

# HOW MARKETS FAIL

THE LOGIC OF  
ECONOMIC CALAMITIES

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## 10. A TAXONOMY OF FAILURE

As far as I can tell, the first economist to use the phrase "market failure" was Francis Bator, who is now an emeritus professor of economics at Harvard's John F. Kennedy School of Government. Between 1964 and 1967, Bator served as a deputy national security adviser to President Lyndon Johnson. He also worked as a consultant for the departments of Treasury and State, and he was the founding chairman of the Kennedy School's public policy program. Bator's major contribution to economics came in the late 1950s, when as a young member of the MIT faculty he wrote a pair of memorable articles on the limits of free market economics. The first one, which appeared in the March 1957 issue of *The American Economic Review*, provided a clear and digestible exposition of general equilibrium theory. Even for economists with strong mathematical training, the original work of Arrow and Debreu was heavy going. Bator distilled it into forty pages of English. With the aid of some fairly simple diagrams, he showed how, under certain conditions, a free market system generated a Pareto-efficient outcome. Fifty years after its publication, the article remains perhaps the most painless introduction to the pure theory of the invisible hand.

Bator's second paper appeared in *The Quarterly Journal of Economics* in August 1958. Entitled "The Anatomy of Market Failure," it examined the circumstances in which the theories he had previously outlined didn't apply—cases where the free market allocation system would fail "to sustain 'desirable' activities or to stop 'undesirable' activities." Bator began by pointing out that the world is full of things that violate the assumptions of the Arrow-Debreu model: "imperfect information, inertia and resistance to change, the infeasibility of costless lump-sum taxes, businessmen's desire for a 'quiet life,' uncertainty and inconsistent expectations, the vagaries of aggregate demand, etc." Some of these phenomena, such as inertia and the desire for peace and quiet, might seem a bit arbitrary, but uncertainty and imperfect information are fundamental features of any economy. They emanate from the second law of thermodynamics, commonly referred to as "time's arrow." Since time doesn't run backward, the future is unknown and businesses, investors, and consumers are compelled to make decisions on the basis of best guesses about what might happen. Sometimes these guesses turn out to be fairly accurate. Often, they don't, and when this happens resources tend to get misallocated. (In adopting the rational expectations hypothesis, the members of the Chicago School sidestepped this problem.)

Having raised the issues of uncertainty and information, which pose fundamental problems for any economic theory, Bator turned to areas that are more amenable to traditional analysis. Even in a world of perfect foresight, he argued, there would be at least three other sources of market failure. One is monopoly or oligopoly power. In the free market model, each industry consists of large numbers of competing firms, none of which can capture more than a small share of the market. The survival of atomized competition depends on the assumption of diminishing returns to scale: if any individual firm tries to ramp up output, its costs will rise and it won't be able to compete with smaller firms. Clearly, this is not very realistic. Most manufacturing industries are organized on a production line basis, which ensures that unit costs fall as production rises. Ford or Toyota can operate a plant making a thousand cars a week almost as cheaply as one making eight hundred cars a week. As noted earlier, in mass production industries, big firms can almost always undercut smaller ones, and over time a handful of them will come to dominate the market. With competition restricted

to a few big players, firms will be able to set prices above costs, which violates the conditions necessary for economic efficiency. ✓

The second market failure that Bator identified is that businesses may have little incentive to produce some things that people value highly, such as bridges, hospitals, parks, and fire departments, because they can't charge enough for them to make it worthwhile. This is the problem of "public goods" that Smith and Pigou addressed, but which the schools of Lausanne and Chicago glossed over. Public goods have two unusual characteristics. (First, one person's use of them doesn't prevent others from using them: if I go sailing on Long Island Sound, there will be plenty of space for you to do the same thing. The second distinguishing characteristic of public goods is that it is very difficult to prevent people from using them for nothing. If the authorities decided to charge small boats for using Long Island Sound, they would have to patrol hundreds of miles of coastline, which would be prohibitively expensive.)

