

APPLMATH 2026 · MESSINA · 10-12 JUNE 2026

Can DMOs drive the sustainable transition of Sicily's tourism supply?

A regional input–output model of supply-chain leakage in the Taormina–Peloritani district, and the value a coordinating DMO could activate.

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● TOURISM IN SICILY

Tourism is a pillar of Sicily's economy

One of Italy's major destinations, at record highs and well above pre-pandemic levels.



≈ €6 bn

value added, about 4.2% of Sicily's economy

Prometeia, 2024–25



17.3 M

overnight stays in 2024, ≈22.5 M incl. short-term rentals

ISTAT · Regione Siciliana



≈ 76,000

tourism jobs in Sicily

Prometeia, 2024



+5.5%

overnight stays in 2024, above the 2019 peak

Banca d'Italia, 2025



Increasingly international: ≈35–40% of presences are foreign and rising fast (top markets Germany, USA, France & UK) · Sicilian airports handle ≈23 M passengers · the Region is now pushing destagionalizzazione.

(Regione Siciliana; Confimprese, 2025)

Big, growing, international. But we have problems too...

● THE PROBLEMS

High volume, but four structural problems



Low value retention

€123.2 vs €144.1 of value added per overnight stay (a 14.5% gap): spending leaks to suppliers in other regions.

SRM / Intesa Sanpaolo 2024 (data 2019)



Coast saturated, inland left behind

Tourism pressure piles onto a few coastal towns (Taormina, Cefalù, San Vito Lo Capo); inland areas draw visitors but capture little value.

Il Sole 24 Ore / CST, 2025



Strong seasonality

71.2% of coastal presences fall in summer (June–Sept): peak congestion, idle capacity off-season.

ISTAT / Regione Siciliana



Fragmentation

≈98% of Sicilian tourism firms turn over under €2M: weak coordination and bargaining power.

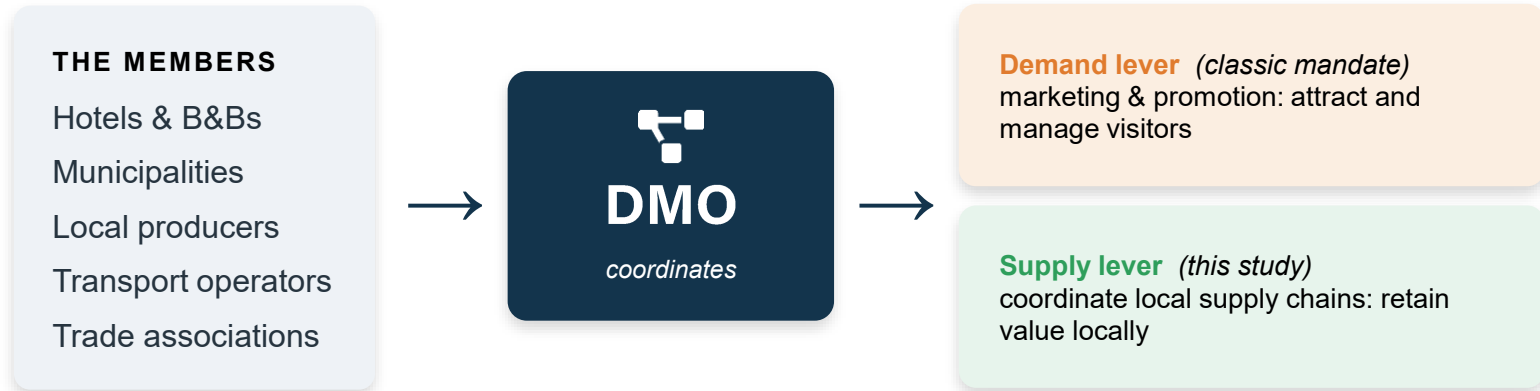
Prometeia 2024

● A SOLUTION

Destination Management Organization (DMO)

A solution comes from the institutions of local DMOs, reconceived as a **meta-organizations instead of promotional entities**: an organization of organizations (hotels, municipalities, local producers, transport operators, cultural sites, trade associations) that governs a destination through shared standards, a common brand and reputation, and pooled resources.

