Industrial Organization

Minds, Bodies, and Epidemics

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Acknowledgments

The book began to take shape one day in 2017, when I received an email from a Jay Grenda offering "free assistance with research." He said that he was a singer, an economics major, and had worked as an editor of a newsletter at a non-profit. I was intrigued. I had been writing a bunch of notes on industrial organization since 2010, and I wanted to see if they could hang together and turn into a book or something like that. So I asked Jay to give it a shot. He went to work right away. Two months later, as I looked at what he had done, I realized that I had struck gold. In the meanwhile, Jay had gone to graduate school.

Ever since Jay, I have been asking students for comments on drafts. Toward the end of a class, I would say to them: "[T]ell me the good, the bad, the ugly of what you have read." Now I have a big folder of their comments. I also asked them to suggest titles for the book. *Heart-Attack Economics* won strong support. I reluctantly passed it over because a couple of friends, upon hearing it, thought I was writing a book in medicine.

To my students I say from the bottom of my heart: Thank you!!! In no particular order, they are Asma Alhazmi; John Breen, Sa-ad Iddrisu; Min-Jeong Kwon; Walt Ryley, Dibin Joy; Juan Fernandez; Badri A. Jawad; Luke Antonczak; Robert Simpson; Matt Barbish; Alec Zatirka; Kevin Stadler, Thomas Wilk, Derek Jenkins, Joseph Janeski, and David Criss.

My mentor John Tomer read two early drafts and offered counsel and encouragement. He also sent me in the direction of editor Elizabeth Graber. How wise of him! Elizabeth commented on substance and design, and helped me pick a title. Meanwhile, editorial assistant Sophia Siegler held my hand as we moved the project along.

I am also grateful to my colleague John Sase and two anonymous reviewers for tips on rhetoric. If you find the book boring, blame me. And if you find the book too long, blame them.

The publisher Elsevier has given me permission to reuse parts of two of my articles. You will find the parts in the appendix of Chap. 2 and the body of Chap. 9. I appreciate the generosity. I shall acknowledge specifically when we reach these places in the book.

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Introduction

Abstract In this book I study how the separation of ownership and management changes industrial organization. I begin with an examination of the mindsets of the owner and the manager. I notice an obsession with market share, rather than profit. I explain why that comes about, in light of behavioral economics and cognitive psychology. Then I examine four bodily symptoms of the obsession: too big, too complex, too fragile, and too similar. (I call them "The 4 Toos.") I suggest how they lead to epidemics such as waves, bubbles, and chaos. Finally, I draw the reader's attention to countervailing forces: corporate raids, antitrust, and creative destruction. In industrial organization, I see these forces as antibodies offering shining rays of hope.

Keywords Multiple minds • The mind-body connections • Behavioral economics

Heart Attacks on Wall Street

On September 15, 2008, the firm Lehman Brothers collapsed and passed out. Within a few hours, other firms started to sputter and pass out. There seemed to be some sort of deadly contagion going on. Caballero (2010) compared it to a contagion of "sudden financial arrest." In any case, the government quickly stepped in and put the unconscious firms on life support. They became known as the Too-Big-to-Fails.

Going through the wreckage, Scherer (2010) conducted a forensic analysis of six of those firms: J. P. Morgan Chase, Citigroup, Bank of America, Wells Fargo, Goldman Sachs, and Morgan Stanley. He found that those firms had grown by serial mergers. From 1985 to 2008, they were involved in 192 mergers.

Any firm that grows in this manner at this pace will become big and complex. Akerlof and Shiller (2015, p. 28) notice the changes as Goldman Sachs grew from $50 million to $28 billion in capital between 1970 and 2005 (I added the italics): "Whereas in the old days Goldman had been overwhelmingly about the underwriting, now it was into *many, many different businesses. …* Goldman Sachs has become *an empire.*"

Banks were not the only casualties of contagious heart attacks; General Motors and Chrysler also succumbed. That did not surprise me. General Motors and Chrysler had tried mightily to become banks by acquiring financial services and products. For at least 20 years before 2008, I had GM cars, GM auto insurances, GM mortgages, GM home insurances, GM Master Cards, and GMAC checking and saving accounts. You name it; I had it. I was a most faithful member of "The GM Family."

Deaths at Heart Attack Grill

A few years later, I came across an article about a restaurant in Las Vegas: Heart Attack Grill. I learned that two spokespersons of the restaurant had died recently. That article hit home and provided much inspiration for the book. Here is part of the article (Polis 2013):

> For the past year and a half, Alleman would stand outside of the restaurant and try to encourage people to come inside. Owner Jon Basso didn't actually pay him for this, but would occasionally give him some free food.
>
> "I told him if you keep eating like this, it's going to kill ya," Basso told the Las Vegas Sun.
>
> The Heart Attack Grill is known for its over-the-top burger creations such as the quadruple bypass burger, which holds the Guinness World Record for "most calorific burger."

> Alleman died of a heart attack.

Multiple Minds

How do we explain those deaths on Wall Street and at Heart Attack Grill? Would it not have been in the bankers' and the patrons' self-interest to stay away from those bankruptcies and quadruple bypass burgers? Yes, if we should assume that everyone has a singular, well-defined self-interest. Then we could conclude that those bankers and patrons are irrational. End of story. But I am not a fan of that story. I prefer stories that explain how their "irrational" behaviors come about in the first place. Fortunately, there are many such stories. What follows is a summary version.

A person has several selves pursuing different interests while bargaining and making compromises among themselves. As Shiller (2005, p. 169) puts it, there is "a pool of conflicting ideas coexisting in the human mind." Things are fine when the selves stay at the bargaining table. Things go wrong when bargaining breaks down, with one self exercising dominion over the others. Take, for example, saving for old age. People don't do it seriously (Thaler and Benartzi 2004; Akerlof and Shiller 2009, chapter 10). The "present self" says: I smoke, eat fast food, drive over speed limits, stay up late, and do not save; I have only so much energy and attention and money; I can't worry for that "future self."

The idea of multiple minds is not new. In *The Theory of Moral Sentiments*, Adam Smith saw multiple minds. The first sentence in the first paragraph of the first chapter of that book is:

> How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it.

The "principles in his nature" represent multiple selves. Later in the book, which predates *The Wealth of Nations* by almost two decades, he suggested that in a good society the rich are led by "an invisible hand" to share wealth with the poor. In the book he also introduced "the impartial spectator," which suggests multiple selves as well. Therefore, it is no accident that he would reintroduce "the invisible hand" in *The Wealth of Nations*.

Behavioral economists today see a person's brain as the dormitory of two or more selves. Schelling (1984) sees the Jekyll self and the Hyde self. Lynne (2006) sees the egoistic self and the empathetic self. Thaler (2015)

sees the planner self and the doer self. Akerlof and Shiller (2015) see the good-taste self and the bad-taste self. (They call their bad-taste selves "monkeys on the shoulders," who make them eat sweets and fatty food.) The list of multiple selves is long (Lee 2018).