The final source of market failure that Bator mentioned was the phenomenon of spillovers or "externalities." (The latter term was another of his inventions.) He updated Pigou's analysis, pointing out exactly how the presence of these effects violated the marginal conditions of classical economic theory. Like Pigou, he also pointed out that spillovers aren't always negative. He gave the example of a beekeeper located next to an apple orchard, which James Meade, a renowned British economist, had originally developed. By pollinating the flowers on the apple trees, the bees help the orchard owner to grow more fruit; by providing the bees with nectar, the apple trees help the beekeeper to produce more honey. But neither the orchard owner, in deciding how many trees to grow, nor the beekeeper, in deciding how many hives to maintain, takes account of these positive spillovers. Consequently, the market doesn't produce as much as it's capable of.

After Bator published his taxonomy of market failures, it didn't take long for other economists to recognize its usefulness. Most modern textbooks contain chapters on uncertainty, imperfect information, monopoly, public goods, and spillovers. However, these topics are usually treated as addendums to the main body of analysis, which is devoted to the classical free market model. This ordering has the effect, welcome to many economists, of relegating market failure to a special case of the Platonic ideal—one to be treated at the end of the course,

time permitting. If economics is to be regarded as a reality-based science, the order of presentation should be reversed.

Market failures range from "micro" problems that afflict particular markets to "macro" malfunctions that affect the entire economy. Often, though, the dividing line isn't very clear. Traffic congestion is clearly a microlevel issue—although no less annoying for it. Abuses of monopoly power by large corporations and excessive CEO pay are microfailures, and yet they have a systemic impact on the economy. Pollution and destruction of the environment is a global problem that results from micro spillovers. The subprime crisis started out as a microfailure: it developed into a global recession. Slumps of this nature are obviously macrolevel market failures, but they have their roots in uncertainty and coordination problems at the micro level, especially in the financial sector.

The problem of monopoly is as old as economics. Many people are introduced to the subject as children when they play the popular board game of the same name, the object of which is to buy up as many properties as possible and charge your opponents exorbitant rents. Parker Brothers, a unit of Hasbro, has marketed Monopoly since the 1930s, but the game's origins can be traced back to the Landlord's Game, which Lizzie Magie, a young Quaker woman from Virginia, invented in 1904 to demonstrate the evils of private land monopolies. Around the turn of the twentieth century, there was also a great deal of public concern about the formation of vast commercial monopolies, known as "trusts," which had come to dominate many industries, such as sugar, tobacco, railroads, and beer. The best known of these behemoths were John D. Rockefeller's Standard Oil Company, and the United States Steel Corporation, which the financier J. P. Morgan put together after buying out Andrew Carnegie's business empire.

Worries that the new combines were squeezing out smaller competitors and bilking customers led to the introduction of antitrust laws. The Sherman Antitrust Act of 1890 outlawed restraints of trade by existing monopolies and any attempt to create a new monopoly. The Clayton Antitrust Act of 1914 proscribed price discrimination, exclusive dealing contracts, and other predatory tactics that the trusts had used to boost their profits. During the same era, President Theodore Roosevelt

(1901–1909) and his successor, William Howard Taft (1909–1913), issued lawsuits to break up more than a hundred of the trusts, including Standard Oil.

On paper, the antitrust laws, which remain on the books, were strong pieces of legislation. In practice, the federal courts have generally been accommodating toward big companies, often adhering to Judge Billings Learned Hand's dictum: "The successful competitor, having been urged to compete, must not be turned upon when he wins." The rise of the Chicago School provided opponents of antitrust with new arguments to hurl at judges and would-be regulators. George Stigler insisted that markets populated by a few big firms were more competitive than they appeared. Friedman and Arnold Harberger—the same Arnold Harberger who would later accompany Friedman to Pinochet's Chile—backed him up. (According to one of Harberger's studies, the economy-wide efficiency losses from monopoly amount to just one-tenth of 1 percent of GDP.) Later on, even some moderate economists, such as NYU's William Baumol, argued that monopolies didn't need to be exposed to actual competition in order to curb their predatory behavior: the mere threat of competition would do the job. During the administration of George W. Bush, antitrust policy was relaxed to favor big companies. In 2008, the Justice Department published guidelines making it much harder to sue big companies for predatory or anticompetitive behavior.

