Competition through Storage

Fabio Antoniou Raffaele Fiocco Salvatore Piccolo

AUEB · University of Bergamo · Econic Partners

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Motivation: conglomerate mergers are back

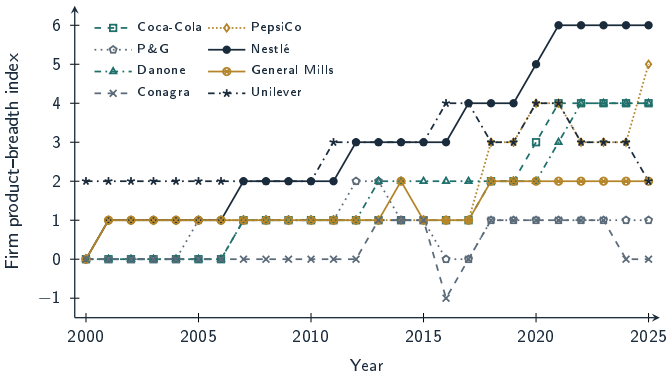
- Conglomerate mergers — firms in **different product markets** — are again at the center of antitrust debate.
- Renewed policy focus: the **2020 OECD report**, the **2023 US Merger Guidelines**, the **EU guidelines**.
- Shapiro (2025): only 4.6% of FY2023 deals were within the same 3-digit NAICS sector.

Recent storable-good deals

Reckitt – Mead Johnson	\$17.9bn (2017)
Gen. Mills – Blue Buffalo	\$8.0bn (2018)
Amgen – Horizon	\$27.8bn (2023)
Mars – Kellanova	\$35.9bn (2025)

Many targets make **storable consumer goods** — food, beverages, health and home products.

Large multiproduct firms keep expanding

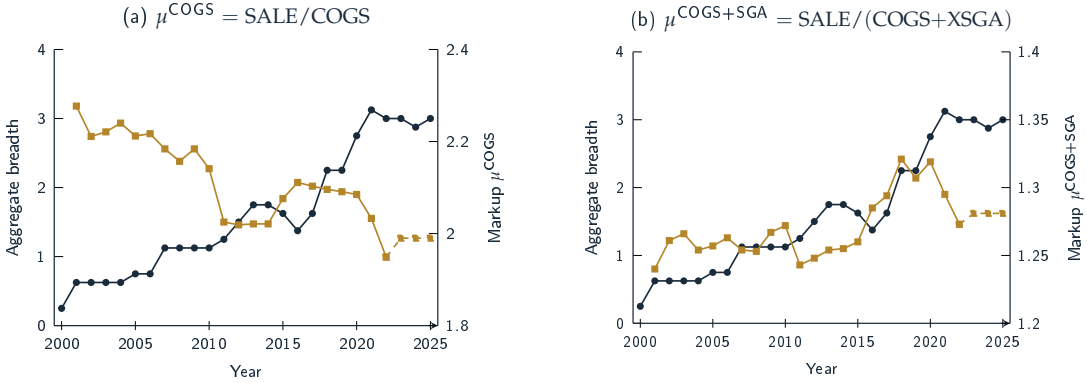


Eight large consumer-goods firms, 2000–2025.

Index cumulates **signed scope events**: acquisitions $(+1)$, divestitures (-1).

Product breadth has expanded markedly.

. . . but measured market power is flat



Breadth (**black**, left) rises; markups (**gold**, right) stay broadly flat.

No clear link between portfolio expansion and long-run market power.

This paper: a different channel

- Portfolio expansion may not move *long-run markups*.
- But it can change **how firms adjust prices to short-run demand and cost shocks**.
- This matters most in **storable-good markets** with intermediaries holding inventories at a **convex** storage cost (e.g. Amazon fulfilment; or commodity merchants such as Cargill, ADM, Trafigura and Glencore, who store grain, metals and oil to buy low and sell high).

Research question

What are the effects of a **conglomerate merger** between firms in **different storable-good markets**, when profit margins evolve over time?

The key idea

Storage by intermediaries creates **intertemporal externalities across otherwise independent markets**.

We call this *competition through storage* — and it determines whether a merger **raises** or **lowers** prices.

Two otherwise separate markets become linked, because the goods *compete for the same storage capacity*.

The model: environment

- Two independent markets $i \in \{A, B\}$, two periods $\tau \in \{1, 2\}$ (no discounting).
- Static demand $D_{i\tau}(p)$, decreasing; constant unit cost $c_{i\tau} \geq 0$.
- Two market structures compared:

  Competition — one single-product firm per market.

