E-Commerce Data Quality Audit for Quarterly Retail Releases

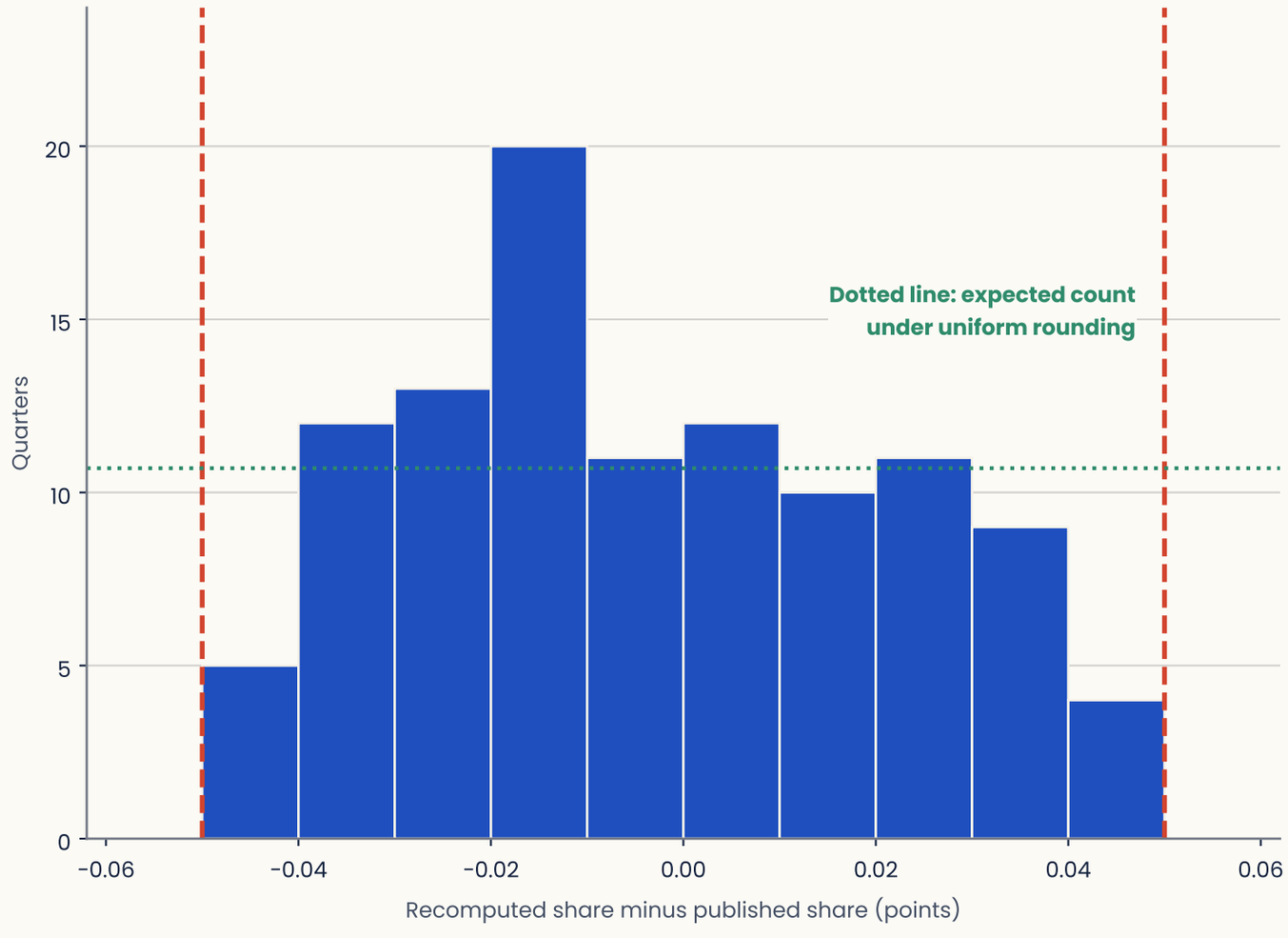
107 / 107

published quarterly e-commerce shares reproduced from the two underlying sales totals, every one within rounding of the one-decimal figure.

