

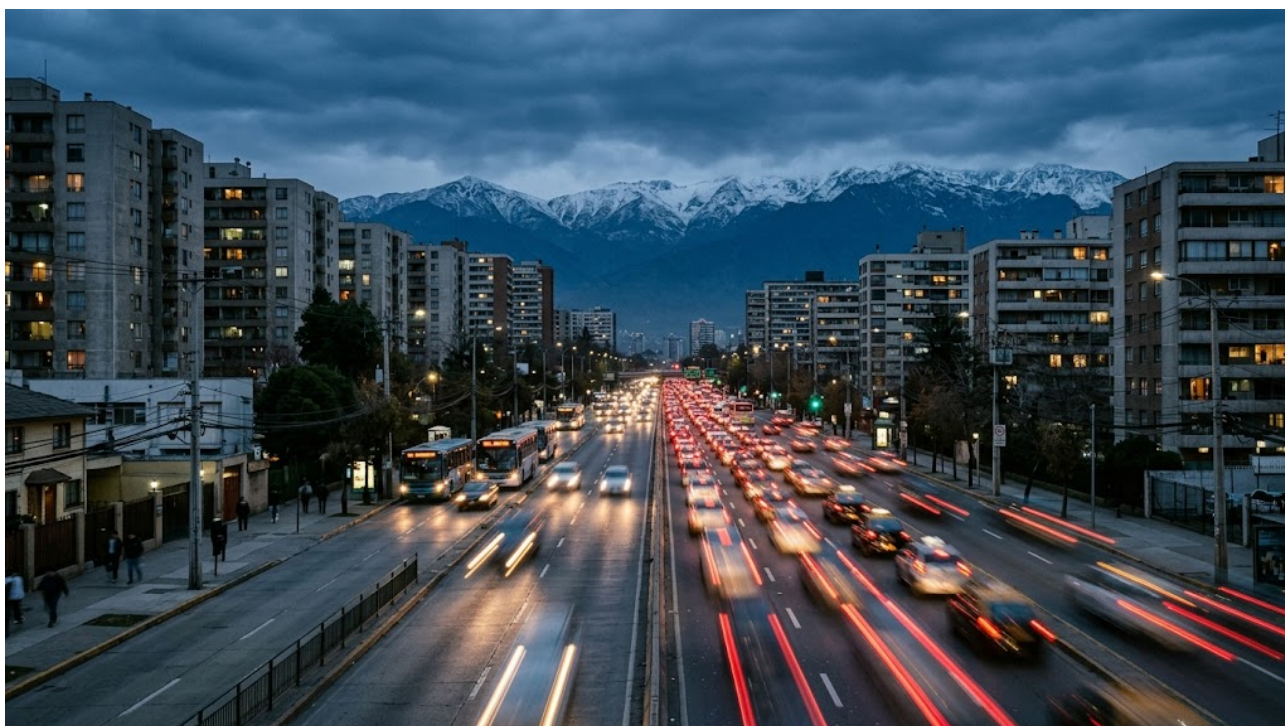
The Rate That Fell by Half

*A city announces that road deaths have halved. The announcement is true.
Almost everything inferred from it is not.*

9 min read

Before you read

- **denominator** — the lower figure in a rate — what the count is being measured against
- **regression to the mean** — the tendency of an extreme measurement to be followed by a less extreme one
- **baseline** — the reference period a later figure is compared with
- **confounder** — a third factor that influences both the supposed cause and the supposed effect
- **counterfactual** — what would have happened had the intervention not occurred
- **attribution** — the claim that a particular cause produced a particular effect
- **secular trend** — a long-running drift in the data, independent of any intervention
- **ecological fallacy** — drawing conclusions about individuals from group-level data



Evening traffic on a Santiago arterial road after the speed-limit change

¹ In March 2018 the municipality of Santiago lowered the default urban speed limit on its arterial roads from sixty kilometres an hour to fifty. Eighteen months later the transport secretariat published a figure that travelled further than any other number the office produced that year: road deaths on the affected corridors had fallen by fifty-one per cent. The figure was accurate. It had been calculated correctly from complete data. It was also, as a basis for the claim it was used to support, close to worthless.