There is no doubt that some liberal economists of the postwar generation overstated the market power that sheer size conferred on corporations. In his 1967 book, *The New Industrial State*, John Kenneth Galbraith argued that companies such as General Motors, Exxon, and General Electric had effectively usurped the role of the free market. "[W]e have an economic system which, whatever its formal ideological billing, is in substantial part a planned economy," Galbraith declared. "The initiative in deciding what is to be produced comes not from the sovereign producer who, through the market, issues the instructions that bend the production mechanism to his ultimate will. Rather, it comes from the great producing organization which reaches forward to control the markets that it is presumed to serve and, beyond, to bend the consumer to its needs."

Galbraith's analysis proved poorly timed. Subsequent decades saw the rise of globalization and the removal of import restrictions, which

left much of American manufacturing—from autos to textiles to toys to furniture to steel to chemicals—struggling to fend off foreign competition. Meanwhile, the rise of corporate raiders such as Carl Icahn and T. Boone Pickens, and leveraged buyout conglomerates such as Kohlberg Kravis Roberts and Texas Pacific, created an active market in the ownership of blue-chip companies. The cosseted top executives of Fortune 500 companies found their positions and perquisites of office under threat.

The demise of the megacorporation shouldn't be overstated, though. Of the top ten companies on the 1967 *Fortune* list—General Motors, Exxon, Ford, General Electric, Chrysler, Mobil, Texaco, U.S. Steel, IBM, Gulf Oil—eight were still on the 2007 list, as independent companies or as divisions of even bigger conglomerates. In many parts of the economy, such as oil, autos, and finance, gigantism remains a basic fact of economic life. Then there is the high-technology sector, where monopoly power is endemic.

One of the first people to point this out was W. Brian Arthur, a soft-spoken applied mathematician who grew up in Northern Ireland and fell into economics almost by accident. Back in the mid-1980s, Arthur, who was then at Stanford, presented a paper at Harvard in which he argued that chance events and network effects can enable inferior technologies to beat out superior products and take over entire markets. A Harvard economist, Richard Zeckhauser, stood up afterward and said, "If you are right, capitalism can't work." A few months later, Arthur presented the same paper in Moscow, where an eminent Russian economist said, "Your argument cannot be true!"

The essence of Arthur's paper was that with some types of goods, the utility they provide to people depends not just on their intrinsic merits but on how many other people are using them. If you buy a new dishwasher or refrigerator, it doesn't really matter whether your friends and neighbors have bought the same model. But if you are considering switching to a new video game console or a new social networking site, the number of people already using these products is crucial. If the network of established users is large, you will have plenty of games to play and many friends to contact; if the console or site is new, or has failed to take off, the value it can offer you will be strictly limited.

The additional benefit that each new user of a product incidentally delivers to all the other users is called a "network externality." As the

number of users expands, these externalities increase in size, making the product even more attractive. Before very long, markets of this nature tend to "tip" in the direction of a single product, which acquires a monopoly, or near-monopoly, position. Once this has happened, even rival goods that are cheaper or offer better features struggle to find a foothold. In the phrase that Arthur used in his original paper, the maker of the inferior product "locks in" to a position of great power.

When I interviewed Arthur in 1998, he recounted the early opposition to his theory with wry amusement. "I was saying all this during the Cold War, so ideology got in the way," he said. "I spent about ten years in the wilderness." Eventually, some other economists began to take Arthur's ideas seriously, and so did some senior figures in business and government. "At first people said, 'Your theory may be theoretically valid, but there's no actual evidence of it in the economy,'" Arthur recalled. "I thought about that and said, 'No, no, no. The whole high-tech sector operates in this way.' When I started to say that, I found it had a lot of resonance in Silicon Valley. People I talked to there just nodded wisely, grinned, and said, 'This is how we see it, too, but we've never seen it written down and formalized.'"

I came across Arthur and his work in the late 1990s, when I was reporting on the Clinton administration's antitrust suit against Microsoft. Then, as now, Microsoft's Windows operating system and Office software suite dominated the PC industry, with about 90 percent of the market. Many computer experts considered Apple Macintosh a far superior product to Windows, but neither Apple nor anybody else had been able to stop Bill Gates and his company. Rivals accused Microsoft of entrenching its position with a variety of abusive practices, such as issuing restrictive contracts to PC manufacturers, tying its products together in a way that forced customers to buy things they didn't want, and refusing to make its products compatible with those of its rivals. In 1994, under pressure from the Justice Department, Microsoft agreed to make its product licenses somewhat less restrictive and to avoid tying other products to Windows. Three years later, the Justice Department sued Microsoft for violating this decree by forcing computer manufacturers to include a copy of its Internet Explorer Web browser with each copy of Windows.