  Merger — one multiproduct firm M serves both markets.

The model: intermediaries, storage, and payoffs

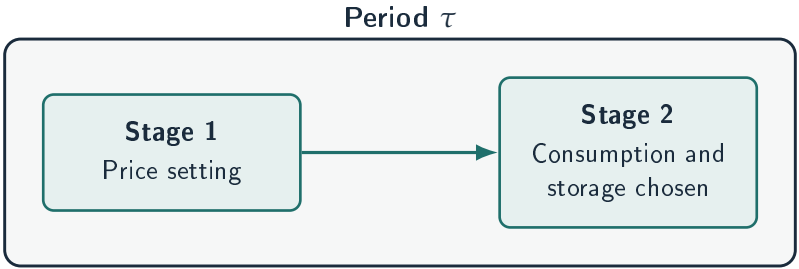
- A unit mass of **competitive intermediaries** buy in each period and sell to consumers.
- They can **store** period-1 purchases for period-2 resale: $S_i \geq 0$, with aggregate storage $S = S_A + S_B$ at **convex** cost $\psi(S)$ ($\psi'(S) \geq 0,\ \psi''(S) > 0$).

Firm profits in market i — period-1 demand is inflated by storage, period-2 depleted:

$$\Pi_{i1} = (p_{i1} - c_{i1}) \left[D_{i1}(p_{i1}) + S_i \right],$$
$$\Pi_{i2} = (p_{i2} - c_{i2}) \left[D_{i2}(p_{i2}) - S_i \right].$$

Intermediaries' profit (competitive arbitrage):
$\Phi = (p^e_{A2} - p_{A1})S_A + (p^e_{B2} - p_{B1})S_B - \psi(S).$

Timing. Each period τ exhibits the same two stages:



- Solution concept: **subgame-perfect Nash equilibrium**.
- **Limited commitment**: no commitment to future prices, so each firm maximizes its *continuation* profit period-by-period.

Equilibrium: solving backward

Period 2 — sequential optimality (firm sets p_{i2}, taking S_i as given):

$$D_{i2}(p_{i2}) - S_i + (p_{i2} - c_{i2})\, D'_{i2}(p_{i2}) = 0.$$

Storage stage — storability constraint (marginal benefit = marginal cost):

$$p^e_{i2} - p_{i1} = \psi'(S), \qquad S = S_A + S_B.$$

The **shared**, **convex** cost $\psi(S)$ couples the markets: storing more of one good raises the marginal cost of storing the other.

Proposition 1 — competition through storage

Proposition 1 (comparative statics of storage)

For $i \neq -i$: $\dfrac{\partial S_i}{\partial p_{i1}} < 0, \quad \dfrac{\partial S_i}{\partial p_{-i1}} > 0, \quad \dfrac{\partial p_{i2}}{\partial p_{i1}} > 0, \quad \dfrac{\partial p_{i2}}{\partial p_{-i1}} < 0.$

- Higher $p_{i1} \Rightarrow$ **less storage** of good $i \Rightarrow$ higher period-2 demand $\Rightarrow$ **higher** p_{i2}.
- Less storage of i **lowers** $\psi'(S) \Rightarrow$ **more storage of good** $-i \Rightarrow$ lower p_{-i2}.

The goods **compete for storage**. This externality drives every merger effect that follows.

From storage to the merger: profit margins

Define the **profit margin** and its change over time:

$$\mu_{i\tau} = p_{i\tau} - c_{i\tau}, \qquad \Delta\mu_i = \mu_{i2} - \mu_{i1}.$$

The first-period objective contains the revealing term $-\Delta\mu_i S_i$.

- Margins **rise** over time $(\Delta\mu_i > 0) \Rightarrow$ **storage hurts profits**.
- Margins **fall** over time $(\Delta\mu_i < 0) \Rightarrow$ **storage helps profits**.
- The merged firm **internalizes** the cross-market storage externality; competing firms do not.

Proposition 2 — when does the merger cut prices?

Proposition 2 (price comparison)

Period 1: $p_{i1}^m < p_{i1}^c$ **iff** $\Delta\mu_i^m > 0$ (margins rise over time).

Period 2: prices move the *same* way, provided the storage cost is **not too convex**.

- Lower p_{i1} **dampens cross-market storage** — which the merged firm wants exactly when storage hurts profits.
- "Not too convex" $\Rightarrow$ the **own-price effect dominates**, so period-2 prices follow period-1.

Corollary 1. With *symmetric* markets, both periods always move together.