Meta-organization concept: Ahrne & Brunsson 2005, 2008.



A DMO can pull two levers with very different effects. We quantify both, and compare them at equal value.

● TWO STRATEGIES, TWO TRADE-OFFS

Two ways to grow value, very different trade-offs



A · DEMAND LEVER

Bring more tourists

Extensive growth: marketing and promotion to lift arrivals.



B · SUPPLY LEVER

Retain more value / tourist

Intensive growth: reconnect local supply chains so more of each euro stays local.

We weigh both strategies on all three dimensions of the **UN SF-MST framework (Statistical Framework for Measuring the Sustainability of Tourism, United Nations)**:



Economic

Value retained in the territory: regional multiplier, leakage



Environmental

Emissions of each path: production vs. consumption based



Social

Concentration of tourist presences (Gini); redistribution to the hinterland

Both are DMO levers, with different economic, environmental and social trade-offs.

THE RESEARCH QUESTION

**How much tourism value can a DMO keep
in the territory, and at what *cost*?**

Two routes to the same economic gain, more visitors or better local sourcing,
weighed on economic, environmental and social grounds.

● METHOD

From national input-output tables to a district coordination model

1

National I-O (Leontief)

Leontief inverse $L = (I - A)^{-1}$: sums every supply-chain round.

Multiplier = column sum (€ output per €1 of demand).

World 2.29 → **Italy 1.88 = 18% import leakage.**

ISTAT I-O tables, 63 sectors (2022).

2

Regionalize (AFLQ)

Augmented Flegg Location Quotient rescales national coefficients to the district. **Location quotients triangulated over 3 proxies**; openness $\delta = 0.3$ taken from the FLQ literature and stress-tested.

Flegg & Webber 2000; Bonfiglio 2009.

3

DMO simulation

$a' = a_{reg} + \varphi \cdot (a_{dom} - a_{reg})$ for 8 targetable sectors.

φ = policy lever: the share of the sourcing gap the DMO closes. Demand $D = €200M$.

ISTAT TSA 2023.

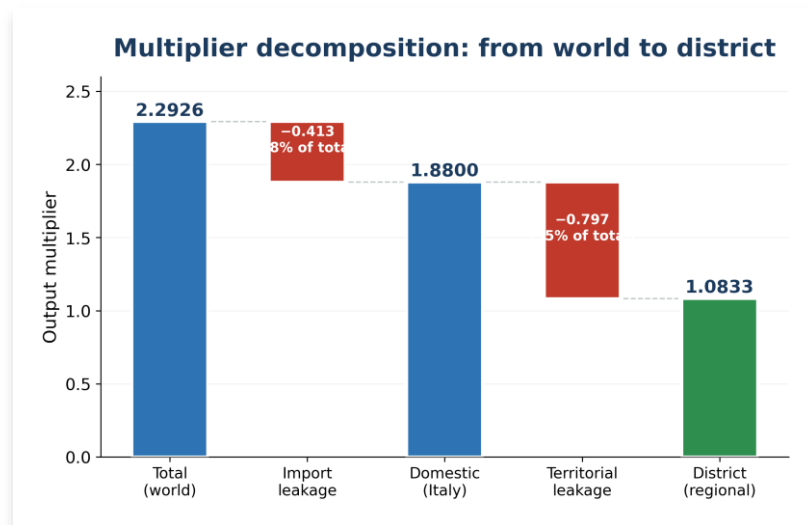
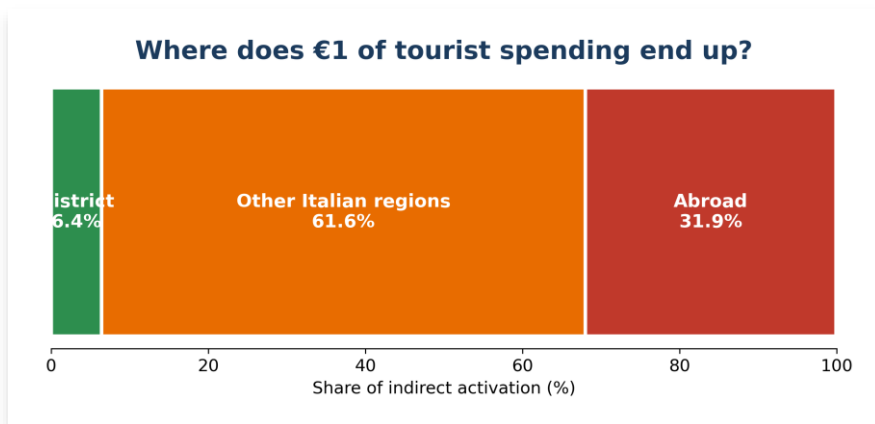


