

Market Power Is Permanent, and Technological Competition Does Not Remove It

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Contrary to the longstanding conventional wisdom, the monopoly power conferred by new technologies is neither short-lived nor is it a small price to pay for the associated benefits. Rising market power leads to all kinds of economic, social, and political problems – many of which have become all too visible in American today.

STANFORD – Economists and policymakers agree that technological improvements are crucial to economic growth. The information technology (IT) revolution of the last four decades has driven the economy forward, and very few people would want to stop it. But since the 1980s, as that revolution has taken root, the US economy has experienced a sharp rise in firms’ market power, defined predominantly as their ability to affect pricing.

Rising productivity and rising market power are the twin outcomes of the innovation process. Both result from the private ownership of technology, and from the legal powers conferred by patents or trade secrets. When an innovation wave like the IT revolution takes off, market power rapidly accumulates and becomes a significant force, with profound economic and political implications. In my recent [book](#), I call this unique force the “*market power of technology*.”

Although economists have long recognized the dangers of such market power, the universal view has been that it is short-lived because competition will erode it, patents will expire, and trade secrets cannot be kept secret for long. Allowing innovators some market power thus has been considered a small price to pay for the great benefits of rising productivity.

But, in fact, innovators’ monopoly power is neither of short duration nor a small price to pay. On the contrary, the price is significant, because the prevailing free-market economic policies do not restrain its growth. Under such conditions, a market economy acquires the features of winner-takes-all monopoly capitalism, wherein a few firms that dominate their respective sectors turn their market power into more enduring forms of economic and political power.

In such a system, where smaller firms are in constant danger of being displaced by more powerful ones, inequality tends to rise, overall economic performance falls below its potential, civic participation declines, polarization increases, and democracy weakens.

FIRST-MOVER ADVANTAGES

Any innovation is associated with two kinds of knowledge. One is purely technical or scientific, and thus patentable. The second is experiential, emerging from a firm’s work with a new technology. This category includes practical knowledge about the optimal organizational structure for the latest technology, the best production methods, the materials to be used, marketing techniques, and so forth.

Both kinds of knowledge come into play early on and may entail a competitive race among many firms seeking dominance. Typically, only one winner will emerge. Whoever survives the initial race comes to be identified as “the innovator” with first-mover advantages over competitors. Apart from knowledge, first-mover advantages include several others that have long-lasting effects.

For example, the early winner can set standards for the industry and gain consumer confidence, even if later products are superior to its own – as was the case with the QWERTY keyboard layout, VHS, and DOS. It can also hoard information about consumers and supplies; achieve operational scale and lower marginal costs; pursue legal permits and banking and financing opportunities; and choose an optimal location (if it matters). All these advantages make it harder for new entrants to compete.

The dual knowledge associated with innovation also corresponds to two kinds of private-property protection, one legal, the other experiential. Together, these provide the lawful monopoly power that a firm can leverage within a particular market where there are profits to be made.

To see how this works – and how it remains permissible under US antitrust laws – consider Apple, the [most valuable company](#) on the planet. Apple is not monopolizing the smartphone market. In 2021, iPhones accounted for only [22% of smartphones sold globally](#). Other smartphones are available for purchase, and anyone, under US law, is free to enter that market. What Apple has is a monopoly power over its technology, which it can prevent others from using. To beat Apple and take over its market, a competitor would have to invent a new smartphone technology that consumers judge to be superior to the iPhone.

Superiority means better quality at the same price, or equal quality at a lower price. But since this has proved very difficult to achieve technologically, Apple has been able to use its technology to dominate the top-quality segment of the smartphone market. It can earn extremely high monopoly profits by setting iPhone prices far above [marginal costs](#). Its profit margins are so large that its 22% share of total units sold translates into about [44%](#) of global smartphone sales revenue.

THE MONOPOLIST'S CONSOLIDATION PLAYBOOK

Without additional strategies, the first-mover advantage would dissipate as patents expire, and as most trade secrets are revealed. Innovators therefore resort to diverse strategies to make it unprofitable for competitors to enter the market.