0.050	-0.0032	p = 0.18	1999–2026
largest difference, in points	mean difference: no systematic bias	KS test against uniform rounding error: not rejected	27 years of quarterly releases

EXHIBIT 1

Recomputed minus published share



All 107 differences fall between the dashed rounding limits.

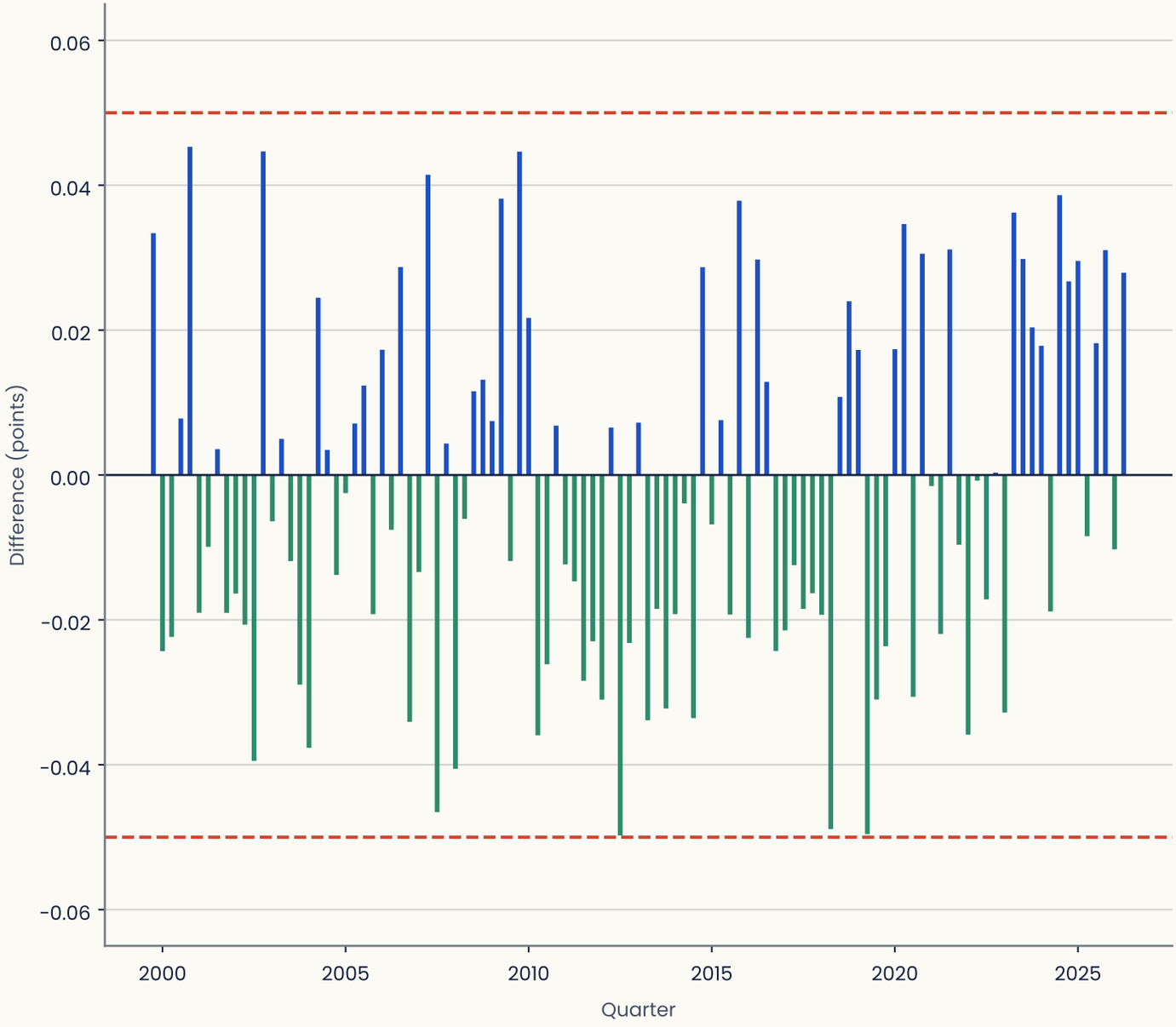
US Census Bureau · seasonally adjusted quarterly retail totals, release through 2026 Q2