Extension · Environmentally-Extended Input-Output (EEIO): Eurostat AEA 2021 emission intensities × 63 sectors. Every scenario returns a pair (**ΔV economic**, **ΔE emissions**), reported with dual accounting.

δ estimates the baseline (how open the district is now); φ is the policy choice (how much the DMO closes the gap)

● RESULTS: THE LEAK

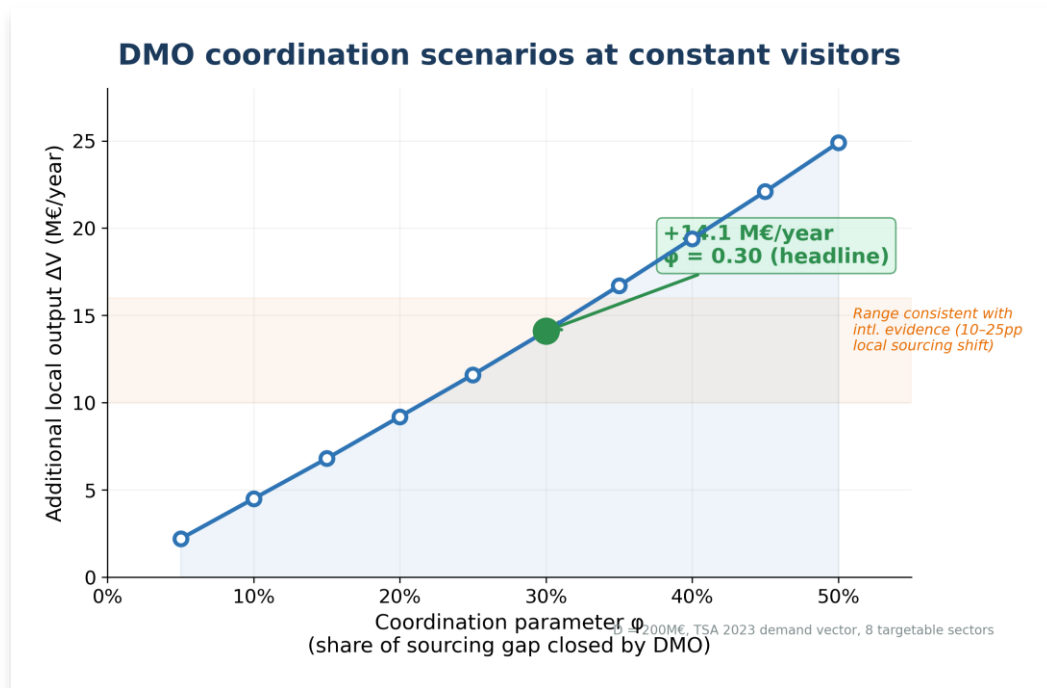
Of every €1 activated along the supply chain, only €0.064 stays in the district



Territorial leakage (42.4%) is three times the international import leakage (18%) and, because the value stays inside Italy, it is addressable locally.