One such strategy is to deploy regular technology updates. The latest update of a product or service not only enhances demand but also creates a patent pyramid: an interdependent, complex combination of old and new patents that is hard for competitors to overcome. Moreover, updates effectively extend the life of the initial patent beyond what was intended when the patent was issued.

A second common strategy is to acquire potential competitors or their technologies. The buyout is a lethal weapon that expands a firm's customer base and positions it to become a "technological empire." While some acquired technologies undergo further development, others are suppressed to protect the firm's own technology from rapid obsolescence. Leading firms such as Microsoft, Meta (Facebook), Google, and Amazon have each acquired a large number of companies since they went public. For example, from 1987 to 2020, Microsoft acquired [237 companies](#), and from 2001 to 2020, Google [acquired 236](#).

Through acquisitions, these firms have become technological empires. Substantial components of their new technologies consist of innovations that they did not create; they were made by other firms that chose to be acquired rather than enter a technological war. The implication is that the large technological monopolies are not necessarily rapid innovators. In the pharmaceutical industry, this empire-building is now standard: Most new drugs are developed by joint ventures between a large and small firm or by a small firm that a larger firm acquires.

A third strategy is to suppress potential competitors through various hostile acts to curtail their development. Microsoft **impeding** Netscape by restricting the distribution of its browser is a well-known example (for which Microsoft faced antitrust enforcement action).

Fourth, dominant firms often try to create an interdependent ecosystem, such as by developing a technology with a unique language or operating system and then introducing products and devices that are linked to that platform. Such “**tying and bundling**” expands the market because customers who purchase one product end up having to buy or use the others linked to it. Notably, Microsoft **bundled** its internet browser, Explorer, with Windows (killing off Netscape in the process).

The fifth strategy is to create information banks on consumers and suppliers, which provides an especially important advantage in the age of artificial intelligence, the effectiveness of which depends on the quality and volume of data on which the algorithm can draw. Finally, companies will develop loyalty programs – a method that is now universal.

In addition to the explicit protection of monopoly power, IT firms also have the advantage of economies of scale and network externalities that benefit larger firms’ users and customers, as well as reducing marginal costs. The first-mover advantage, in this case, is due to the scale of operation. The larger the scale, the harder it is for competitors to enter.

Moreover, as the twentieth-century economist Joe S. Bain **observed**, no entry occurs in markets where firms earn monopoly profits, even without any noted technological advantage. The research resulting from this insight, based on advanced game theory, yielded many papers showing that an incumbent monopolist has many commitment strategies to deter new entrants.

All told, there is a vast literature showing that the monopoly power of the firm that wins the initial technological race is long-lasting. Apart from new companies like Apple, Amazon, and Google, many dominant firms today – such as Johnson & Johnson, Procter & Gamble, and DuPont – are older than 100 years. The market power of technology is so long-lasting that it should be measured not in years but in centuries.

TECHNOLOGICAL COMPETITION IS DIFFERENT FROM WHAT YOU THINK

Technological competition is different from regular competition. Standard competition begins with a competitive industry being abnormally profitable, owing, for example, to a sudden increase in demand that drives the price of a product above its marginal cost. Such “**monopoly profit**” attracts new entrants, who can compete simply by hiring workers and financing capital investments and the cost of materials used in production. The increased supply from the new firms is sold by lowering the product price slightly to attract demand. Other firms then have no choice but to accept the lower price. But because the price reduction is slight, all firms continue making monopoly profits. This process continues as long as the price is above marginal cost; when the price falls to marginal cost, the monopoly profits disappear. At the end of this process, all firms may survive, but they are making zero monopoly profits.

Technological competition, by contrast, begins with a firm owning a superior technology. To compete, other firms (or individuals) search for a new technology to supply a similar product. In addition to securing the inputs needed for production, these competitors must invent something better than the existing technology.

This additional hurdle can have one of two consequences. First, there may be only one winner. The triumphant technology is used to supply a product that consumers like best or at lower cost. Even if it is not the best, it may be the one with the best reputation or the one that set industry standards early on (as with QWERTY). The losers disappear, leaving the market to be dominated by the monopolist, with some low-profit marginal firms perhaps selling an inferior version of the product.