Between Adam Smith and modern-day behavioral economists stand Berle and Means (1932). In *The Modern Corporation and Private Property*, they find two minds in the modern corporation (ibid., p. 300):

> The owner of a private business receives any profits made and performs the functions not only of risk-taking but of ultimate management as well. … In the modern corporation, with its separation of ownership and control, these two functions of risk and control are, in the main, performed by two different groups of people.

Berle and Means saw corporate power encroaching on state power. They predicted that the day would come when corporate power would surpass state power. Has that day come? That is the question.

The Book in a Nutshell

In this book I take the reader on a custom tour of industrial organization. We start with a visit to the inside of a firm, with the agency problem at the top of our agenda. We meet the owner and the manager. We look deeply into their mindsets. They, in separate persons or not, are constantly judging each other. The owner judges the manager by the firm's dominance. The manager is fully aware of that judgment heuristic and pursues dominance to impress the owner.

Then we move outside the firm to observe its body. Several features catch our attention: size, complexity, fragility, and its similarity to other firms.

Next we tour communities of firms and consumers, or what we call "markets." We watch waves of mergers, chaos, and bubbles. We also witness battles between managers and creatures that act like antibodies in blood stream: raiders, trustbusters, and creative destructors.

When all told, the book is my story of how I learned to worry about industrial organization, with hope.

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The Minds of a Firm

Two Minds

Abstract A firm has two minds: the manager's and the owner's. In a small firm, the two minds reside in one person: the owner-manager. In a big firm, the two minds reside in separate persons: one in the owner and the other in the manager. I illustrate the separation of ownership and control with network diagrams. Then I review Ronald Coase's idea that the nature of the firm is management, not production. I find the idea as inspiring as ever.

Keywords Small firm • Big firm • Separation of ownership and control • Capitalism

The Roofers

I have been watching the four roofers on my neighbor's house. The work looks simple: Tear off old shingles, get bags of new shingles on the roof, nail down new shingles, do trims and gutters, and clean up. But this is the third week into the job now. There have been a snow storm, an ice storm, and several rain storms. Today, they showed up later than usual. They might have run out of new shingles on the roof top, so they had to wait for the delivery truck with that big, long crane. A truck just came.

I wonder how they have been able to deal with all these problems. How do they develop contingency plans, reach agreement on them, monitor compliance, and enforce agreement? Also, how many contingency plans do they make?

These are the questions that Ronald Coase asked in "The Nature of the Firm." (He watched workers at auto assembly plants.) His answer is amazingly simple: Stuff happens, and people who work together just have to deal with it. There is always need to manage and control. People may choose to manage and control as problems arise or to develop plans for them ahead of time. Either way, collective actions must be agreed to, individual actions monitored and infractions punished. The bottom line is that people who work together have to spend resources on managing their relations.

How do the roofers do it? I can think of three ways.

A Co-op

They can work everything out by forming a co-op. A co-op is a network in which each roofer is linked to all other roofers. Figure 2.1 shows how:

There are six links, each containing two relations. So there are 12 relations, the maximum in this "complete network." The roofers spend resources on the management of each of these relations. They also take all risks, like inclement weather and bounced checks.

A "Small" Firm

Here, the four roofers bring in someone to manage relations and take risks. Call that someone "the owner-manager." Let's say you are that someone. Figure 2.2 shows the new organization, "a small firm."

Fig. 2.1 A co-op. Source: Author's creation
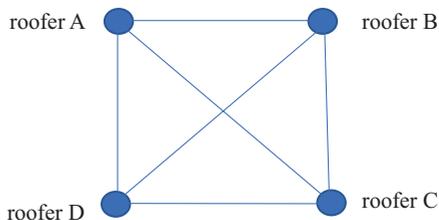
Fig. 2.2 A small firm.
Source: Author's
creation

roofer A   roofer B

owner-manager (you)

roofer D   roofer C
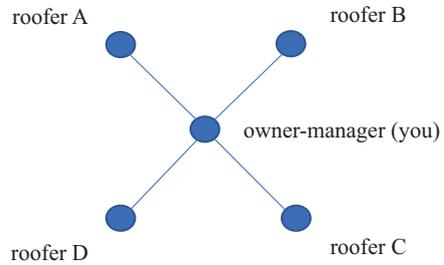
In your small firm, we note three features:

(a) The firm is a star network with one center.
(b) At the center of the network is the owner-manager.
(c) There are five persons connected by four "links." Each link runs
   two ways, as the relation is managed by both the roofer (the
   employee) and you (the owner-manager). So there are two rela-
   tions in each link and a total of eight relations in the firm.

Exactly how do you make a living as the owner-manager of this roofing
company? You offer each roofer an "employment contract." The contract
pays a fixed wage, and each roofer deals with you and you only. There is
no change in the nature of work. You assure them that if anything out of
the ordinary comes up, let you know and you will deal with it. Of course,
you will design the employment contract so they all prefer it to what they
have now in the co-op.

Let's count again how many relations in the firm you and the four roof-
ers must manage. There are four links, each containing two relations. So
there are eight relations in total to manage. That is 4 fewer than 12, the
number in the co-op. This saving is your income as the owner-manager. It
is "profit." You may think of profit as the "network efficiency" that you
achieve by reducing the number of relations that must be managed.

Another source of profit is what you may call "management acumen."
Under your management, the suppliers get paid more timely, the roofers
are happier, and the roof gets done sooner.

Fig. 2.3 A big firm. Source: Author's creation
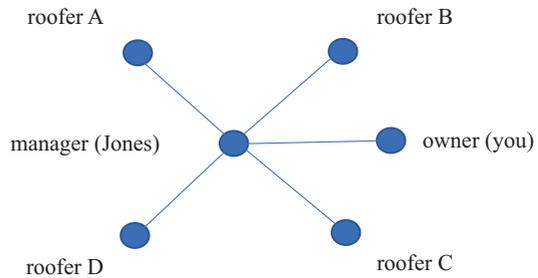
A "Big" Firm

You don't have to manage a firm in order to own it. Ownership and control can be separated. You find someone to be the manager, while you remain as the owner. This allows you to kick back a little. You pay the manager a salary just as you pay each of the four roofers a salary.

You like this idea, so you hire Jones as the manager, and you become the owner. Figure 2.3 shows the reorganized roofing company. Now you own a "big firm."

Note four architectural features:

(a) The firm is a star with one center.
(b) The owner and the manager are separate persons.
(c) At the center of the star is the manager.
(d) There are a total of six persons connected by five "links." Each link runs two ways, as the relation is managed by both sides. The "peripheral" persons are the four roofers and the owner.

So there are ten relations in the firm now. Still, that represents a saving of two relations from the time when the four roofers worked as a co-op. And that saving is the source of both Jones's salary and your income.

The Separation of the Owner's Mind and the Manager's Mind

As Berle and Means (1932) see it, every firm has to perform two functions: risk-taking and management. In the "small firm," the two functions are performed by you as the owner-manager. So when we look into your head, we see two minds: the owner's mind and the manager's mind (Fig. 2.4).

