

HISTORICAL STUDY

The Next Bottleneck Only Matters If Someone Can Own It

What 21 historical abundance shocks show about where economic value moves when something important becomes dramatically cheaper, and what that suggests about AI.

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Between 1995 and 2000, telecom companies spent something like \$500 billion laying 80 to 90 million miles of fiber across the United States. The logic was hard to argue with. Internet traffic was exploding, bandwidth was the constraint, and whoever owned the pipes would own the future.

They were right about the importance and wrong about the economics.

By 2001 roughly 95% of the fiber in the ground was dark, unused. Between 2000 and 2002 more than \$2 trillion of telecom market value disappeared. WorldCom filed the largest bankruptcy in American history to that point. Global Crossing and 360networks went with it.

The fiber itself was fine. It is still there, still carrying traffic, and it made broadband, cloud computing and streaming possible. It was genuinely essential infrastructure. The companies that built it were destroyed anyway, and consumers and later software companies took nearly all the value they created.

Now put Google next to that.

The web made publishing free. Anyone could put anything online, and by the early 2000s the volume of content had passed the point where finding anything useful was the real problem. Google did not own a single page of that content. It owned the ability to find what mattered, plus the default position in front of the person searching. In 2024, Google Search and related properties generated \$198 billion, roughly 57% of Alphabet's revenue, at margins most industries never see.

Fiber

SUPPLY RESPONDED

- Essential infrastructure
- Massive demand growth
- Supply outran demand
- Value largely passed downstream

Google Search

SUPPLY COULD NOT

- Did not own the content
- Controlled discovery and intent
- Supply of the gate did not expand the same way
- Captured extraordinary economics

Same era. Same underlying shock, more or less, in the sense that something enormously expensive became cheap. One outcome created a graveyard of suppliers. The other created one of the most profitable positions in commercial history.

The interesting question is why.

THE FINDING

Strategic importance is not the same as economic value.

When something becomes abundant, value migrates only if demand shifts toward an adjacent layer whose supply cannot respond as quickly, and someone can defend control of that layer.

The abundance misconception

There is a comfortable idea in strategy circles that goes like this: when something becomes abundant, something else becomes scarce, and the smart move is to go own the new scarce thing. Cheap intelligence means attention gets valuable. Cheap content means trust gets valuable. And so on.

We went and checked. The study behind this piece looked at 21 abundance shocks going back to the printing press: rail, electrification, containerization, PCs, search, cloud, smartphones, digital photography, streaming, e-commerce, plus a deliberately awkward set of cases where the cost collapse was enormous and nothing much happened afterward. LED lighting, DRAM, NAND flash, solar panels, generic drugs, long-distance telephony, airline deregulation, the fiber glut, the Green Revolution.

The controls were the point. It is easy to assemble a list of famous cases where abundance minted a new monopolist, because those are the cases people write books

about. If you only look at those, you will conclude that abundance always creates a new bottleneck. The record is less obliging.

Roughly six in ten of the cases we could resolve showed real value migration. The other four in ten showed cheaper prices, more consumption, and customers keeping the gains. Not a weak effect on the losing side either. Some of the largest technological achievements in the sample produced almost no durable rents for anybody.

So the honest version is: abundance does not automatically create a valuable new bottleneck. Most of the time it creates customer surplus. The cases where value migrates share a recognisable structure, and once you can see the structure you can usually tell which situation you are in.

What separates the two outcomes

Start with the cases where nothing migrated, because they are more uniform than the winners.

LED lighting got about 90% cheaper per lumen every decade. Light today is something like 2,000 times more affordable than it was in 1902. Solar modules went from around \$100 per watt in 1980 to under \$0.10 today. DRAM prices per gigabyte fell by a factor of ten every five years for decades. These are among the steepest cost curves ever recorded in any industry.

The manufacturers made almost nothing. In 2024 all five of the largest solar manufacturers posted losses. Jinko lost around \$470 million, LONGi around \$1.3 billion. Polysilicon fell from \$32.70 a kilo in early 2023 to \$4.40 by mid-2024. DRAM and NAND run the same cycle on a repeating loop.

Four separate industries, one structure. Scarcity kept showing up, but none of it stayed scarce enough. Capital and capacity responded, competitors entered, and the margins disappeared. There was no adjacent layer customers had to pass through, nothing that accumulated, nothing anyone could gate. So the surplus went where surplus goes when nobody can hold it: to the buyer.

Long-distance telephony and airline deregulation got there by a different route and landed in the same place. Real fares fell 45 to 50%, passenger volumes more than doubled, and the industry has cumulative losses to show for it. Deregulation was the abundance shock. Competition did the rest.

Generic drugs look like they belong on this list and only half do, which is worth flagging now because it turns out to be the most instructive case in the study. I will come back to it.

Now the other side.

When PC hardware commoditised in the early 1990s, the box makers went to thin single-digit margins and buyers got cheap computers. The money did not disappear. It moved one layer down and one layer up, into the CPU and the operating system. Intel ran 50 to 60% gross margins while other chipmakers ran 3 to 22%. For most of that decade Intel and Microsoft between them earned more than the entire rest of the world PC industry combined. Cheap hardware made the standard more valuable, not less, and the standard was not something a competitor could add capacity to.