Second, several technologies could prove to be superior. One may be best in product quality but very costly, whereas another might be of lower quality but also lower cost. In this case, the industry becomes an oligopoly with two or three market segments and two or three dominant firms, each extracting monopoly profits from its segment.

Thus, while free entry guarantees that standard product competition ultimately will lead to zero monopoly profits, this is not the case with technological competition. Moreover, two other factors differentiate technological competition. The first is the suite of reaction strategies that incumbents can deploy. In regular competition, incumbent firms cannot avail themselves of the aforementioned defensive strategies (product updates, technology acquisitions, and the rest) that are available to incumbent monopolists.

Second, technological competition depends on the technology being contested. So far, we have been discussing competition *within a technological paradigm*, where innovations improve an existing technology. A new technological paradigm emerges only when the state of human knowledge itself changes. Such shifts are rare – typically once a century. Economists call such technologies [general-purpose technologies](#). Examples are the steam engine, electricity, and the internet. Each generates innovative applications across all sectors of the economy.

THE MYTH OF CREATIVE DESTRUCTION

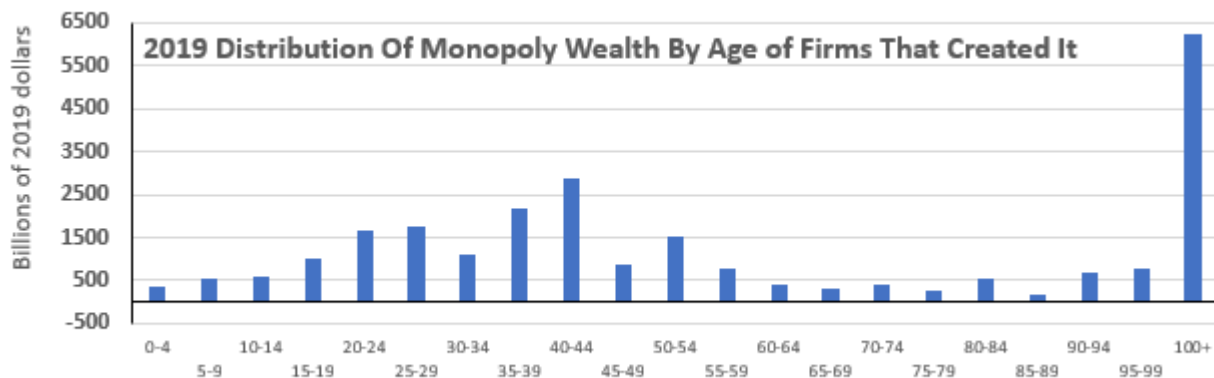
One corollary of this process is that older technologies (like the horse and buggy) are phased out. Hence, many regard Joseph Schumpeter's concept of [creative destruction](#) as a model of technological competition. While this idea has many interpretations, it boils down to an older technology being made obsolete by a newly invented technology that eliminates the forerunner's market power. But two facts immediately cast doubt on this assertion. First, there are the exceptionally long lives of firms like Johnson & Johnson, Procter & Gamble, DuPont, and many others. Second, there is much [empirical evidence](#) that most new improvements are made by incumbents, not by challengers.

To be sure, firms do die (think of Sears, Xerox, Polaroid, or Enron), and new firms are born (Apple, Microsoft, Amazon). To see how the market power of technology remains a permanent feature of the economy, we therefore need to consider the impact of new paradigms. Some firms fail because their management fails to make the right decisions. But firms also fail because they cannot innovate when confronted by a new technological paradigm.

New general-purpose technologies change everything. When older firms' market power declines, they can survive only by reinventing themselves: developing new technologies through research, joint ventures, or acquisitions. Old and new firms thus end up in a more symmetric competition, using the new general-purpose technology for applications in all sectors. Since they are all starting from the same place, older firms can still succeed or even maintain their lead. Meanwhile, some younger firms will fail, and others will succeed, taking a leadership position with respect to the newly established general-purpose technology.

The evidence for this death and renewal process is reflected in the following figure from my book, *The Market Power of Technology*, where I estimate monopoly wealth in the US. [Monopoly wealth](#) is the market value of a firm's future monopoly profits. If a firm creates zero monopoly wealth, the value of its stock equals the capital assets it owns. With positive monopoly wealth, its total wealth is equal to that plus its capital. Monopoly wealth thus is a measure of market power.