Fig. 2.4 The owner-manager (you). Source: Author's creation
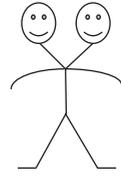
Fig. 2.5 The separation of ownership and control. Source: Author's creation

manager (Jones)   owner (you)
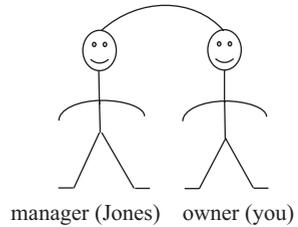
The day when Jones shows up at work is the day when the two minds get separated physically (Fig. 2.5). Jones picks up the manager's mind, while you retain the owner's mind. In other words, the degree of separation of ownership and control goes up by one. This has consequences. The most serious is that coordination between the owner and the manager becomes more difficult.

The separation of ownership and control reminds me of the Alien Hand Syndrome. In this syndrome, a person's two hands lose coordination, so one hand does not quite know what the other hand is doing. In a big firm, the owner and the manager are the two hands of the firm.

Conclusion

In the aftermath of the Great Recession, John Bogle (2009) said:

> But the larger cause was our failure to recognize the sea change in the nature of capitalism that was occurring right before our eyes. That change was the growth of giant business corporations and giant financial institutions controlled not by their owners in the "ownership society" of yore, but by agents of the owners, which created an "agency society."
>
> The managers of our public corporations came to place their interest ahead of the interests of their company's owners.

John Bogle was the owner-manager of the Vanguard Group of Mutual Funds in its early years.

Appendix: Coase's Explanation of the Firm (Adapted from Lee 1987)

When Ronald Coase was a college student, he wondered why we needed firms when the prevailing wisdom was that prices alone could make the world go round and round. He looked in vain for a satisfactory answer in his books. So he boarded a ship in England and found his way to Detroit, Michigan. It was in the early 1930s. He got himself into car assembly plants and watched how people worked together. In 1937, he reported what he had learned in "The Nature of the Firm."

Coase's explanation of the firm is so simple that it can be boiled down to six words: Firms are better at managing relations. The explanation is extraordinary because everybody else thought the essence of a firm was production, not management. For that same reason, though, economists did not want to take his explanation seriously. Coase (1972) mused 35 years later: "What is curious about the treatment of the problems of industrial organization in economics is that it does not now exist." Then, 16 more years later, Coase (1988, p. 62) again reviewed the impact of "The Nature of the Firm" and found the article to be "much cited but little used." Macey (2008, p. 5), alarmed by economists' willful blindness to Coase's wisdom, issues a warning: "(I)f Coase is right … then everything is up for grabs—or up for negotiation—including the issue of what the basic objectives and purpose of the corporation should be."

In this Appendix, I revisit Coase's theory of the firm. I show that profit comes about from management, not production. It follows that the manager—not the owner—collects profit.

"A firm," according to Coase (1937, p. 339), "consists of the system of relationships which comes into existence when the direction of resources is dependent on an entrepreneur." Firms are an alternative resource-allocation mechanism to the price mechanism. Why do firms exist in the midst of the price mechanism? Coase's explanation is simple: some of us think that we are better at allocating resources than the price mechanism.

Let's consider a barber by the name of Joe. He does one hairdo a day. He has been thinking about an occupational choice: go solo or work for someone by the name of Mary. If he goes solo, he can charge and keep the competitive price p. But then he must manage the relation with the grumpy and manipulative customer, thereby incurring a transaction cost τ. His daily net income as a solo barber is

$$(p - \tau) \tag{2.1}$$

If, alternatively, he works as an employee for Mary, who owns a barber shop, Mary pays him a fixed daily wage of w. Also, Mary deals with all customer payment and complaints. All Joe needs to do is deal with Mary the boss. For that relation, Joe incurs a daily transaction cost θ. In sum, Joe's net daily income as an employee equals:

$$(w - \theta) \tag{2.2}$$

Joe considers the two incomes. He chooses the higher income.

Let's say that, unlike most other barbers, Joe turns out to be indifferent between working as a solo and working as an employee. His indifference may be expressed as the equality of the two net incomes above:

$$(p - \tau) = (w - \theta) \tag{2.3}$$

or

$$(p - w) = (\tau - \theta) \tag{2.4}$$

This equality says that Joe is indifferent because the extra net income as a solo is equal to the extra transaction cost as a solo.

This indifference equation turns out to be the link between the Coasian firm, founded on transaction costs and management, and the neoclassical firm, founded on prices and production. To show the link most directly, assume that Mary's barber shop produces X haircuts a day by employing X barbers and dealing with X customers. Let its cost of administering these relations be A(X), which increases with X. Then Mary's profit equals:

$$\pi(X) = pX - wX - A(X) \tag{2.5}$$

or

$$\pi\left(X\right)=\left(p-w\right)X-A\left(X\right) \tag{2.6}$$

By substitution from Eq. (2.4), Eq. (2.6) becomes

$$\pi\left(X\right)=\left(\tau-\theta\right)X-A\left(X\right) \tag{2.7}$$

Mary's profit, then, becomes a function of transaction costs entirely. Her profit is equal to the transaction cost that she can save by substituting herself for the price mechanism.

This pretty much captures the essence of Coase's theory of the firm.

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The Owner's Mind

Abstract In proportion to the degree of separation from managers, owners agonize over a question: How competent is the manager? This question and the many attempts to answer it have given rise to the field of corporate governance or "the agency problem." In this chapter I make the case that the most popular heuristic for judging a manager's competency is market share. As a measure of dominance, market share has claimed the crown. All managers know it and they waste no time in pursuing it. That is why empire building has become the singular obsession among managers today.

THE SEPARATION ANXIETIES

We suffer anxieties when we part with something we own. Psychologists call such anxieties "the endowment effect." It is therefore only natural that owners of firms suffer the endowment effect when they yield control of their firms to professional managers.

It is also natural that firm owners find ways to alleviate such anxieties. In this chapter I take a close look at two ways: distancing institutions and willful blindness.

Distancing Institutions

Organizations known as "distancing institutions" are a popular remedy for separation anxieties. These institutions serve as the intermediary between ownership and control. By merely standing between ownership and control, they help dull the anxieties that owners feel about letting go their control. They reduce separation anxieties in precisely the same way they dull our other negative feelings such as sympathy, anger, and jealousy (Bandura 1999; Heffernan 2011). And those of us who suffer from these negative feelings embrace distancing institutions and pay for their services.

A popular distancing institution is the Board of Directors (BOD). It sits between owners and managers. Figure 3.1 is a picture of the roofing company with a BOD:

BOD is no panacea. For one thing, by sitting between managers and owners, the BOD increases the degree of separation between owners and managers. As a result, owners know even less about managers. Besides, owners must monitor the BOD: The link between BOD and managers tends to get rusty and corrupted. Macey (2008, chapter 4) offers four reasons why monitoring is advisable:

(a) "Time inconsistency": Directors, when evaluating managers who acted upon their advice earlier, are not inclined to be critical. For they feel a conflict of interest here. It is similar to a doctor's reluctance to confront the report that the patient who took the prescribed medicine has died.
(b) "Cognitive bias": This is akin to the Stockholm Syndrome, whereby the captured begins to identify with the captor. Another term for
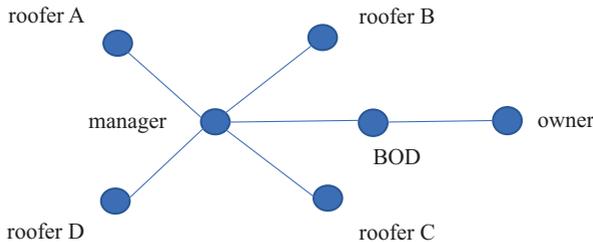
Fig. 3.1   A big firm with a Board of Directors. Source: Author's creation

this phenomenon is "board capture." Directors want to keep their jobs, too. If they antagonize or let go the current manager, they become "at risk" themselves.