● THE INTERVENTION

What a coordinating DMO could activate, at constant visitors



DMO COORDINATION SCENARIOS

$\phi = 0.10$ +€4.5M

$\phi = 0.20$ +€9.2M

$\phi = 0.30$ +€14.1M

$\phi = 0.50$ +€24.9M

$\phi = 0.30$ is anchored to international evidence. The model is linear in demand, so euro results scale with actual spending.

● KEY RESULT

Same +€14.1M, two very different paths

	A: MORE TOURISTS	B: MORE VALUE / TOURIST
Economic gain	+14.1 M€	+14.1 M€
Additional visitors	+130,411 (+6.5%)	0
Local prod. emissions	+346 t CO ₂ e	+1,695 t CO ₂ e
Chain emissions	+1,547 t + travel	≈0 (relocation)
Spatial effect	Concentrates (Gini worsens)	Redistributes to hinterland
Congestion	Yes (+6.5% visitors)	None

WHY IT MATTERS

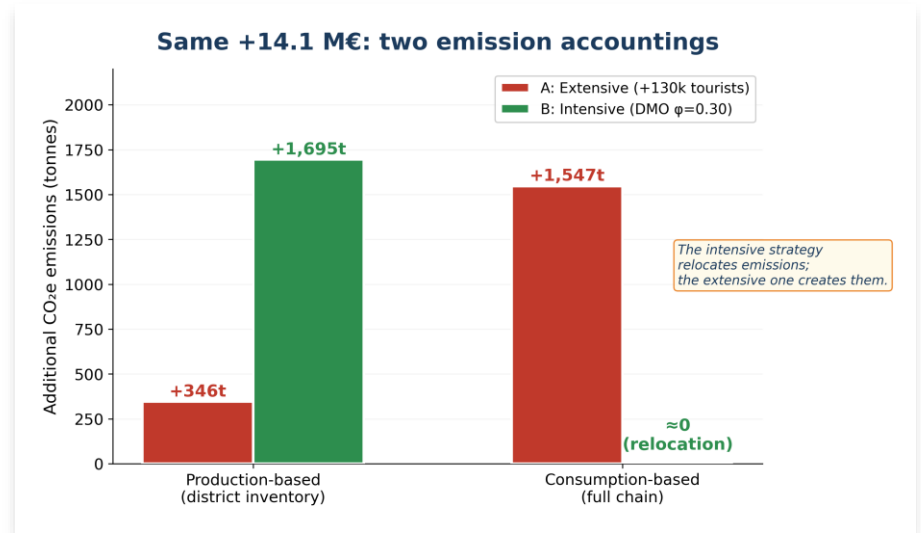
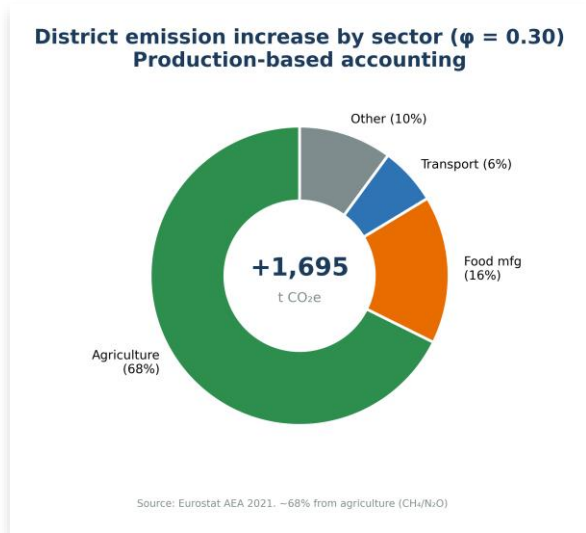
Both paths add the same value.

The extensive path needs **+130,411 visitors** and adds congestion and travel emissions.

The intensive path keeps visitors flat and **redistributes value to the hinterland**, but raises local production emissions.