In the figure, based on my assessment of active US firms with publicly trading securities in the Compustat files for 1950-2019, we can see the distribution of monopoly wealth in 2019 (measured in 2019 dollars), by the age of the firms that created it.



To define old and new, I take the new technology firms to be those incorporated after 1973, since the IT revolution began in the early 1970s. In 2019, 48.2% of the total monopoly wealth in US markets was created by young firms, but 33.4% was still created by firms over 80 years old, and 24.9% by firms over a century old. Clearly, achieving this continued dominance requires a strong capacity for reinvention. But the larger point remains: At the end of this competitive race within the new paradigm, only winners (meaning incumbent monopolists) in each respective market segment survive. Creative destruction does not eliminate market power.

But what if a young upstart innovator takes on an incumbent monopolist and succeeds in taking over an industry? Is this an example of competition eliminating monopoly? No, because in this remote case, a new monopolist replaces an old monopolist, and the economy experiences a change in the identity of the innovator-monopolist that dominates the industry. For the economy as a whole, the market power of technology remains a permanent feature.

WHY COMPETE WHEN YOU COULD COOPERATE?

There is only one tool for redirecting the evolution of market power: public policy. We cannot rely on competition to eliminate market power, because we cannot assume that innovators have an incentive to take on a technological monopolist. A careful examination of the issue shows that the opposite is true. As the entrepreneur Peter Thiel [puts it](#), "Competition is for losers."

Successful innovators with consolidated monopoly positions are most likely to retain some profits as a business weapon. Why would upstart innovators engage in a long, expensive technological war against such incumbents? A new innovator may have a temporary advantage, but the battle is long, and the incumbent has multiple strategies to improve its position. Many challengers with successful

innovations will do better by selling out. With too much to lose, the incumbent monopolists are motivated to over-bid to prevent entry.

Young firms agree to be acquired because they, too, have much to lose. In an environment of rising market power, small independent firms are in a constant struggle for survival, and the risk of losing an economic war with a powerful incumbent is too great. Most new firms are led by young innovators who face a choice of becoming wealthy overnight or becoming even richer in the future at the risk of losing everything. On top of these considerations, I add Bain's [conclusion](#): empirical evidence shows that no entry occurs in markets where firms earn monopoly profit, owing to incumbent monopolists' ability to deter new entrants.

In short, there is broad evidence that apart from technological competition erupting when a new paradigm arrives, a direct technological challenge to an incumbent monopolist is rare, and the norm among innovators is to cooperate. A few examples will illustrate this dynamic.

When GE was created in 1892, it acquired [patents](#) on the electric bulb and electricity generation. In 1886-87, Nikola Tesla received patents on the alternating current motor, which he [sold](#) to Westinghouse. This led to the "war of the currents" between GE and Westinghouse, and [AC won](#). GE then held the old technology, and Westinghouse owned the winning one. But Westinghouse did not destroy GE. Instead, the two companies reached a [patent-sharing agreement](#) and jointly monopolized the market for half a century, sharing it at agreed proportions.

Silicon Valley start-ups have analogous motives. They do not aim to replace firms like Google or Microsoft. Virtually any start-up begins with a plan to demonstrate the viability of its idea and be acquired by a leading firm. This preference is reflected in the dramatic [decline](#) in the number of active firms in the US. The number of US-based non-financial firms with publicly traded stocks in the [Compustat](#) database was 3,914 in 1980, and 7,429 in 1998, reflecting the IT revolution. But by 2016, this number had declined to 4,621. But most of the 2,808 that disappeared did not default; they were acquired (as were many private firms during the same period). This flood of acquisitions reflects the deeper trend toward expanded technological market power.