² The claim it was used to support was causal: that lowering the limit had halved the deaths. Nothing in the published figure establishes that. A before-and-after comparison measures the difference between two

periods; a causal claim requires the difference between what happened and what would otherwise have happened. The second quantity is unobservable. Every honest evaluation is an argument about how to estimate it, and the quality of the evaluation is the quality of that argument, not the precision of the arithmetic.

³ Three problems sit inside the Santiago figure, and they are generic enough that they are worth learning as a set.

The baseline was chosen, not given

⁴ The comparison period was 2017. Road deaths on those corridors in 2017 were the highest recorded in the preceding eleven years — a spike driven in part by a single multi-fatality collision in the September of that year. Measuring from a peak guarantees an improvement, because extreme values tend to be followed by less extreme ones whether or not anything is done. This is regression to the mean, and it is the reason that interventions are so often introduced at the moment they are least needed: the decision to act is itself triggered by the spike. Compared with the eleven-year average rather than with 2017, the fall is twenty-two per cent.

The denominator moved

⁵ A count of deaths is not a rate. Over the same eighteen months, metro line 3 opened along two of the four corridors studied, and arterial traffic volume fell by roughly fourteen per cent. Fewer vehicle-kilometres travelled produce fewer deaths without any change in how dangerous each kilometre is. Deaths per hundred million vehicle-kilometres — the measure that actually describes risk — fell by rather less than the headline, and on the two corridors without new metro access it barely moved at all.

Something else changed at the same time

⁶ The speed-limit decree was one clause of a package. The same instrument funded a camera-enforcement programme, resurfaced four intersections, and mandated protected turning phases at eleven junctions. Each of these has a defensible claim on part of the effect. A package evaluated as a whole cannot apportion credit to its parts, and a political system that needs a single headline will apportion it anyway, to whichever part is cheapest to repeat elsewhere.

⁷ None of this establishes that the speed limit did nothing. The point is narrower and more uncomfortable: the published evidence is equally consistent with a large effect, a modest one, and none at all. A sceptic who concluded from this that the limit was useless would be making the same error as the secretariat, in the opposite direction — treating an uninformative number as though it settled something.

⁸ What would have settled more? Comparison corridors in a neighbouring municipality where the limit did not change, measured over the same months, would absorb the secular trend and the weather and the economy. Speed data rather than outcome data would show whether the behaviour the policy targets actually changed, which is a precondition for the deaths falling because of it. Neither is expensive. Both were available. Neither was published, and the reason is not statistical incompetence but the fact that the office was answering a question about its own performance.

⁹ The general lesson is not to distrust figures. It is that a figure answers exactly one question, and that the question it answers is almost never the question being asked of it. Reading quantitative claims well is mostly the discipline of recovering the first question from the second.

Part A **Select the best answer**

Circle the letter next to the answer best supported by the text.

1. The author's objection to the fifty-one per cent figure is that it
 - A was calculated from incomplete data
 - B answers a different question from the one it is used to answer
 - C understates the true effect of the speed limit
 - D relies on a sample too small to be meaningful
2. Regression to the mean is introduced in order to explain why
 - A interventions tend to be adopted when a measure is at its most extreme
 - B traffic volume falls when a metro line opens
 - C camera enforcement outperforms speed limits
 - D deaths per vehicle-kilometre is the preferred measure
3. In paragraph 7 the author criticises the sceptic in order to
 - A concede that the speed limit was probably ineffective
 - B show that the evidence supports a modest effect
 - C demonstrate that the same error can be made in either direction
 - D distinguish statistical incompetence from political motive
4. The observation that the office "was answering a question about its own performance" (paragraph 8) functions to
 - A excuse the omission as a resourcing problem
 - B locate the cause of the omission in incentives rather than in skill
 - C accuse the secretariat of falsifying the data
 - D introduce the comparison-corridor method

Part B **Analyse and explain**

Answer in continuous prose. Refer to the text by paragraph number where it strengthens your point.

5. Explain, in your own words, why the author says the counterfactual is "unobservable" (paragraph 2), and what follows from that for how evaluations should be judged.