In a historic finding of fact issued in November 1999, Judge Thomas Penfield Jackson, of the D.C. district court, ruled that Microsoft's dom-

inance of the operating system market constituted a monopoly. Jackson subsequently ruled that the firm's anticompetitive practices had violated the Sherman Act, and he recommended that Microsoft be split in two, with one unit manufacturing Windows and another producing the Office software. In 2001, the D.C. Circuit Court of Appeals overturned Jackson's rulings, and the Justice Department, which by then was under the control of the Bush administration, dropped the threat to break up Microsoft. The case was settled with Microsoft agreeing to share some proprietary information with other companies, and the government effectively dropping most of its demands. Although the antitrust suit ended indecisively, it provided plenty of evidence of how dominant companies use predatory behavior to smother competition. During the trial, one senior Microsoft executive was quoted as saying the firm intended to "smother" the rival Netscape browser and to "cut off Netscape's air supply" by giving away Internet Explorer.

In some ways, the high-tech version of monopoly is more difficult to deal with than sugar and oil combines. Even if the government had broken up Microsoft, the two halves of the company would almost certainly have retained their strangleholds on the markets for operating systems and consumer software. The subsequent rise of Google and Facebook has only added to concerns about monopolization. Google's grip on the Internet search market gets tighter every year, and Facebook may be on its way to establishing a similar position in social networking. While both companies market themselves as cool Silicon Valley do-gooders, some of their recent actions belie their public image. Google's attempts to digitize entire libraries without getting any copyright approval and Facebook's repeated efforts to assert ownership rights over the information that people post on their profiles both smack of old-fashioned abuse of market power.

In April 2009, the antitrust division of the Justice Department announced it was investigating Google's book initiative, and some reports suggested it might eventually launch a Microsoft-style antitrust suit. A month later, the Obama administration formally abandoned the Bush administration's antitrust guidelines, indicating that it intended to look particularly closely at the high-tech and Internet sectors. Quite what this reversal amounts to remains to be seen, but it seems to mark a return to the approach of the Clinton administration, which Berkeley's Daniel Rubinfeld, who was chief economist at the antitrust divi-

sion during the Microsoft case, explained to me thus: "In these kinds of markets, it is just not right that leaving it to the market is always going to get an efficient outcome. There is still an honest debate about exactly what role government ought to play, and people are going to differ, but there are very few economists I have talked to who would argue that leaving it to the market is always the best solution. We are just not in that world anymore."

The modern treatment of public goods begins from the recognition that capitalism is a system of property rights. In some cases, these rights are clearly defined and easily enforceable. American Airlines owns planes, which it flies to cities all over the world. For a certain fee, you or I can buy the right to occupy a seat on one of these flights. If we can't afford the fee, we can't get on the plane: that is the basis of free enterprise. Now consider the U.S. Air Force. It, too, owns a big aircraft fleet, which it uses to patrol the skies and protect Americans from attack. The air force provides a valuable service, which, theoretically, it could market to individuals. Why doesn't this happen?

Some free market fanatics might claim the answer is politics. A more realistic explanation is that national defense, like the construction and operation of national parks, doesn't lend itself to private enterprise. If you buy the last two seats on the American Airlines red-eye from Los Angeles to New York, that is the end of the matter: there isn't any space left for me. In that sense, we are rivals for consumption of the good. However, the fact that the air force is defending you doesn't affect the services it is supplying to me. To the contrary, it is virtually impossible to exclude me or anybody else from sheltering under its protection. If the air force were privatized and it offered to sell me an air defense policy for \$1,000 a year, I'd say no thanks, knowing full well that its planes and missiles would be protecting my neighbors anyway. This sort of behavior is known as "free riding." Short of issuing a list of free riders that the country's foreign enemies were free to bomb, a for-profit Defense Department could do little to prevent it. The only practical way to get people to pay for the armed forces is to force them to do it through the tax system.