(c) "Anchoring bias": Once we form an opinion about something or someone, we develop a vested interest in that opinion. For that opinion provides a stable vision, which we need in order to navigate in complex environment.

(d) "Collegial" model of decision-making: Directors tend to be strongly linked in their small-world network, making for conformity in judgments.

Owners who see their BOD being captured by managers will become exasperated and start to delegate further. They may ask mutual-fund managers, for a fee, to keep an eye on the BOD. Figure 3.2 shows that the owner of the roofing company now has three degrees of separation from the manager.

Indeed the process of delegation may go further. Figure 3.3 shows that the owner pays a broker to keep an eye on the mutual-fund managers. So
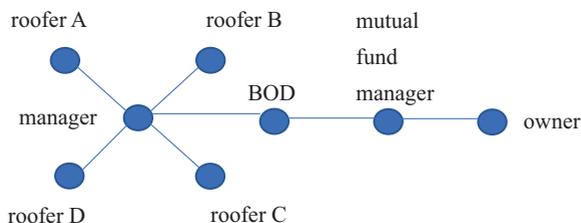
Fig. 3.2 Distancing. Source: Author's creation
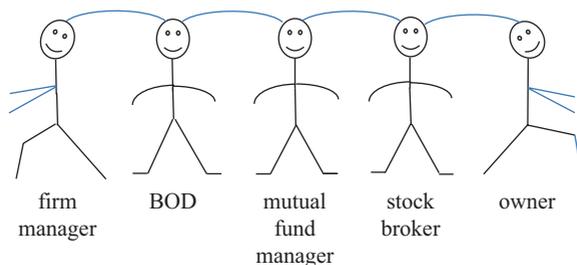
Fig. 3.3 Distancing by delegating. Source: Author's creation

when all is said and done, owners have created the illusion that others are watching each other. They are able to get rid of the separation anxieties and, finally, sleep well at night.

This process of delegation in corporate governance works in pretty much the same way as that in a representative democracy.

Willful Blindness

There is an even more effective mechanism for reducing the separation anxieties: Forget the responsibility that causes anxieties. Indeed we have the innate ability to become oblivious to things that we find unpleasant, inconvenient, irritating, offensive, or unethical. It is known as willful blindness (Bazerman and Tenbrunsel 2011). Willful blindness is both a substitute for and complement to distancing institutions. Willful blindness may be pure "self-delusion." But, like any delusion, it performs a personally useful function.

My willful blindness does not mean that I do not care anymore; it means that I imagine that others are bearing most if not all responsibility, so my attention and effort would not make a difference. This is easy to do when I own just a small portion of the ownership. For example, I can easily reduce my sense of responsibility by reducing my share of the ownership of a firm. Indeed, my ideal share of the ownership of a particular firm is so tiny that I don't even know about it. I can do that by owning a few shares of a big index fund. This is but an example of free-rider behavior in the provision of public goods. Indeed stock markets make possible much of my willful blindness. I go there when I want ownership but not the responsibility for oversight that comes with it. I simply cannot afford to pay much attention to any particular firm. Attention is a scarce resource, probably the scarcest of all (Simon 1978; Shiller 2005; Mullainathan and Shafir 2013; Wu 2016).

Heuristics for Competency

Though freed from responsibility, the owner cannot help but ask one question: How competent is the manager whom I have left behind? An immediate follow-up question is: How to measure competency? That is a big question. Here I recall reading a news article about a retiring manager at a big firm (The Associated Press 2017). It contains a laundry list of the manager's accomplishments. Out of curiosity, I categorized the measures

used and then counted the number of times that each measure was mentioned. I found that profit was mentioned twice, market share three times, and stock price three times. The writer of this article presumably knows well what measures—"heuristics"—readers use to judge a manager.

I have doubts about daily stock price as a heuristic for a manager's competency. How about accounting profit? How about market share?

Profit

Despite the prominence of profit in economic theory, Berle and Means (1932, p. 301) doubt that it is a good measure of manager's competency when functions of ownership and control are performed by separate persons:

> Furthermore, if all profits are earmarked for the security holder, where is the inducement for those in control to manage the enterprise efficiently? When none of the profits are to be received by them, why should they exert themselves beyond the amount necessary to maintain a reasonably satisfied group of stockholders?

There are also technical reasons why accounting profit is a poor heuristic for the manager's competency. Profit is what is left after cost has been subtracted from revenue. Now, both cost and revenue are random variables, due to shifting consumer preferences, labor strikes, trade wars, exchange rate fluctuations, wars, market bubbles, and natural catastrophes. So profit is a cocktail of random variables. Profit is also opaque, since it is at the bottom of layers of other opaque accounting concepts. If profit is high in the first quarter, it is not all because the manager did a wonderful job. Or, when profit evaporates in the fourth quarter, it is not all because the manager did a lousy job.

Market Share

In the final analysis, market share is a predictor of the likelihood of survival. It signifies dominance, and dominance signifies success (Porac and Thomas 1990; Zajac and Bazerman 1991; Chen 1996). If a firm has a large market share, then the manager must have done many things right in the past. A large market share also portends well for survival in the long run. Our attention is drawn to a rapidly growing firm for the same reason.

Conclusion

As owners of big firms, we try to escape from responsibility by creating distancing institutions and cultivating willful blindness. While we are successful at these things, we also collectively create problems for each other, at both the firm and the market levels. The mindset of a shareholder these days is not different from that of a cattleman in "Tragedy of the Commons," or a citizen in a large democracy: "I am sorry that I can't do my part, but I trust that others are doing their parts."

I am getting a bit ahead of myself here. Stay tuned.

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CHAPTER 4

The Manager's Mind

Abstract Market share is the most popular measure of corporate dominance. For evidence, look no farther than U.S. and European merger guidelines: they are replete with references to market share. To measure market share, we must be able to measure market first. In this chapter I confront the inconvenient truth that anyone's measure of a market is subjective. Judges in antitrust cases know this conundrum best. (The name is "relevant market.") I suggest a mental experiment that illuminates the nature of the problem. This experiment—The Magic Mirror—should lie at the very foundation of any theory of industrial organization.

Keywords Dominance • Market share • The Magic Mirror • The relevant market

The manager, forever anxious about how they are being judged, knows that the owner has the binoculars focused on signs of the firm's dominance. Indeed, dominance has been the singularly most powerful preoccupation of human beings. In *The Theory of the Leisure Class*, Veblen (1899) writes about how our desire for "dominion" drives our consumption behavior. In *Luxury Fever*, Frank (1999) provides evidence aplenty of our relentless striving for "relative position." Anyone else who pays attention to what corporate managers say and do needs no convincing. The pursuit

of dominance is what makes the world go around: Corporate managers are eager to showcase it, reporters are eager to write about it, and we are eager to read about it.