6. The passage distinguishes a count from a rate. Using the metro example, explain what that distinction changes about the conclusion.
- _____
- _____
- _____
- _____
7. Paragraph 6 argues that a package cannot apportion credit to its parts. Why does the author think it gets apportioned anyway, and to which part?
- _____
- _____
- _____
- _____
8. Identify the shift in the author's tone between paragraphs 4–6 and paragraph 9, and explain what that shift is doing argumentatively.
- _____
- _____
- _____
- _____
9. The author claims the two better methods were "neither expensive" nor unavailable. Explain how that claim strengthens the argument of the final two paragraphs.
- _____
- _____
- _____
- _____

Part C **Argue a position**

There is no single correct answer. Take a position, and make the reasoning that supports it visible.

10. The passage argues that a figure "answers exactly one question". Take a statistic you have met recently — in news, advertising or coursework — and reconstruct the question it actually answers. State where it diverges from the question it was used to answer.

11. Suppose the comparison-corridor analysis had been run and showed no difference. Would that be sufficient grounds to repeal the speed limit? Argue a position.

12. The author says the secretariat's failure is one of incentives, not competence. Does that distinction reduce the secretariat's culpability, or increase it? Defend your answer.

13. Is there a defensible case for publishing the simple before-and-after figure to the public, while reserving the harder analysis for specialists? Make the strongest version of that case, then say whether you accept it.

14. The passage treats scepticism as a discipline rather than a disposition. Explain the difference as you understand it, and say whether you think the distinction holds.

Answer key

For parents and teachers

Part A

1. B | 2. A | 3. C | 4. B

Part B

5. The counterfactual is what would have happened without the intervention, and only one of the two worlds actually occurs, so it can never be measured directly — it can only be estimated. It follows that an evaluation should be judged on the quality of its argument for the estimate, not on the precision of its arithmetic. Credit answers that grasp the one-world point even if the terminology is loose.

6. A count of deaths falls automatically when exposure falls. The metro removed roughly fourteen per cent of arterial traffic, so fewer deaths followed from fewer journeys rather than from safer ones. Deaths per vehicle-kilometre is the measure of risk, and on the corridors without new metro access it barely moved — which removes most of the support for the causal claim. A strong answer notes that the two corridor types diverge, not merely that the denominator changed.

7. Because the parts were introduced together, their effects cannot be separated statistically. Credit is nonetheless assigned because the political system requires a single transferable headline, and it goes to whichever component is cheapest to replicate elsewhere — here, the speed limit, which costs a decree rather than construction.

8. Paragraphs 4–6 are forensic and particular; paragraph 9 generalises and concedes ground ("not to distrust figures"). The shift converts a demolition of one report into a transferable reading method, and the concession pre-empts the charge that the author is simply anti-statistical. Accept any answer that names both the move from particular to general and the function of the concession.

9. If the better methods were costly or unavailable, the omission would be excusable and the fault structural. Establishing that they were neither forces the explanation towards motive, which is exactly what paragraph 8 then supplies — the office was evaluating itself. It closes off the charitable reading before the author advances the uncharitable one.

Part C

These answers vary. Mark the reasoning, not the conclusion.

10. A strong answer separates the two questions explicitly and names the gap (population, period, denominator, selection). A weak answer summarises the statistic without reconstructing its question.

11. Either position is defensible. Strong answers distinguish 'no detectable effect' from 'no effect', raise the cost of the policy as the relevant counterweight, and avoid treating a null result as proof of absence.

12. Reward engagement with the fact that incentive failures are predictable and therefore designable-against, which can cut either way: less personal blame, more institutional responsibility. Prompt: who had the power to change the incentive?

13. The strongest version appeals to actionability and public attention. Look for recognition that the simplified figure is not merely incomplete but misleading in a specific direction, and that the asymmetry matters.

14. A disposition is a standing attitude; a discipline is a procedure applied regardless of whether one likes the conclusion. Strong answers notice that paragraph 7 is the passage's own test of this distinction.

EyeQBoost builds thinking skills in young learners through cognitive training, reading and gamified online classes.
More free reading sets at eyeqboost.com/resources.