To adopt the ugly terminology of contemporary economics, flights from JFK to LAX are "rival" and "excludable"; hence they are private

goods. National defense is "nonrival" and "nonexcludable"; it is the prototypical public good. Other obvious cases include irrigation systems, streetlights, and clean air. Less obviously, but equally important, many public services, such as education and health care, are essentially public goods—a point Galbraith emphasized in his 1958 bestseller, *The Affluent Society*, which contrasted the abundance of consumer durables, such as cars and televisions, in postwar America with the dearth of many collectively provided services. "[T]here are large ready-made needs for schools, hospitals, slum clearance and urban redevelopment, sanitation, parks, playgrounds, police and other pressing public services," Galbraith wrote. "Of these needs, almost no one must be persuaded. They exist because, as public officials of all kinds and ranks explain each day with practiced skill, the money to provide for them is unavailable . . . The economy is geared to the least urgent set of human values. It would be far more secure if it were based on a range of need."

Galbraith's analysis, which has often been reduced to the phrase "private affluence, public squalor," still rings true. Despite repeated efforts on the part of conservatives to encourage private enterprise to build schools, provide low-cost housing, and redevelop run-down areas, governments continue to bear the financial burden in these areas, and in many others. Indeed, for all the efforts of Margaret Thatcher and Ronald Reagan, the role of the state has continued to expand. To be sure, other factors have played a role in this process, such as a concern about equity, interest-group activity, and pork barrel spending. Still, Galbraith's main point stands: "[T]o a far greater degree than is commonly supposed, functions accrue to the state because, as a purely technical matter, there is no alternative to public management."

\* In the domain of goods and services that are nonrival and non-excludable, public provision isn't just inevitable; it is necessary on classical economic grounds to secure a Pareto-efficient outcome. Relying on the market to provide both private and public goods will always lead to underprovision of the latter. Similarly, in monopolistic industries, producers will produce too little and charge too much. "We need not pursue the fine detail," Bator wrote in 1960. "The point is clear enough—public goods and decreasing cost phenomena cause private market decisions to go wrong. Market prices will fail to approxi-

mate true scarcity values in terms of wants; they will be loaded with misinformation, and producers' profit calculations will leave out of account much of the private benefit associated with public goods. The 'invisible hand' will fumble: people's decentralized market choices will not efficiently cater to their tastes."

A highly important public good that largely escaped the attention of economists until pretty recently is scientific knowledge. Back in the 1950s, Robert Solow, an economist at MIT, calculated that between 1909 and 1949, technical progress accounted for about 51 percent of the annual growth in U.S. GDP, which meant it had made a bigger contribution to American prosperity than population growth and the accumulation of capital combined. Subsequent studies confirmed that the application of scientific knowledge, in the form of new inventions and new methods of organizing production, is central to the growth process, but for many years economists had little to say about where this technological advancement came from and whether it could be speeded up. Solow joked that it was "manna" from heaven.

Things started to change in the early 1980s, when Paul Romer, a Stanford economist whose father, Buddy Romer, was once the governor of Colorado, turned his attention to the forces that drive technical change. Romer quickly realized that knowledge is a lot like national defense in that it is nonrival and largely nonexcludable. If Firm A's research and development division comes up with a good idea, such as making tennis rackets out of lightweight graphite composites, Firm B can exploit the same idea without wearing it out. Once a piece of technical knowledge has been invented, preventing other firms from copying it, and perhaps improving on it, is extremely difficult, which means that the originators of new technologies often don't end up benefiting from them—as Netscape Communications and many other innovative companies have discovered. IBM and AT&T are both notorious for having created technologies that other companies exploited. "After the transistor was invented at Bell Laboratories"—which was then part of AT&T—"many applied ideas had to be developed before this basic science discovery yielded any commercial value," Romer noted. "By now, private firms have developed improved recipes that have brought

the cost of a transistor down to less than a millionth of its former level. Yet most of the benefits from those discoveries have been reaped not by the innovating firms, but by the users of the transistors."

Romer's work inspired a huge if not universally enlightening literature. Its main importance was that, starting out from a perfectly orthodox position—Romer did his Ph.D. at Chicago, where Robert Lucas was one of his teachers—it ended up undermining Adam Smith's argument that unfettered competition is always the most effective vehicle for promoting economic growth. In an encouraging sign, at least some textbook writers have recognized this point. "That knowledge is both nonrivalrous and nonexcludable creates substantial problems for a market economy," David Miles and Andrew Scott, the authors of *Macroeconomics: Understanding the Wealth of Nations*, note. "Because the output of R&D activity is both uncertain and, largely, nonexcludable, firms would prefer to let other firms discover successful new technologies and then copy them. But this means that no firm will want to spend money on R&D because as soon as they are successful the technology will be stolen, and the firm that spends money will be unable to make any profit. As a result, market economies with competitive firms will not produce enough R&D."