● THE ENVIRONMENTAL TRADE-OFF

Relocalizing value is not by default greener, so we account for both



Dual accounting is mandatory: production-based (emitted inside the district) vs. consumption-based (the full chain). Bringing agriculture in raises **local** emissions even as logistics shorten.

The DMO's job: maximize value retained under an environmental constraint, picking high- ΔV , low- ΔE chains.

Limitations



- 1** φ is a **scenario, not a prediction**, measuring realized φ needs procurement surveys (LM3-style).
- 2** **Non-survey AFLQ**, cannot observe inter-firm transactions; mitigated by 3-proxy triangulation.
- 3** δ **uncalibrated below province scale**, literature covers NUTS-2/3; defended via sensitivity [0.1–0.5].
- 4** **National TSA composition as district proxy**, no regional TSA for Italy; one national TSA, result robust to 4 alternative demand compositions (no-shopping, accommodation-only, \pm shopping margin).
- 5** **Fixed coefficients, Type I**, no income or price effects; results are gross output (value added \approx 40–50%).
- 6** **Agricultural employment undercount**, 565/1,118 farms report 0 employees \rightarrow estimates are conservative.
- 7** **Regional emission intensities = national**, no sub-national environmental accounts by sector.

CONCLUSIONS

Growth without more visitors

1.08

regional output multiplier
(baseline)

42.4%

of tourism value leaves the
district

€14-17M

DMO effect, across all
specifications

130,000

extra tourists for the same value

① Growth without more visitors
metric: retention, not arrivals

② The DMO is a coordinator, not a marketer

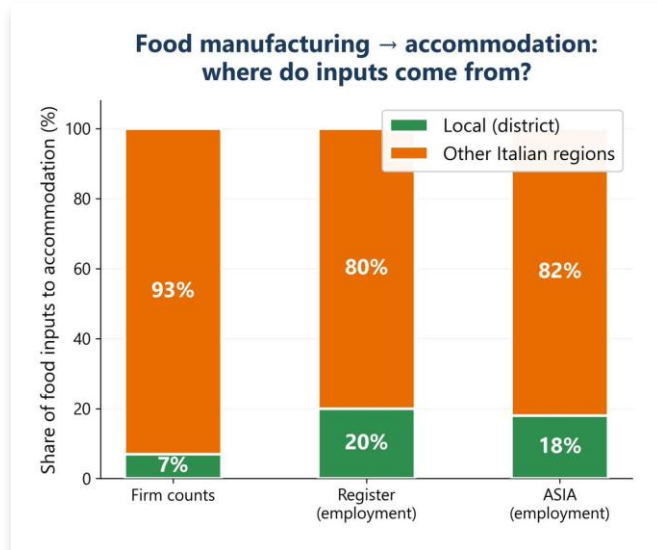
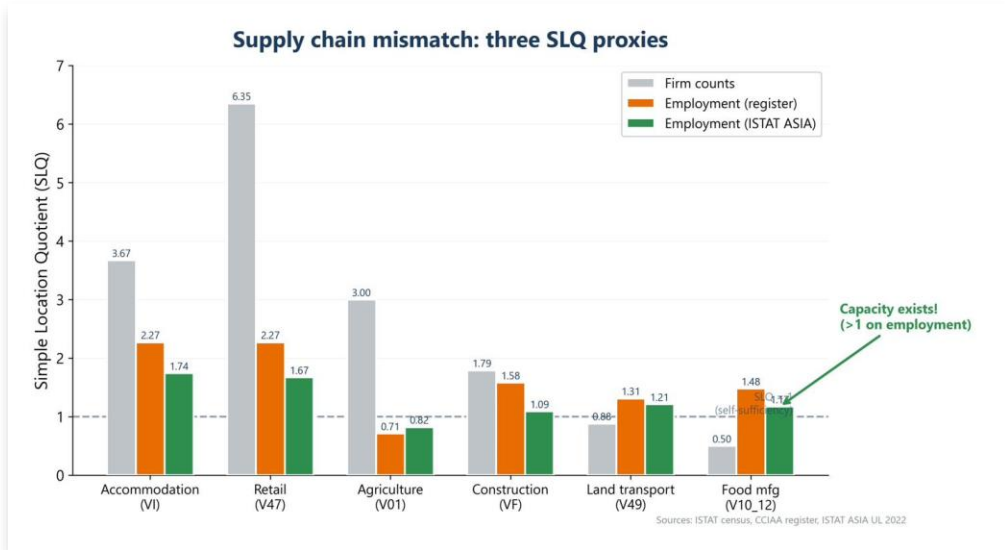
③ A new