Electrification is the physical version of the same thing, which matters because it means this is not simply a digital phenomenon. Electricity became cheap and universal, and the thing that became more important was the wires. You cannot build a second grid down the same street. Entry is constrained by land, rights of way and regulation, so the position is durable. It has been durable for a century, which is longer than any digital position in the sample. Regulated utilities earn steady returns rather than spectacular ones, which is the trade: the same regulation that protects the position also caps the rent.

Streaming did it with rights. Distribution went to roughly zero, which should have been terrible news for the music industry, and initially was. What actually happened is that as distribution stopped being scarce, the catalog became the only thing left that was. Rights holders now take around 80% of the value of an audio stream. Spotify, the aggregator everyone thinks of as the winner, runs thin. The label that owns a back catalog nobody can recreate does better than the platform that delivers it.

Digital photography is the sharpest version. Marginal cost per photo went to zero. Kodak went from \$16 billion in revenue to Chapter 11. Camera shipments fell 94% from their 2010 peak. Enormous surplus to consumers, who now take something like 1.6 trillion photos a year. But value did not vanish, it relocated twice. It went to the attention platform where the photos ended up, and Facebook bought Instagram and its 13 employees for a billion dollars in 2012, the same quarter Kodak filed. And it went to image sensors, where Sony holds something around half the smartphone market. Two adjacent layers, both hard to enter, both more valuable precisely because photos got free.

THE DIVIDING LINE IS SUPPLY RESPONSE

Capacity can respond	Supply cannot respond easily
CUSTOMERS KEEP THE GAINS	VALUE MIGRATES AND IS HELD
LED	Search default
Solar	Wintel standard
DRAM	Electric grid
NAND	Music rights
Fiber	App distribution

Strategic importance is not the same as economic value

This is the part I would want an executive to actually internalise, because it is where most of the expensive mistakes live.

Fiber was indispensable and worthless to own. Container shipping cut the cost of moving a ton of cargo by 97%, remade global trade, and container carriers have spent the decades since going bankrupt in cycles. Generic drug manufacturers keep the healthcare system functioning at margins that would embarrass a distributor. Solar manufacturers are decarbonising the planet at a loss.

All of these are strategically critical. None of them have bargaining power.

Meanwhile the value in generic drugs did migrate, just not to anyone making drugs. It went to the pharmacy benefit managers. Three of them, CVS Caremark, Express Scripts and Optum Rx, processed about 80% of American prescription claims in 2024. They do not manufacture anything. They sit between a commoditised product and the patient and decide what gets on the formulary. Commoditisation upstream made the gatekeeper more valuable, not less.

That is the pattern. When something becomes abundant, look one step along the chain for the thing demand is now growing faster than supply can respond to, then ask who controls it.

So the question is not "is this asset becoming more important." Plenty of assets become more important and stay bad businesses. The questions that actually predict the outcome are narrower:

Can customers substitute away from it? Can competitors add supply within a few years? Does one company control access, or is access open? Does the position get stronger with use, or does it just sit there? Can regulation cap or remove the rent? And when things get tight, does the customer pay you more or use you less?

That last one is the cleanest tell. When bandwidth got scarce nobody paid fiber owners more, because there was 20 times more of it than anyone needed. When app distribution got valuable, developers paid Apple 30% and had no alternative.

Nothing digital is permanent either

Two of the strongest positions in the sample eroded, which is worth sitting with before assuming a good position stays good.

Wintel held for about twenty years and then mobile happened. The standard was still the standard, it just stopped being the standard that mattered, and value moved to phones and cloud. Nobody competed with Windows. Something else got built next to it.

The App Store is the other one. Apple's 30% commission was one of the great distribution positions ever assembled, and it held cleanly for more than a decade. Then the Digital Markets Act and the Epic ruling forced alternative payment routes and commissions started coming down. No competitor beat Apple. A regulator changed the rules.

Regulation cuts both ways in this data. It created durable positions in utilities, spectrum and pharmacy benefits. It destroyed them in railroads and app stores. If your position depends on a gate, the gate can be legislated open, and that risk goes up roughly in proportion to how well the position is working.

So what about AI

The useful way in is not to list things that might become scarce. It is to ask the same question we asked of every historical case.

AI is making intelligence, analysis, content generation, software creation and chunks of knowledge work dramatically cheaper. Fine. What does that make people more dependent on, and can supply of that thing expand at the same speed?