One way of tackling this problem is by strengthening patents, which give inventors and innovators a temporary monopoly on their brainwaves. Another option is for the government to fund scientific research. During the past twenty-five years, the U.S. government has combined both these methods in a strategy designed to maintain the country's technological leadership. By giving universities and other publicly funded research institutes the right to patent their inventions, the Bayh-Dole Act of 1984 created financial incentives for academic researchers to team up with businesses and venture capitalists. According to one study, since the act became law, U.S. universities have created more than 4,500 companies and signed more than 40,000 licensing deals. In research-intensive areas such as information technology and biotechnology, the development of this public-private framework has helped the United States maintain its dominant position.

This strategy recognizes that the key to creating a successful economy is finding a middle ground between laissez-faire and state control. Two of the biggest success stories in the U.S. economy are commercial aircraft production and the rise of online commerce. At first glance,

the two industries don't seem to have much in common, but they share a common heritage: the technologies they are based on—the jet engine and the Internet—were both developed by the government. Scientists working for Hitler's Luftwaffe built one of the first high-speed jets, the Messerschmitt ME-262. In the United States, Boeing built a number of prototype jets for the Pentagon, culminating in two long-range jet bombers, the B-47 Stratojet and the B-52 Stratofortress, which formed the basis of the company's first commercial jetliner, the Boeing 707. Then there is the Internet. In the early 1960s, Paul Baran, a computer scientist at the Pentagon-financed RAND Institute, which is based in Santa Monica, invented the concept of package switching on which it is based. A few years later, the Pentagon's own Advanced Research Projects Agency (ARPA) financed construction of the network, which for the first eleven years of its life was called the ARPANET.

These stories aren't untypical. The list of commercial products that originated in research financed by the Pentagon or NASA includes satellite television, titanium golf clubs, GPS navigation systems, water filters, cordless power tools, smoke detectors, ear thermometers, and scratch-resistant spectacles. It can even be argued that the Department of Defense, through its finance of research into integrated circuits during the 1950s and '60s, was primarily responsible for the rise of the personal computer industry. The Pentagon's Republican defenders would never admit it, but one of its main contributions to the strength and well-being of the United States has been in providing it with a surrogate industrial policy. Freed from the threat of free riders and the imperatives of short-term profit maximization, scientists and companies working for the U.S. military have created many of the technologies on which the country's prosperity is now based. Whether by design or accident, the military-industrial complex, which President Eisenhower warned his countrymen about half a century ago, has arguably done more to encourage scientific research than the entire private sector of the U.S. economy.

Although it is more than a half century old, Bator's taxonomy of market failures remains useful. Increasing returns to scale, monopoly power, and the issue of providing public goods aren't just arcane eco-

conomic concepts. They are essential elements of twenty-first-century capitalism, and they play an important role in reality-based economics. But Bator, writing in the mid-1950s, couldn't address all of the problems that plague modern economies. Some hadn't become manifest; others hadn't been subjected to productive analysis.

One common problem arises when two or more parties to a given transaction have different incentives. The senior executives of a corporation, for example, may be more interested in ramping up the value of their stock options before they retire than in preserving the long-term interests of the stockholders. The problem, in this case, is designing an incentive package that aligns the two sets of interests.

Another class of problems emerges when the parties on either side of a transaction have different amounts of information. An important issue in health reform, for example, is that individuals know more about their health than insurance companies do, so the insurers are understandably wary about taking on individual new clients with pre-existing conditions. I use the word "understandably" because, today, almost all health insurers are profit-making concerns with a shareholder base that demands a certain level of earnings. From the perspective of an individual insurer, it is perfectly rational to turn away sick people. From the perspective of society as a whole, it is inhumane and inefficient. Sick people who don't get treated tend to get worse, at which point, often, they end up in the emergency room, where somebody has to pay for their care. This is an example of what I call rational irrationality. In the coming chapters, we will come across many more examples of it.

social  
choice

Adverse  
selection