The DMO has the potential to maximize value retained, under an environmental constraint.

Grazie! · Thank you!

● RESULTS: THE MISMATCH

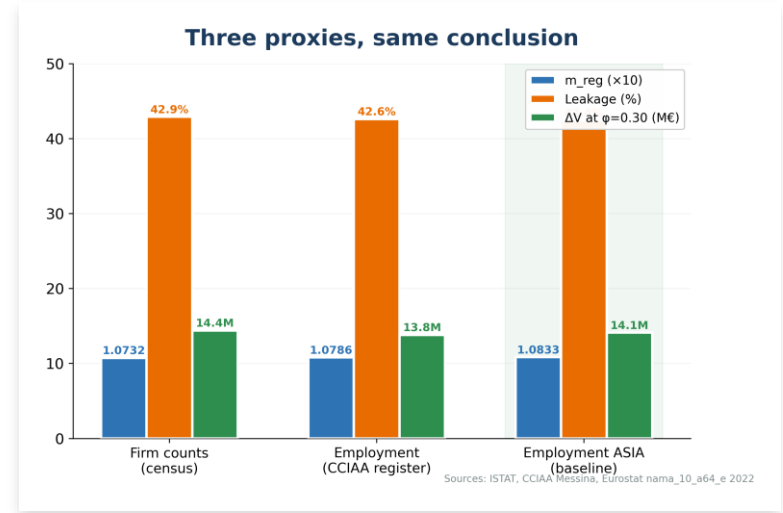
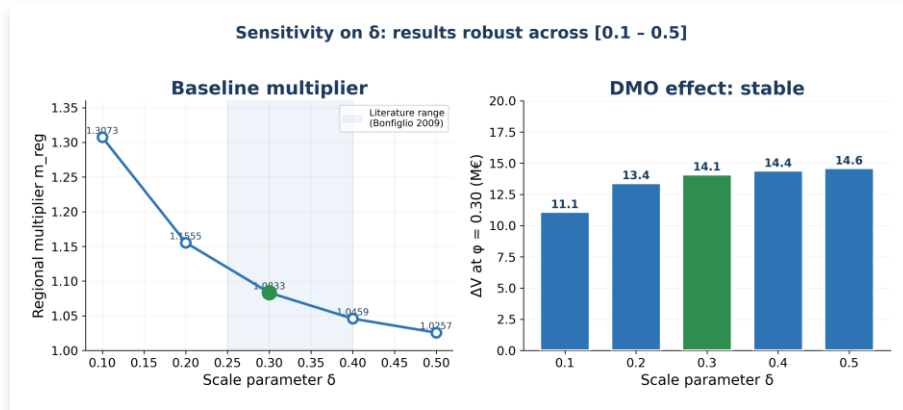
The capacity exists, it is simply not well connected



Few firms, but many workers. By firm counts food manufacturing looks scarce (quotient 0.50); by employment it is abundant (1.17–1.48): the few local plants are large. The capacity is there, yet only 18% of hotels' food is sourced locally, raw material here, processing and value captured elsewhere. That is the gap a DMO can close.

SLQ = Sector Location Quotient: local share vs. national share (>1 = over-represented locally). Sources: ISTAT census, CCIAA Messina, ISTAT ASIA 2022; local-sourcing share, authors' estimate.