- 01

Electric power and grid interconnection

Comes out strongest, and it is not close. This is the electrification case running in reverse. Compute demand is expanding on a two-year cycle and interconnection queues, transformers, permits and transmission expand on a ten-year cycle. You cannot venture-fund your way past an interconnection queue. The scarce thing is a sited, permitted, interconnected piece of land with power attached, and that is closer to a port terminal than to a semiconductor fab. Supply response is the slowest in the entire candidate set.
- 02

Default distribution and attention

The second, and the most repeated mechanism in the whole historical record. Six of our cases ran on it. Whoever ends up being the place people bring their intent to an AI inherits something structurally similar to the position Google took in search or Apple took in app distribution. It is not settled yet, which is exactly why it is interesting.
- 03

Proprietary and permissioned data

Third, and more conditional than most people treat it. The historical analogue is the record catalog: valuable because it cannot be recreated. That means the durable version is data that is genuinely exclusive or regulated, not data that is merely large. Most corporate data is neither. If a competitor can assemble something equivalent, or if synthetic data closes the gap, this is a five-year advantage rather than a moat.
- 04

Workflow and system-of-record ownership

Real but narrower than the pitch decks suggest. It is the Wintel embedding mechanism, and it works through switching costs. Owning the log of what agents did, what went wrong and who approved the exception is a defensible place to sit in a regulated business. It is also exactly the kind of thing cloud and model incumbents ship natively once it becomes obvious.
- 05

Accountable human sign-off

More interesting than it sounds. Where a licensed human is legally required to take responsibility, AI abundance makes that signature more valuable rather than less, because everything around it got cheap and the bottleneck did not move. This is the PBM mechanism: regulation creates a gate, and the gatekeeper captures. It only works where the requirement is genuinely legal rather than customary.
- 06

Frontier compute

Where I would push back hardest on the consensus. Yes the constraint is real right now and the current evidence is overwhelming. But structurally it is a semiconductor manufacturing business, and this study contains four separate cases telling you what happens to semiconductor manufacturing bottlenecks: capacity arrives, margins compress, and the cycle repeats. DRAM has done this for forty years. The only thing that could make this one different is software lock-in, and lock-in is a different asset than the chip. Treat the current margins as shortage rents until you can identify what keeps them intact after capacity responds.

Trust, provenance, verification and human authenticity are the most attractive narratives in the AI conversation and they have the weakest historical support in our data. Zero durable cases. Not weak evidence, none. Verification tends to standardise into a protocol nobody pays for, or gets absorbed into the platform as a feature. The same goes for scarce real-world experiences: probably true as a cultural observation, very hard to build a business that captures it, because the whole appeal is that it does not scale.

I am not saying these are wrong. I am saying if you are betting on them you are betting on a mechanism with no historical precedent in the sample, and you should know that is the bet you are making.

The version you can actually use on Monday

Take whatever is getting cheap in your market and walk it through five questions in order. It takes about twenty minutes and it is more useful than most strategy offsites.

01 **What becomes more important because this is now cheap?**

Not what becomes scarce in the abstract. What do your customers now have to go through, depend on, or pass by that they did not before.

02 **Can supply of that thing expand as fast as demand?**

If the answer is that someone can build more with money and two years, you are looking at a temporary shortage, not a position. Price it accordingly.

03 **Who controls it today?**

Sometimes the honest answer is nobody, which is the interesting case. Sometimes it is you and you have not noticed.

04 **Why can't someone else replicate it?**

Be specific. Network effects, an installed base, exclusive rights, a proprietary dataset nobody else can assemble, a permit, land, a licence, a default position, or genuine switching costs. If the answer is "we are better at it," that is not a reason.

Does control convert into money?

Pricing power, margin, switching costs, or a gate the customer has to pay to pass. If the asset is critical but the customer has three alternatives and buys on price, you have identified a cost centre, not a moat.

The strategic error this framework is designed to catch is the common one: investing in the layer with the most visible demand growth rather than the layer that will keep the economics. Everyone who built fiber in 1999 was looking at a demand curve going straight up.

The demand curve was correct. It just was not theirs.

Practically, this pushes you toward a small number of moves. Secure the constrained physical or legal thing early, because that is the one you cannot buy later at any price. Own the record of what happened rather than the thing that does the work. Take exclusivity where exclusivity is available, since non-exclusive access to anything is a service, not a position. And be willing to let go of the layer that is heading for commodity economics, rather than defending it because it used to be the business.

The uncomfortable part

If AI is making something you currently sell dramatically cheaper, the instinct is to defend the old scarcity. Add features, tighten the contract, argue that your version is better.

Kodak had the best film in the world.

The more useful question is what your customers are going to depend on next, whether that thing can be built by anyone with capital and a couple of years, and whether you can own enough of it to matter. If you cannot own it, do not build the strategy on it. Sell into it instead and let someone else fund the buildout.

So: what is becoming abundant around you, and what does that make newly important that you could actually control?

If you can answer the second half of that with something specific, you have a strategy.
If you can only answer the first half, you have a trend.

RESEARCH NOTE

This analysis draws on a comparative study of 21 historical abundance shocks across infrastructure, technology, manufacturing, media, transportation, healthcare, and agriculture. PastBehavior examined where value migrated, who captured it, and whether the resulting bottleneck persisted.

WORK WITH US

What does past behavior say about your next move?

If a market you operate in is being reshaped by AI, automation, falling costs, or a new distribution model, we can map the historical cases against your situation and identify where the economics are likely to move.

TALK THROUGH A DECISION