Proposition 3 — expanding vs. mature markets

Proposition 3 (market conditions)

Growing demand $\Rightarrow$ merger sets a **lower** price (procompetitive).

Rising cost $\Delta c > 0$ $\Rightarrow$ merger sets a **higher** price (anticompetitive).

Expanding markets

Demand growth $\Rightarrow$ margins rise $\Rightarrow$ storage hurts profits $\Rightarrow$ **prices fall**.

Mature markets (cost inflation)

Rising costs $\Rightarrow$ margins fall $\Rightarrow$ storage helps profits $\Rightarrow$ **prices rise**.

Policy. Be **more lenient** in expanding markets; **more severe** in mature markets with cost inflation.

Proposition 4 — welfare

Proposition 4 (welfare)

Growing demand $\Rightarrow$ the merger **strictly increases** welfare.

Rising cost $\Delta c > 0 \Rightarrow$ the merger **strictly decreases** welfare.

Expanding markets ($\uparrow$)

Lower prices raise consumption toward the efficient level. A **revealed-preference** argument gives higher consumer surplus; joint profit rises too.

Cost inflation ($\downarrow$)

Two distortions: *(i)* higher prices restrict consumption (deadweight loss); *(ii)* the merger **suppresses storage**, which is socially valuable when costs rise.

The **price effect signs the welfare effect**: lower prices $\Rightarrow$ welfare up; higher prices $\Rightarrow$ welfare down.

The result that travels

Internalizing the storage externality, the merged firm **lowers prices iff storage hurts profits** ($\Delta\mu^m > 0$).

This logic survives a wide range of generalizations:

- Longer time horizon (finite & infinite)
- Arbitrary number of markets
- Intermediaries with market power
- Nonlinear pricing
- Commitment to future prices

Extensions (I): horizon and number of markets

Longer time horizon.

- Under **dynamic strategic complementarity**, a longer horizon **strengthens** the incentive to cut (raise) prices when margins rise (fall).

Multiple markets (n markets) — the intensity of competition through storage.

- More markets $\Rightarrow$ **larger own-price** and **smaller cross-price** sensitivity of storage.
- Increasing n **raises first- and second-period prices**: $\frac{\partial p_{i1}}{\partial n} > 0$ and $\frac{\partial p_{i2}}{\partial n} > 0$.

Extensions (II): intermediaries' market power

Now a **single intermediary** chooses storage to maximize its own profit.

- *Unobservable storage* (stochastic demand): any equilibrium is **outcome-equivalent** to the baseline (Proposition 1).
- *Observable storage*: the same intertemporal externalities arise; the merger is procompetitive iff margins rise.

Extensions (III): nonlinear pricing and commitment

Nonlinear pricing.

- The firm manipulates period-1 *production*; the merger spurs it iff period-1 marginal utility exceeds period-2 marginal cost net of storage cost.
- Period-2 consumption is **first-best efficient**.

Price commitment.

- Same period-1 logic, *plus* the firm can lower p_{i2} to dampen storage.
- Full commitment **magnifies** the storage effects.
- Under the merger, the first-period price is **lower** and the second-period price **higher** iff margins rise over time ($\Delta\mu_i > 0$).

Related literature

Conglomerate mergers

- Mueller (1969); Church (2008); Shapiro (2025)
- Rhodes & Zhou (2019); Chen & Rey (2026); Ide (2026)

Multiproduct firms / intermediaries

- Rhodes, Watanabe & Zhou (2021)
- Johnson & Rhodes (2021); Nocke & Schutz (2025)

Storable goods

- Dudine et al. (2006) — seminal monopoly benchmark
- Hendel & Nevo (2013); Hendel et al. (2014)
- Antoniou & Fiocco (2019, 2023)
- Anton & Das Varma (2005); Guo & Villas-Boas (2007)

Our contribution: storability creates **intertemporal externalities across independent markets**, giving novel, signed effects of conglomerate mergers.

Concluding remarks

- Storage creates **intertemporal externalities across distinct markets** — competition through storage.
- The merged firm **lowers** prices when margins rise (expanding markets) and **raises** them when margins fall (cost inflation).
- The price effect **signs the welfare effect**; the mechanism is robust across all our extensions.

Policy takeaway

A **more lenient** stance in expanding markets, a **more severe** stance in mature markets with cost inflation — with empirically testable predictions.

Thank you

Competition through Storage

Antoniou · Fiocco · Piccolo · CRETE 2026

Comments welcome: fantoniou@aueb.gr