Robustness



✓ $\delta \in [0.1, 0.5]$: ΔV stays €11–15M

✓ **4 demand variants**: range €14–17M

✓ **3 SLQ proxies**: leakage 42–43%, DMO +€13.8–14.4M

✓ **Capacity stress**: max +1.1% on food mfg → coordination, not capacity

Step 1: the multiplier

$$\mathbf{x} = \mathbf{d} + \mathbf{A} \cdot \mathbf{d} + \mathbf{A}^2 \cdot \mathbf{d} + \mathbf{A}^3 \cdot \mathbf{d} + \dots = (\mathbf{I} - \mathbf{A})^{-1} \cdot \mathbf{d}$$

the €1, plus the supplier's purchases, plus their suppliers', ... out to infinity

A, recipe matrix: a_{ij} = € of input i to make €1 of output j

d, final demand: the tourist's €1

$(\mathbf{I} - \mathbf{A})^{-1}$, total requirements: every round summed

$\mathbf{m}_j = \sum_i \mathbf{L}_{ij}$, column sum = total output from €1 of demand

WHAT IT MEANS HERE

€1 spent at the hotel triggers €2.29 of production (world). As the value must stay local, most rounds leak out:

2.29 → **1.88** → **1.07**
world · Italy · district

A small, open economy keeps few rounds at home, that is exactly why the district multiplier collapses to 1.07.

Step 2: regionalization (AFLQ)

First, what is a location quotient? SLQ_i = (district share of sector i) ÷ (national share), measured by employment. Above 1 means the sector is over-represented locally.

$$\mathbf{a_{reg} = a_{dom} \cdot \min(AFLQ , 1)}$$
$$\mathbf{AFLQ_{ij} = (SLQ_i / SLQ_j) \cdot \lambda^* \quad \lambda^* = [\log_2(1 + \lambda)]^\delta}$$

SLQ_i location quotient of supplying sector i (employment): >1 = locally abundant

λ district size relative to the nation (employment share)

δ openness parameter: higher δ = more open district

λ^* regional scaling factor, $[\log_2(1+\lambda)]^\delta$

$\min(\cdot, 1)$ a region cannot source more locally than Italy already produces

VALUES IN THIS STUDY

$\lambda = 0.0026$ $\delta = 0.30$ $\lambda^* = 0.19$

δ from literature, tested 0.1–0.5

SLQ by employment:

Accommodation 1.74

Food manufacturing 1.17

Agriculture 0.71

Then invert: $m_{reg} = \text{column sum of } (1 - A_{reg})^{-1} = 1.08$ (national 1.88). The gap is the territorial leakage.

Step 3, the DMO lever ϕ , step by step

First, what is the a coefficient? a = the euros of an input a sector buys per €1 of its output (one entry of the recipe matrix A from Appendix A). a_{reg} , a_{dom} and a' are the same coefficient, measured three ways:

$$a' = a_{reg} + \phi \cdot (a_{dom} - a_{reg})$$

a_{reg} , what the sector buys **locally today**: low, because the district imports most inputs

a_{dom} , the **ceiling**: the most that Italy already produces (so recapturable)

ϕ , the policy lever: the share of the gap ($a_{dom} - a_{reg}$) the DMO closes

a' , the **new local coefficient** after the DMO acts

WORKED EXAMPLE (illustrative)

A hotel buys €0.15 of food per €1 of output. Today only **€0.01 is local** (a_{reg}); up to €0.15 could be Italian (a_{dom}).

At $\phi = 0.30$:

$$a' = 0.01 + 0.30 \cdot (0.15 - 0.01) = \mathbf{0.052}$$

Local food rises from ~1¢ to ~5¢ per €1.

Then recompute the multiplier with the new A' $\rightarrow \Delta V = D \cdot (m' - m)$. **At $\phi = 0.30$: +€14.1M, visitors constant.**

Applied only to 8 targetable sectors; the ceiling is a_{dom} , recapturing inter-regional purchases, not foreign imports.