What the analysis shows

- Dividing online sales by total retail sales reproduces all 107 published shares from 1999 Q4 to 2026 Q2. The largest gap is 0.050 points, inside the 0.05 that one-decimal rounding allows.
- The differences are centred on zero (mean -0.0032) with a spread of 0.025, against 0.029 expected under a uniform rounding reference.
- A Kolmogorov–Smirnov test against a uniform distribution on ±0.05 does not reject ($p = 0.18$). That is consistent with rounding as the only source of difference; it does not prove it.
- There is no drift over time: early quarters with small shares and recent quarters with shares above 16% reconcile equally well.
- The share itself rose from 0.6% to 17.1%, so the same audit covers a nearly thirty-fold change in the quantity being checked.

EXHIBIT 2

Difference by quarter

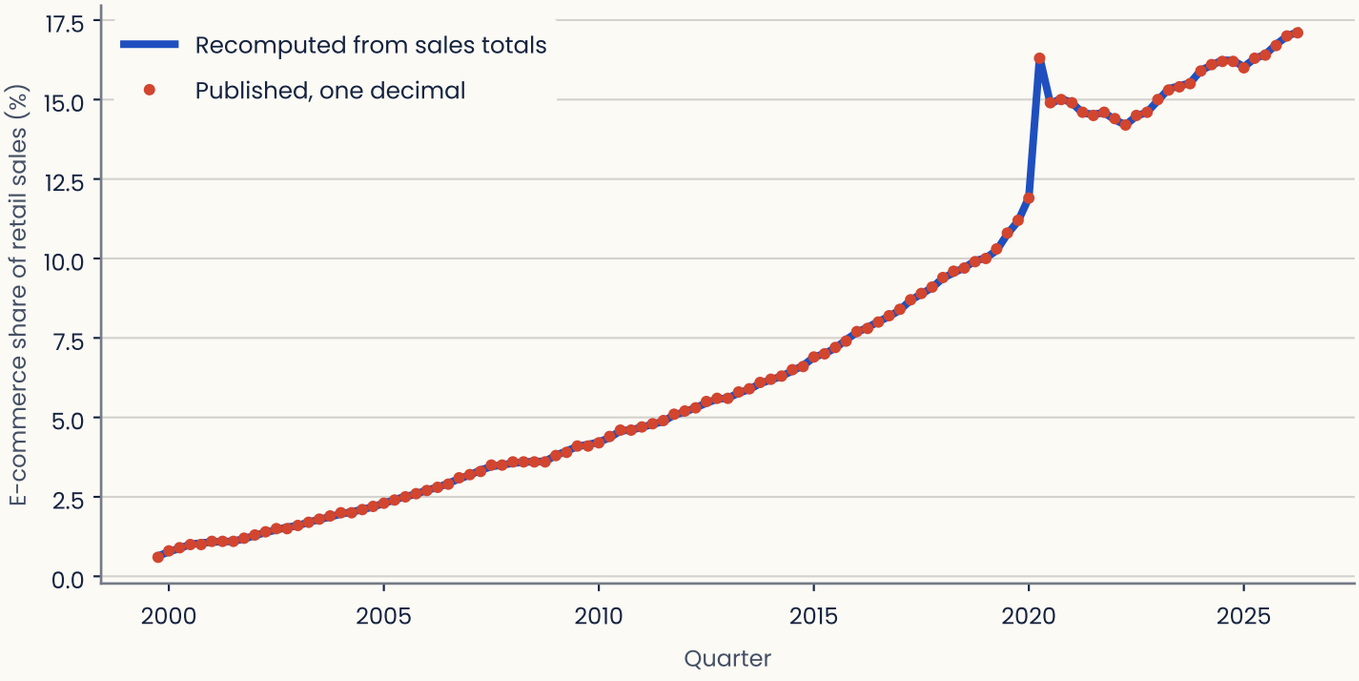


No trend, no cluster, no quarter outside the limits.