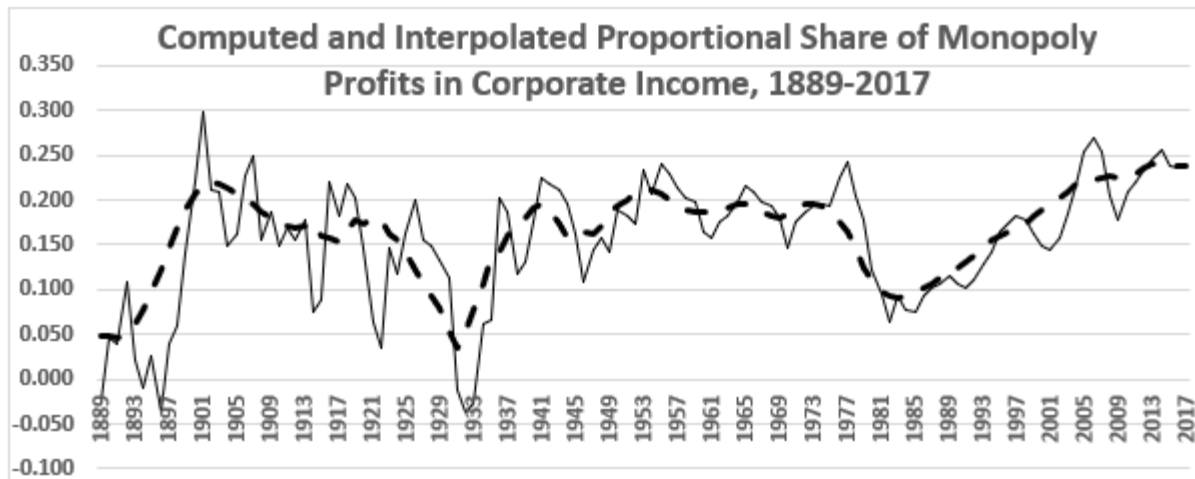
A third example is the pharmaceutical industry, where smaller firms do most of the research. Big projects are either initiated by joint ventures between small and big firms, or they are launched by small firms that are acquired once their research reaches a mature stage.

A fourth example is OpenAI, the small firm that developed ChatGPT. As a software developer, it was a potential competitor to companies like Microsoft. But Microsoft nullified that threat by entering into a [\\$13 billion joint venture](#) with the company.

IT'S THE POLICIES, STUPID

Two forces can lower the market power of technology: intellectual-property rights can expire, and trade secrets can be revealed; or technological depreciation and obsolescence can set in. Yet, as we have seen, monopolists have many strategies to counteract these forces, making entrenched market power a constant feature of capitalism.

That leaves public policy as the only viable check on rising legal technological market power. To see how public policy has shaped US economic history, consider how monopoly profits as a share of total income – a measure of market power – in the US private corporate sector has changed from 1889 to 2017. In the figure, the solid line is the estimated percent of monopoly profits and the dashed line is a statistical interpolation, intended to clarify the trend.



Source: Kurz, Mordecai, *The Market Power of Technology*, Online Appendix Part B, Figure 0.2

The first fact revealed in the figure is that market power varies greatly over time. But there were three periods in recent US history when market power was clearly elevated: during the First Gilded Age, peaking in 1901 and declining afterward, and during the Second Gilded Age, which began in 1981 with the introduction of [free-market policies](#). Surprisingly, there is also an elevation through the Great Depression and World War II, extending to about 1953. The two Gilded Ages were characterized by an increase in market power because policymakers promoted laissez-faire and opposed antitrust activities. During the middle period, market power rose because the US was engaged in building up the economy during the Depression and wartime mobilizations, and effectively suspended policies to restrain market power in the interest of recruiting business to the national effort.

Market power declined from 1901 to 1933 and from 1953 to 1981, owing to the profound impact of public policy – following the [Progressive reform movement](#) and the [New Deal policies](#), respectively. Periods of declining market power are characterized by high corporate and personal income-tax rates that extract a share of corporate monopoly profits; pro-labor legislation and institutions that bolster union power and collective bargaining; active regulatory institutions that restrict firms' ability to exploit market failures to establish market power; and a robust antitrust policy that limits firms' ability to use the strategies described above.

Market power today is extremely high, owing to the impact of the free-market policies since the 1980s. If we want to rein in technological market power once again, reconsidering the current policy regime would be a sensible place to start. The Biden administration's [industrial policy](#) suggests that a new direction has been charted.