Market Share as Dominance

In business, market share is regarded as the essential element of dominance. This is amply codified in public policies toward business. For example, U.S. *Horizontal Merger Guidelines* take a great deal of stock in "market definition" (Chap. 4), "market shares" (Chap. 5), and "market concentration" (Chap. 5). Footnote 9 of the *Guidelines* explains Herfindahl-Hirschman Index (HHI), which antitrust agents use to measure dominance. HHI is made up entirely of firms' market shares. For a market with *n* firms, each having market share *s*, we have:

$$\text{HHI} = \sum_{i=1}^{n} \left(s_i \right)^2 \tag{4.1}$$

HHI speaks eloquently to how real-world people focus on dominance and how they measure it. So do published "concentration ratios" of each of numerous industries: 4-firm, 8-firm, 20-firm, and so forth. Profit and stock price find no place in these policy guidelines.

The Relevant Market

Dominance is a matter of relativity. At an Olympic game, the athletes are all absolutely great, and yet only the relatively great take home the medals. Without other great athletes, there can be no medalists. The dominance of a manager is no exception to this law of relativity. That means that, to measure a manager's dominance, we must know the firm's competitors. That is, we must be able to measure the firm's market. This is the problem of "market definition"—or, in antitrust jargon, "the relevant market."

The relevant market is a most interesting problem of economic rhetoric. By itself, a market has no such thing as a natural boundary. Its boundary is something we draw. How we draw a market's boundary is a quintessential problem of behavioral economics. Let's give it a try.

Suppose you are the manager of an apple cider mill. You offer just one kind of cider. Consumers' tastes for cider are evenly distributed between very sweet and very tart, so we can imagine the "customer base" as the line in Fig. 4.1.
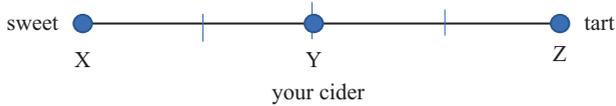
Fig. 4.1 The cider market. Source: Author's creation

A consumer in this cider market may choose among three ciders: X, Y, and Z. You make cider Y, which is neither too sweet nor too tart. If a consumer who prefers the sweet cider X were to buy your cider, he would incur a "psychic" cost proportional to the distance between X and Y.

Assume that each consumer buys one gallon a week. Also assume that cider mills do not compete in price for fear of escalating a price war, so all three cider mills charge the same price for a gallon of cider. These ciders are available at local supermarkets.

In this case your cider has 50% market share, while each of the other two 25%. So you tell everyone that your cider dominates the market.

Wait a minute. What is your market again? Is it just apple cider, or is it fruit juice? Does it include beer? How about wine? Is it cider in Michigan or all of U.S.?

The more questions we ask, the more the suspicion grows that your choice of "the relevant market" is based on your desire to project your dominance. You choose cider as the relevant market because you believe you would have 50% of that market. If you should choose instead fruit juice as your relevant market, you probably would have a smaller share, like 10%. And if all non-alcoholic drinks, even smaller, like 1%.

The boundary of what you perceive as your relevant market is flexible. It expands or contracts, depending on whether you see more or less competition, both existing and potential. You see more competition as you attract more attention with your greater dominance. That is the conundrum. So it does not serve your interest to try to project your dominance by defining your relevant market very narrowly. That strategy will backfire. It would seem that there must be a way of drawing the boundary of your relevant market that maximizes your market share, given your capacity.

This notion that the boundary of your market can be derived, rather than assumed, is so intriguing that I have come up with a thought experiment to help myself understand it. I call the experiment "The Magic Mirror":

Fig. 4.2 The Magic
Mirror. Source: Author's
creation
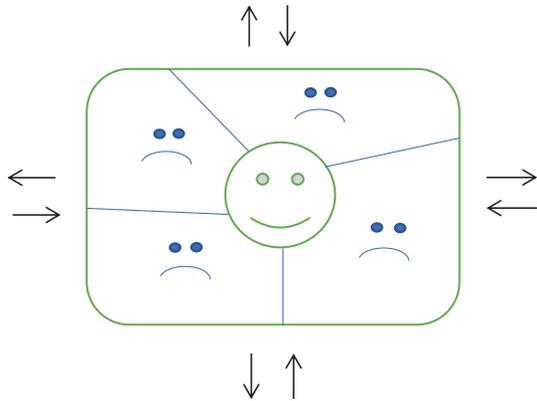
I am holding a mirror and looking at myself in it. I notice that the frame of
the mirror can expand or shrink, depending on how much space my image
takes up within the frame. See Fig. 4.2. As I move the mirror closer to me,
expecting to look bigger in the mirror, the frame of the mirror expands,
making me look smaller than I expect. The closer I get to the mirror, the
more the frame expands. As a result, as my nose touches the mirror, I look
smaller as a fraction of the mirror than I would farther away. By trials and
errors, I find the distance at which the frame of the mirror barely changes.
That is the distance at which the prominence of my image in the mirror and
the size of the mirror become harmonious.

In this experiment, the frame of the mirror expands as there is more
competition attracted by my prominence, and shrinks as there is less. The
fraction of the mirror that my image takes up measures my market share at
that instant. When my image becomes harmonious within the frame, I
have a stable measure of my market share. Call it "consistent market
share." To explore this feature, I conducted a simulation of sort, which
you can find in the Appendix. I summarize what I find in Table 4.1. The
table shows a firm's consistent market share as a function of two things: its
capacity k and competitive attention α. For example, when $k = 10$ and
$\alpha = 5$, the market share equals 74%. As the firm's capacity goes up, its
market share goes up as well. But as the firm's dominance attracts more
competitive attention for some reason, its market share goes down.

Are these predictions intuitively plausible? We may find out by compar-
ing them with our gut feelings in hypothetical events. For example, how
does the lowering of trade barriers affect the manager's market and market

Table 4.1 The consistent market share

	k = *10 (%)*	k = *100 (%)*	k = *1000 (%)*
$\alpha = 5$	74	95	99
$\alpha = 10$	63	92	99
$\alpha = 20$	50	85	98

Source: Author's creation

share? Our intuition says that there will be more competition, which expands the market and shrinks the firm's share of it. The model's answer is the same: The lowering of trade barriers brings about more competitive attention, which shrinks the firm's market share for any given capacity.

Incidentally, this experiment shows that it is impossible to achieve *complete* dominance of a market. The manager may increase capacity by a hundred fold, and yet achieve only 99% market share: 100% market share is still out of reach. To this observation we shall return in the next chapter.

The Cognitive Psychology of the Relevant Market

Cognitive Dependency

A manager's perception of the relevant market is far from definitive. If you were to look at the manager's firm in his Magic Mirror, you would surely see a different relevant market. One reason is our cognitive difference: In our mental pictures of enemies and other threats to our well-being, we see different peoples and things. You will see Charlie as my competitor, whom I do not see; meanwhile, I see Maria as my competitor, whom you don't see. In other words, we have different visions when we look in my Magic Mirror.