Inside the numbers

EXHIBIT 3

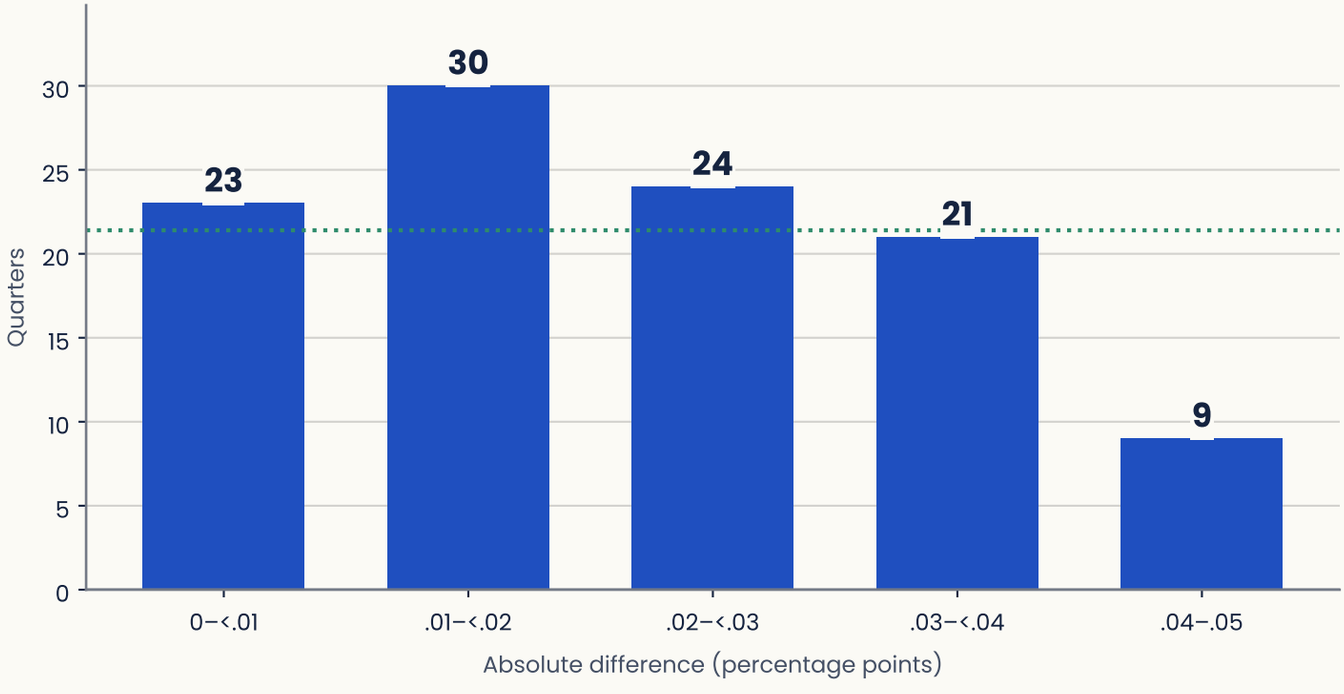
The series being audited



Published points sit on the recomputed line throughout.

