

The cost of a millisecond: what 20 years of speed-vs-revenue evidence shows

PageSpeedAudit Research · evidence audit, June 2026 · register and charts under CC BY 4.0



Read the full audit
<https://pagespeedaudit.com/research/the-cost-of-a-millisecond>

Problem

"100 ms = a few percent of revenue" is one of web performance's most-cited claims, and marketed headlines of **3–8% per 100 ms** circulate unchecked.

Gap. No systematic, design-graded review of the speed-to-revenue literature existed.

The best-known collection, **WPO Stats**, curates positive case studies — a showcase, not a sampling frame — so the record is close to **100% positive**: a file-drawer problem.

Motivation

An inflated multiplier sells a return that never shows up.

- Speed budgets and sales decks rest on one per-100 ms multiplier; if it is **5–13×** too high, the promised ROI is wrong.
- Headlines blend **server delay**, **page load**, **LCP** and **INP** and report **local cross-sectional slopes** as causal averages.

Method

- Tier first.** Grade every record by research design before trusting any effect size.
- Standardise selectively.** Per-100 ms scale only where the design supports it.
- Triangulate, don't pool.** No meta-analysis: most sources publish no standard errors or microdata.

$$\Delta_{\text{conv per 100 ms}} \approx \epsilon \times 100 \text{ ms} \div t_0$$

$\epsilon = -0.21$ at Gallino's documented $t_0 = 2.96$ s $\Rightarrow \approx -0.70\%$ conversion per +100 ms

Key result

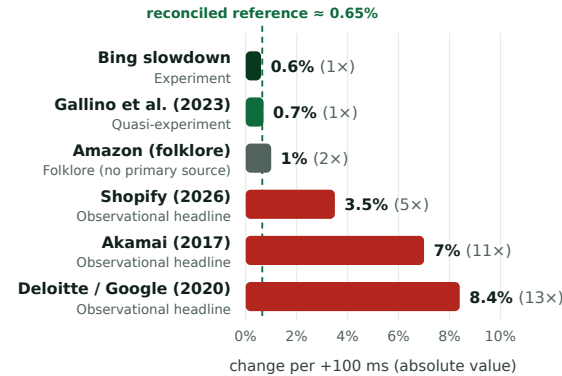


Figure 1 — Reported effect per 100 ms, coloured by design tier.

So what → the marketed headlines run **5–13×** above the clean causal designs.

Why headlines run high

HEADLINE	CLAIM	FLAW
Akamai 2017	≤ 7%	local slope near 2.7–2.8 s; the fastest pages include 404s that never convert
Deloitte/Google 2020	8.4%	commissioned; four speed metrics combined; unaudited data; only significant results kept
Shopify 2026	3.5%	openly a correlation, not causation

Takeaway

Budget speed wins at roughly 0.5–0.8% of conversion or revenue per 100 ms.

Localise it to the page and funnel step that matters, and demand a real experiment before believing anything bigger. Retire generic "7% per 100 ms" multipliers.

The effect is local

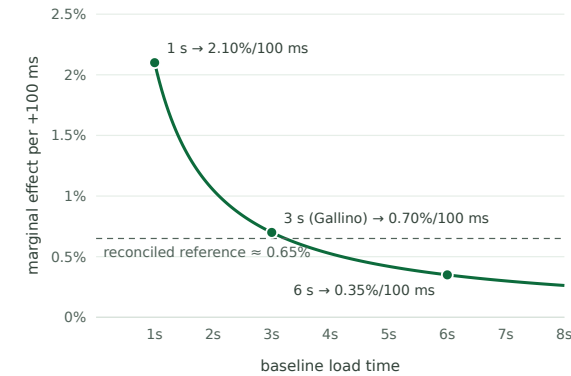


Figure 2 — One fixed -0.21 elasticity, so the same 100 ms is worth less on a slower page.

Not every metric monetises

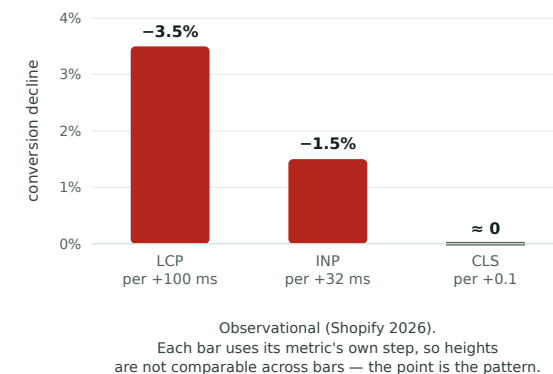


Figure 3 — Shopify 2026: LCP and INP monetise; CLS doesn't. Bars are in each metric's own unit (LCP per 100 ms, INP per 32 ms, CLS per 0.1).

The register

- Bing slowdown A/B
 - Google 2009
 - Etsy (reported null)
 - Gallino et al. 2023
 - Poggi et al. 2014
 - Shopify 2026
 - Akamai 2017
 - Deloitte/Google 2020
 - Amazon "100 ms = 1%"
 - Google 2006 "0.5 s = -20%"
 - Vodafone
- Legend:
- Experiment — causal
 - Quasi-experiment — causal
 - Observational headline
 - Folklore — no primary source
 - Before/after case study

Headline numbers

≈ 0.65%
per 100 ms: the midpoint of Bing (0.6%, revenue) and Gallino (0.70%, conversion), a reference rather than a pooled estimate

0.5–0.8% practical corridor
5–13× headline gap
~3 s Gallino's baseline

11 records (2006–2026), graded by design tier; the one reported null (Etsy) is kept, not dropped.