This point is illustrated in the landmark case of *Cellophane* (U.S. v. DuPont 1956). The central question in that case was whether cellophane was a market in and of itself, or a part of a larger market including wax paper and glassine and other things for wrapping. The government attorneys thought cellophane was a market in and of itself. The DuPont manager demurred. Then the judge sided with the manager, after determining that those "flexible packaging materials" were interchangeable and therefore belonged to the "relevant market" of cellophane. After the

decision, economists pointed out that the presence of competition is a logical consequence of a firm's dominance: DuPont raised the price of cellophane and saw consumers defect to other products; the more DuPont raised the price, the more consumers defected to other products (Stocking and Mueller 1955). The "other" products all were competitors of cellophane, because of its dominance. This has become known as the "Cellophane Paradox."

Why is this important? Suppose A and B are two firms making one product: liquid bleach. A has more capacity than B; otherwise, they are identical. It is entirely possible—due to differences in genetic composition—that B sees A in its relevant market, but not vice versa. If so, then on the day they merge into A&B, they will have a new relevant market. Let's say they see firm C in it. In their separate relevant markets before the merger, they did not see C. So it follows that rigid rules of defining relevant market are at best first approximations. I notice an example in U.S. *Horizontal Merger Guidelines* (2010, p. 19, footnote 10):

> Before merger, the firms have, respectively, 5% and 10% shares of a market. After merger, they together have 15% share of the market.

In this example, the relevant market is totally inflexible.

Subjectivity

From the very beginning of antitrust, the relevant market has been a subject of contention (Kaplow 2011; Lopatka 2011). A most remarkable case is *U.S. v Falstaff Brewing* (1973). There we find four Supreme Court judges debating the subjective nature of a firm's relevant market. Suppose that the managers of brewers F and N want to merge their firms into F&N. F says that N is not in its relevant market, so the merger would not eliminate a competitor. Further, N says that it does not see F in its relevant market either, so the merger would not affect competition in N's relevant market. How do we know if these claims are true or not? Also, what will the manager of F&N see in the new relevant market? Managers, antitrust agents, and court judges all know these are important questions to ask. But there are no easy answers.

We can learn from cognitive psychologists who study how people perceive competitors and threats (Porac and Thomas 1990; Zajac and Bazerman 1991; Chen 1996; Bergen and Peteraf 2002; Chen et al. 2007). Their findings can help explain the workings of The Magic Mirror.

Conclusion

Managers pursue market share, rather than stock price and profit. This conclusion is difficult to swallow for those of us who grew up on a diet high in profit-maximization hypothesis and efficient-asset-pricing model. But Berle and Means (1932, pp. 307–308) would have no problem:

> Just what motives are effective today, in so far as control is concerned, must be a matter of conjecture. But it is probable that more could be learned regarding them by studying the motives of an Alexander the Great, seeking new worlds to conquer, than by considering the motives of a petty trades-man of the days of Adam Smith.

Incidentally, Adam Smith would have no problem, either. Berle and Means (ibid., p. 304) quoted Smith (1776):

> The directors of such companies…, being the managers of rather other peo-ple's money than of their own, it cannot well be expected that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own. … Negligence and pro-fusion, therefore, must always prevail, more or less, in the management of the affairs of such a company.

It is a safe conclusion today that managers see so-called owners as just another class of stakeholders, not much different from workers, suppliers, bondholders, and banks. Managers only need to provide them a return on their effort and money that does not make them jump ship. As Herbert Simon (1982) would put it, managers satisfice owners. And managers keep what is left, namely, profit.

So far, we have been looking at how the separation of ownership and control changes the minds of a firm. Next, we turn our attention to how it changes the body of a firm.

Appendix: Drawing the Boundary of the Relevant Market

Let M stand for the size of the Magic Mirror and k for the area of the mir-ror that is the firm's capacity. So the manager's market share equals the ratio k/M or what we call "market share." Now write the market M as the sum of the firm's capacity k and competing capacity C:

$$M = k + C\left(\frac{k}{M}\right) \tag{4.2}$$

Note that competing capacity C is a (positive) function of the firm's market share k/M. Namely, dominance attracts competition.

The wonder of Eq. (4.2) is that it defines the firm's market: you can solve it for M as a function the firm's capacity k. To appreciate the wonder, let's look at a special case. Imagine you are the manager and you believe Eq. (4.2) is linear:

$$M = k + \alpha \times \frac{k}{M} \tag{4.3}$$

Factor α is your belief of the rate at which your market share attracts competitive attention. From Eq. (4.3), you can solve for your firm's relevant market M.

$$M = \frac{k + \sqrt{k^2 + 4\alpha k}}{2} \tag{4.4}$$

It follows that your firm's market share $[k/M]$ equals:

$$\left[\frac{k}{M}\right] = \frac{2}{1 + \sqrt{1 + \frac{4\alpha}{k}}} \tag{4.5}$$

In this case, two things determine fully the firm's market and the firm's market share: the firm's capacity (k) and the rate at which the firm's market share attracts competitive attention (α). For example, let $k = 10$ and $\alpha = 5$. Then solve Eq. (4.4) to find market size M equal to 13.5. It follows that the firm's market share k/M equals 10.0/13.5, or 74%. Table 4.1, which I place in the body of this chapter, gives us a sense of how these things work.

Last but not least, the theory is critically dependent on the assumption that your firm's competition is attracted by your market share, not your profit. To see why, write down Eq. (4.2) again, except this time with profit (π) driving the competing capacity C. Because profit is not customarily

defined as a function of a firm's market M, you cannot solve for M from Eq. (4.2). It is disconcerting to realize that the hypothesis of profit maximization is incapable of explaining even where the market is.

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The Firm's Body: The 4 Toos

Too Big

Abstract As managers pursue market share, they find that the boundaries of their markets keep expanding at the same time. They see in The Magic Mirror that they can approach, but never reach, 100% market share. This is the reason why their appetite for growth is insatiable and why their firms become too big. In this chapter, I demonstrate their relentless pursuit of size. I show that managers prefer buying capacity (through mergers and acquisitions) to making capacity (through internal growth). Either way, their firms become big.

Keywords Empire building • Make growth • Buy growth • Limit to growth

Thanks to financial crises of late, we now have a long—and still growing—list of reasons why firms can become "too big." For example, firms can become too big to fail. The list has brought renewed attention to private power in a democratic society supposedly ruled by public power (Wu 2018; Hughes 2019).

In this chapter we focus on a generic reason why firms are too big. The reason springs from the separation of ownership and control: the manager's quest for dominance. It is that simple.

L. W. Lee, *Industrial Organization*,
https://doi.org/10.1007/978-3-030-26237-2_5

Grow Your Market Share

Let's say that you are a CEO. Being the center of much attention, you are self-conscious. Every day, you look in The Magic Mirror to see how you are doing in market share.

You know that your market share is the proportion of The Magic Mirror taken up by your capacity.

$$\text{your market share} = \frac{\text{your capacity}}{\text{the total capacity in your market}} \qquad (5.1)$$

There are two ways to get bigger market share:

(a) shrink the denominator, which is your market (or the size of The Magic Mirror);
(b) grow the numerator, which is your capacity.