EXHIBIT 4

Absolute difference by band

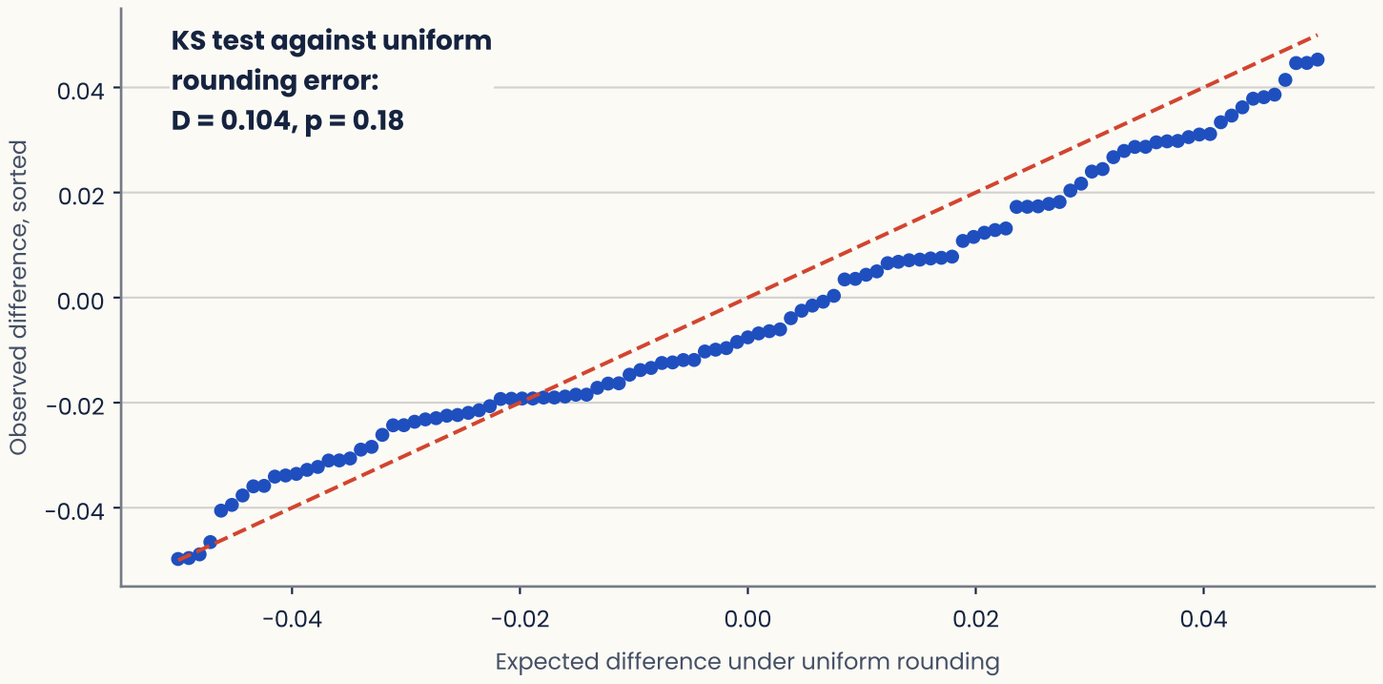


Disjoint bands contain 23, 30, 24, 21 and 9 quarters. A uniform rounding reference gives 21.4 per band.

What changes the answer

EXHIBIT 5

Observed differences against uniform rounding



Sorted differences follow the diagonal that uniform rounding error would produce.

EXHIBIT 6

The six largest differences

Quarter	Retail $M	Online $M	Published	Recomputed	Diff
3rd quarter 2012	1,053,293	57,407	5.5	5.450	-0.050
2nd quarter 2019	1,322,365	135,548	10.3	10.250	-0.050
2nd quarter 2018	1,288,247	123,042	9.6	9.551	-0.049
3rd quarter 2007	981,567	33,898	3.5	3.453	-0.047
4th quarter 2000	733,089	7,663	1.0	1.045	+0.045
4th quarter 2002	771,687	11,920	1.5	1.545	+0.045

Even the largest gaps are explained by rounding to one decimal.

How it was built and how far it goes

RECOMMENDED USE

- Publish the headline with confidence that readers can rebuild it from the two totals.
- Keep the reconciliation ledger with each release and re-run it when figures are revised.
- Flag any quarter where the difference exceeds 0.05 before publication.

METHOD

- Recomputed share = online sales ÷ total retail sales × 100, from seasonally adjusted quarterly totals.
- Each quarter is compared with the published one-decimal share in the same release; tolerance is 0.05 points.
- Distribution check compares the 107 differences with a uniform distribution on ±0.05.

LIMITS

- Checks arithmetic consistency within one release, not the accuracy of the underlying estimates.
- Preliminary and revised quarters are treated the same.
- The last band (0.04 to 0.05) holds 9 quarters against about 21 expected under uniform rounding; that band is not tested separately here.

NUMBERS RECONCILED

Quantity	Value	How it was checked
Quarters checked	107	rows in the reconciliation ledger
Within rounding	107	largest difference 0.050
Latest quarter	17.1% published	340,244 ÷ 1,986,488 = 17.128%
Band counts	23, 30, 24, 21, 9	sum to 107; match project chart