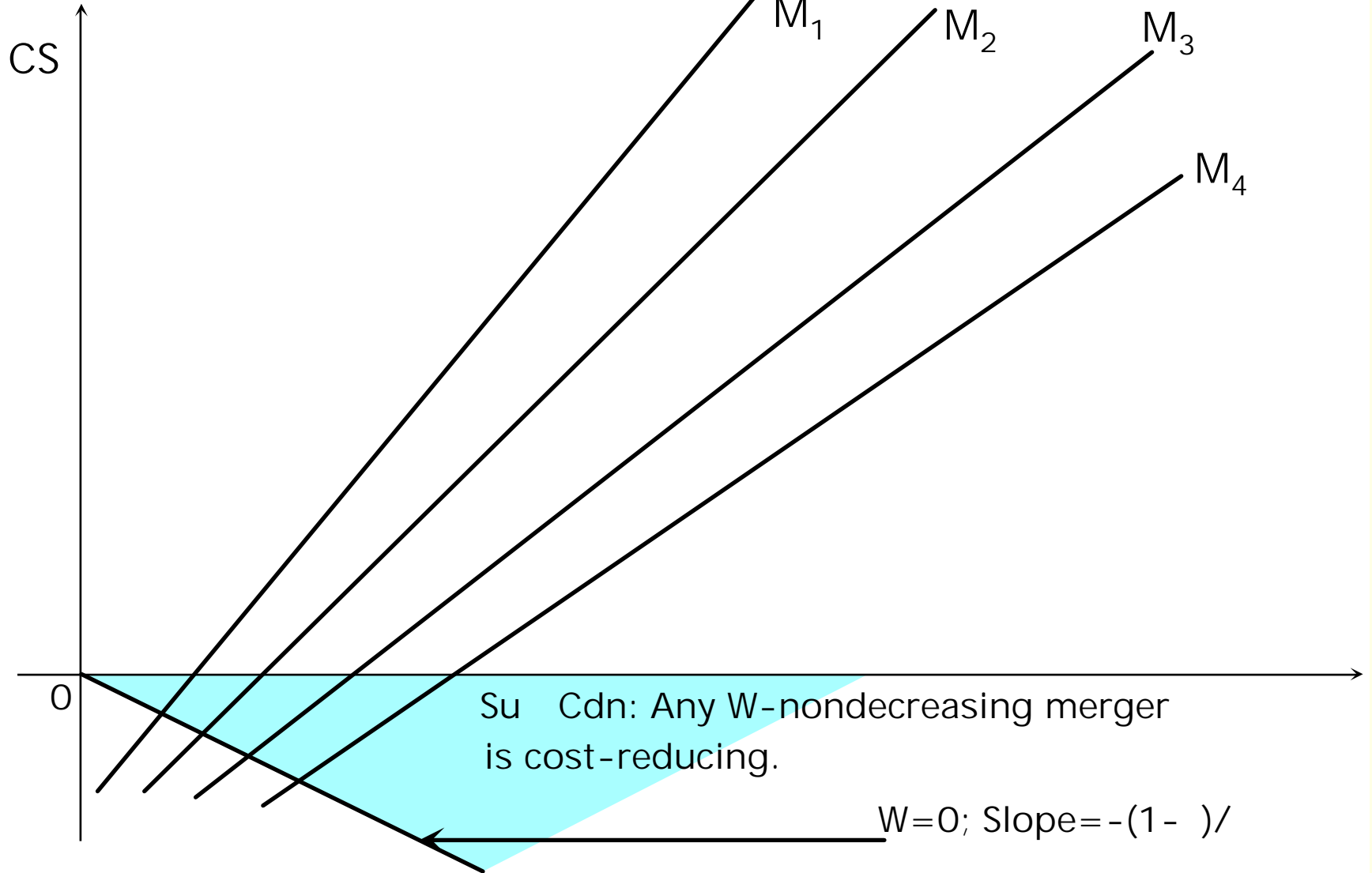




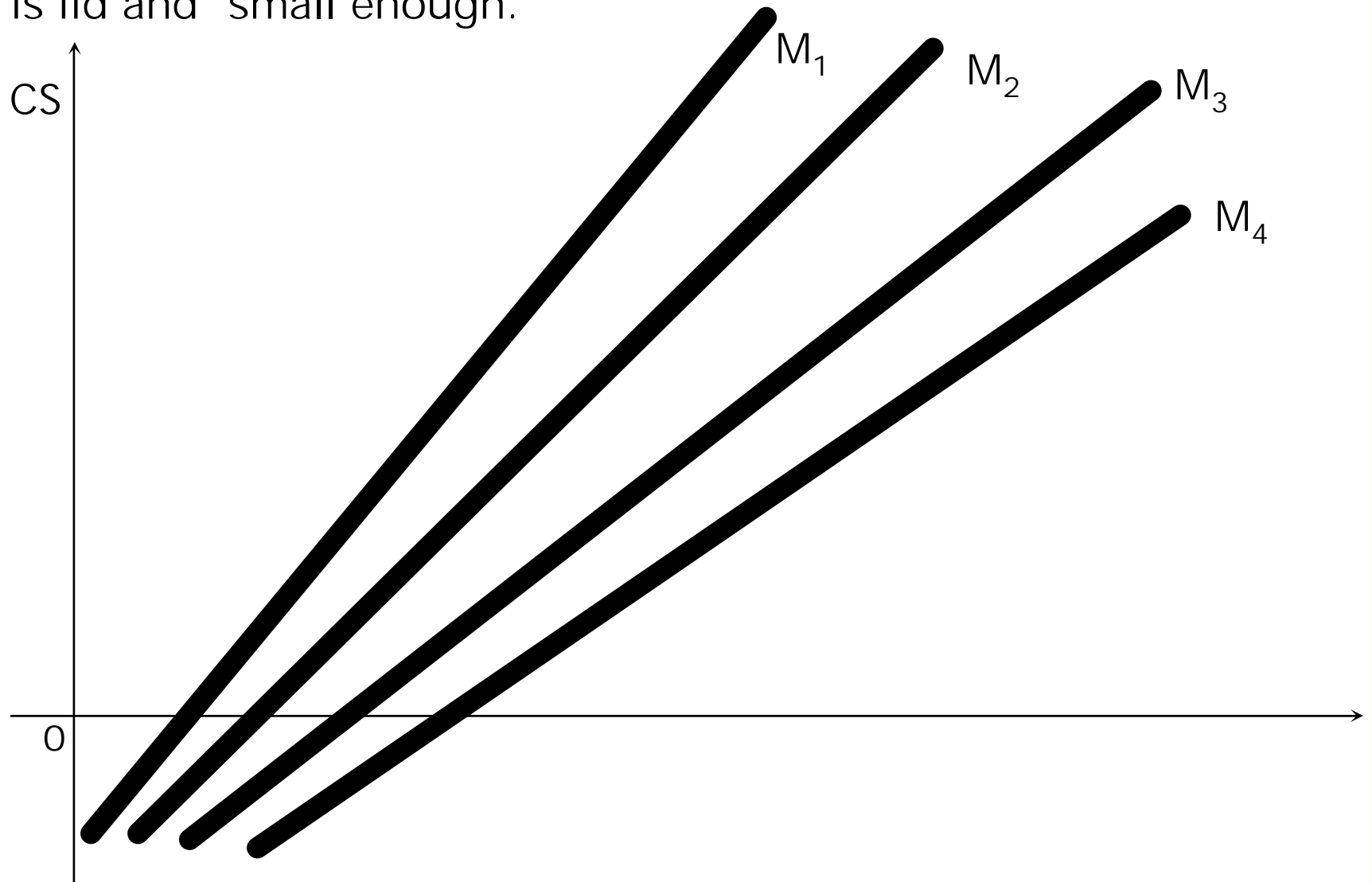
# Price Competition with Differentiated Products

- Do our results hinge on specifics of Cournot model?
- Consider two models of price competition with differentiated products:
  - CES.
  -

$$W = CS + (1 - \alpha)C$$



Fixed Cost Synergies? Result extends if  $f_i = f + \epsilon_i$ , where  $\epsilon_i$  is iid and "small enough."



## More General Set of Potential Mergers

- So far:
  1. all potential mergers involve two firms;
  2. firm 0 is part of each potential merger.
- What can we say in general (but continuing to assume that at most one merger can be proposed)?

- Key observation:
  - Conditional on being CS-neutral, induced change in aggregate profit (and, hence, in bilateral profit of merger partners) is proportional to induced change in Herfindahl index  $H$ .
  - Hence, in general, at  $CS = 0$ , the merger curves can be ranked on the basis of their induced change in the  $H$ .
  - But for CS-neutral mergers, this induced change in  $H$  can be *naively*



- Sufficient condition? For any  $CS \geq 0$ , curve of  $M_k$  is to right of that of  $M_j$  if:

1.  $H_{M_k}^{naive} > H_{M_j}^{naive};$

2.  $\sum_i M_k S_i > \sum_i M_j S_i;$

3.  $\# M_k > \# M_j.$

## Conclusion

- Have analyzed simple model where pivotal firm, firm 0, can choose *which* merger to propose to antitrust authority.
- Antitrust authority's optimal policy involves a higher minimum CS-standard the larger is the proposed merger.
- Analysis makes clear why discriminating between mergers on basis of naively computed post-merger Herfindahl indexes may be optimal.

- Open questions:
  - Other bargaining processes.
  - Full distribution of fixed cost synergies.
  - Correlation in synergies.

The End