You can shrink your market by driving away competitors. Practices like "predatory pricing," "foreclosure," and "patent trolling" come to mind. Meanwhile, you can persuade legislators to set up barriers to entry (e.g., "proof of necessity") around your market. A problem with these practices is that they may be challenged by potential entrants as violations of anti-trust laws. Another problem is that your competitors may not find the threats credible. It is difficult to know if and how much your threat changes minds.

So you decide to grow your capacity instead. Your mantra is: *Just Grow Bigger*. The only constraint is the need to pacify owners who may disagree with you for divine reasons. But the constraint is not at all well prescribed. As we have noted in Chap. 3, the art and science of pacifying owners is "satisficing" (Simon 1982).

Just Grow Bigger: MAKE or BUY

Still, there are two ways to grow capacity. You can make new capacity from scratch, or you can buy capacity from competitors through mergers and acquisitions. Call them MAKE and BUY. You ask: Which way will your dominance grow faster?

Fig. 5.1 BUY is the
faster track. Source:
Author's creation

your market share

100%

BUY

MAKE

your capacity
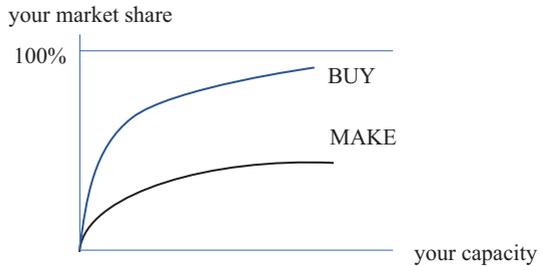
Table 5.1 Growth by acquisitions in plant-based meat

animal meat processors	plant-based meat producers
Tyson Foods	Future Meat Technologies
Cargill	Memphis Meats
Maple Leaf Foods	Lightlife Foods; Field Roast
Nestle	Sweet Earth Foods

Source: Author's creation

You will choose BUY. Here is why. As BUY adds to your capacity, it also reduces your competition by the same amount. Both boost your relativity and therefore dominance. MAKE, on the other hand, does not reduce your competition; on the contrary, it adds to the total size of the market. Figure 5.1 illustrates this difference between BUY and MAKE. You approach total dominance faster by taking the BUY track.

As an example, consider the protein market. People are eating more cheese, milk, and meats (including fish) made or grown from plant ingredients. Meanwhile, people are eating less cheese, milk, and meats that are simply animal parts. Big meat processors are taking notice of the changes in consumer preference, and some have decided to grow into the plant-based protein market. Few do it by MAKE; most do it by BUY. Table 5.1 shows what I know at this writing.

Why "Too" Big

In what sense is a firm "too" big? I do not have a threshold size or market share in mind. Rather, I look for signs of satiation. If the manager is never satiated with a market share less than 100%, then by definition the firm is too big.

In the figure above, the BUY path approaches 100% market share, but *never* quite reaches it. That means that the 100% mark is a moving target; it always stays ahead of you. It's like chasing your own shadow: you can never outrun it. Besides, you will hurt yourself when you do not know when to stop chasing it. There is no end to the BUY path; the firm becomes too big. The same fate awaits the firm on the MAKE path; it merely takes more time.

Another reason for building size is that size is easy to show off. When a firm adds capacity overseas, the manager can bring out a map and show the incremental dominance in a vivid way. But if a firm improves the quality of product and service, the manager must engage in the art and science of persuasion. As parties of interest, we can better grasp a firm's dominance by its total capacity—or its market share—than by the quality of product and service. That cognitive bias gives size an advantage over measures such as stock price and quarterly profit. And the manager notices.

Conclusion

In this chapter I show that corporate managers' desire for dominance is insatiable. This has given rise to the mammoth firms today.

As I write about them here, a storm is building over them. There have been sirens. We hear calls for breaking up the big firms (Hughes 2019). We have growing concern about the rise of private power over public power in democratic societies in the last one hundred years (Wu 2018). We also realize that much of the growth of the big firms today has been made possible by mergers and acquisitions, rather than organic growth (Wu and Thompson 2019).

Appendix: Make or Buy an Empire

I have suggested that you can grow your market share faster if you buy competitor's capacity than if you make new capacity. Let's see if we can render the suggestion in math.

Market share s is defined as your capacity k as a fraction of your market M:

$$s = \frac{k}{M} \tag{5.2}$$

Furthermore, M is the sum of k and competing capacity C:

$$M = k + C(s) \tag{5.3}$$

We assume that C is a positive function of s: Your market share attracts competitive attention.

MAKE

Suppose that you make new capacity. To see how your new capacity changes your market share, take the total derivative of market share:

$$\frac{ds}{dk} = \frac{1-s}{M + s\dfrac{dC}{ds}} > 0 \tag{5.4}$$

This derivative has a positive sign given that dC/ds is positive. The positive sign means that while you can increase your market share by new capacity, you can never make it equal to 100%: You can never become a true monopolist by building new capacity.

BUY

To increase market share, you may buy capacity from a competitor. When you do that, your firm's capacity goes up and the competitor's capacity goes down by the *same amount*. To see how it works, take the total derivative of market share again. This time, recognize that the competing capacity goes down when your capacity goes up by equal amount:

$$\frac{ds}{dk} = \frac{1}{M + s\dfrac{dC}{ds}} > 0 \tag{5.5}$$

This derivative also has a positive sign. That is, buying capacity from competitors increases your market share but it never gets your market share to 100%. Again, you find that you cannot become a monopolist by buying competitors' capacity.

That said, growth rate in Eq. 5.5 is always greater than growth rate in Eq. 5.4: Your firm's market share goes up at a higher rate when you buy a competitor's capacity than when you build that same capacity from scratch.

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Too Complex

Abstract Big firms are also too complex. One reason is that managers, in their pursuit of market share, grow their firms in all ways possible: horizontally, vertically, and diagonally. Another reason is that complexity can be a trap, like the Prisoners' Dilemma: Neither firms nor consumers wish to escape from it alone, though they all would be better off if they could escape from it together. We do not know much about "economic complexity": What it is and how to measure it. I conclude with a call for deeper understanding of complexity in industrial organization.

Keywords Complexity • System 1 • System 2 • Fast-and-frugal heuristics • The complexity trap • The complexity loop

It seems to be a law of nature that a big firm is also complex. In any case, it makes sense. For example, the manager of an automaker can grow her firm in many directions. She can grow it northward by acquiring suppliers; southward by acquiring dealers; eastward by acquiring other automakers; westward by moving into foreign markets; and diagonally by acquiring insurance companies, credit-card companies, hospitals, space shuttles, and so on. Before you know it, her firm has become a conglomerate. It has become complex.

Can a conglomerate be "too" complex? In this chapter I go over a few reasons why the answer is yes.

What Is Complexity?

This is a strong candidate for the most difficult question in the Guinness World Records. We all know what complexity is, but we all cannot articulate it. Or, we can articulate it but do not know how to measure it. Or, we all know how to measure it, but all our measures are different, and we can't agree on what is the best measure. Consider the complexity of forest fires. A computer engineer can measure the complexity of a spreading fire, but it may not help a firefighter determine the simplest way of containing the fire. The firefighter's measure of the complexity of the fire in turn does not help an economist figure out the complexity of the cost of the fire. So what are we to do?

I suggest that the answer is right under our nose: Something is complex when we do not understand it and therefore use heuristics to grasp it. Here is an anecdote that makes clear what I mean. One day, Roland and I were walking toward the backyard of our house. All of a sudden, he froze and then ran back to the house, pulling me with him. It did not take me long to figure out what made him run away: It was the big flower pot. I had moved it the day before from the front yard to the back yard. Roland did not have that pot in his mental frame of the backyard. He just ran away from it. I moved the flower pot back to where it was. Then I went back to assure Roland that everything was alright now. He followed me out again, this time without incident. But by then 15 minutes had gone by.

What was going on in Roland's head when he saw that flower pot? Psychologists have an answer. Think of our brain as a hybrid car, with two systems (Gladwell 2007; Kahneman 2011):

- System 1 (for fast thinking)
- System 2 (for slow thinking)

System 1 is intuitive. It employs "heuristics" such as gut feelings. System 2, on the other hand, is calculating and deliberate. When the environment is complex, System 1 kicks in. Roland used his System 1 when he saw the flower pot but did not find it in his mental frame of the backyard. So he had the gut feeling that the pot was a menace. He decided to run away from it. If he had known that I had moved it the day before, he would have used System 2 and cautiously walked by it.

This is how people make decisions, too. Even Warren Buffett has a "too hard" pile: These are "companies that the famed investor passes up on buying because he can't understand them well enough" (Bary 2018).

Fig. 6.1 The slow thinker and the fast thinker. Source: Author's creation

As I write this, a sculpture comes to my mind: The Thinker. In Fig. 6.1, you see that he puts his hand under his chin. Have you ever thought about why he does that? He looks to me as if his head has become very heavy. My theory is that he must be a slow thinker using System 2.

Today, most of us are fast thinkers. We use System 1. We spend much time on watching each other. We trust that there is more wisdom in crowds than in each of us.

Why "Too" Complex

Something is "too complex" when we all would be better off if it were simpler. But we may be trapped in it. Complexity is like air pollution: We collectively suffer from too much of it, but we individually have no incentive to reduce it.

Here is an example of something too complex. Let's say that I write a *complex* book and the student *memorizes* it. Both the student and I would be better off if I could write a *simple* book and the student were to *understand* it. Yet neither has the incentive to change. If I should write a simple book, I would have no guarantee that the student would understand it rather than memorize it. If the student should commit to understanding a book I write, the student would have no guarantee that I would write a simple book. So we are trapped. The book is too complex, and the student does not understand it.

This example can be presented as a Prisoners' Dilemma. Table 6.1 is the "payoff matrix," the first number in each cell being the payoff to me as a book writer and the second number being the payoff to the student. The student and I, acting independently, are stuck in the southwest cell $(3, -1)$.

Note that I and the student both would be much better off in the northeast cell $(4, 1)$, where the book is simpler and the student understands

Table 6.1 The Prisoners' Dilemma in complexity

The professor	The student	
	Memorize (System 1)	Understand (System 2)
A simple book	0, 0	4, 1
A complex book	3, −1	3, −2

Source: Author's creation

it. Our problem is that we do not negotiate whether a simple or a complex book is to be read, nor do we negotiate whether System 1 or System 2 is to be used in reading the book. As a result, we are not doing the best we can. That is the dilemma.

The dilemma exists in investment, too. Say the manager of an investment firm can make the firm simple or complex. Let's also say that people invest by using System 1 or System 2. Presently, the strategy pair is: (complex, System 1). This can be a trap. As long as investors use System 1, the manager has no incentive to make the firm simple. By the same token, as long as the firm is complex, people have no incentive to use System 2. So complexity and System 1 are locked onto each other here also.

THE COMPLEXITY FEEDBACK LOOP

While complexity and System 1 are locked onto each other, they also feed on each other.

Managers know fully well that investors use System 1 to choose among complex firms. Since managers want to continue to grow their empires, they must find money for growth by offering ever more complex arrays of products. The more complex products encourage us to use System 1 even more. So we have the makings of a feedback loop, as Fig. 6.2 depicts.

Behavioral economists have noticed that environment and heuristics form a feedback loop. Simon (1982) thinks of a decision as essentially a compromise between the bounded brain and the unbounded environment; he calls the act of compromise "satisficing." Gigerenzer (2015) uses evolutionary adaptation to explain how we have come to possess the capacity for making fast-and-frugal decisions in complex environment. Arthur (2015) introduces the "complexity-economics" perspective, in which decisions and environment are interdependent.

Fig. 6.2 The complexity loop. Source: Author's creation
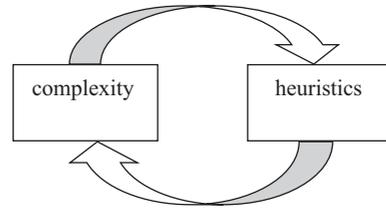
The intensity of the feedback loop depends on the institutional environment. In a market, an environmental factor is price fixing. When we choose among things that look similar, we go for the one with the lowest price. If prices of these things are fixed to be similar, then we look for other differences. Indeed prices are more often similar than dissimilar. Managers go to great lengths to make sure their prices are similar, because of the tendency of price competition to escalate out of control. When prices become "cut-throat," managers are quick to invite the government to step in with price controls. Managers prefer to compete in complexity, by adding this and that to products and services. The result is that the complexity feedback loop revs up to ever higher level of intensity.

EVIDENCE OF COMPLEXITY: THE CORPORATE LIVING WILL

A personal living will is evidence that things have become too complex to trust gut feelings. People with complex medical conditions, finance, or both are inclined to have living wills. These wills are plans for ending a life, disposing assets, and covering liabilities.

Firms have living wills, too. The common template is known in the U.S. as Chap. 11 of Bankruptcy Code. But that is not what I have in mind as a genuine corporate living will. A genuine one is available from The Board of Governors of the U.S. Federal Reserve System (2018):

> Each plan, commonly known as a living will, must describe the company's strategy for rapid and orderly resolution in the event of material financial distress or failure of the company, and include both public and confidential sections.
>
> Currently, the largest, most complex banking organizations supervised by the Board are required to file resolution plans by July 1 of each year. All other companies supervised by the Board and subject to the resolution planning rule generally are required to file by December 31 of each year.

Such a mandatory living will sends a message: The firm is too big and too complex, because in the event of its death it will cause serious collateral damage.

Conclusion

Complexity and fast thinking feed on each other. We know that firms are too complex and we think too fast. But we individually feel powerless to do anything about the complexity.

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Too Fragile

Abstract The urge to build empires makes for fragility. Corporate empires are commonly built on debt, instead of equity. I illustrate fragility by the debt-equity ratio. A firm with a low debt-equity ratio has the shape of a pyramid, while a firm with a high debt-equity ratio has the shape of a Martini glass. Do I need to explain that a Martini glass is more likely to topple than a pyramid during an earthquake? The answer has not escaped central banks. They now administer artificial stress tests on the biggest banks to determine which ones are "too fragile."

Keywords Fragility • Capital structure • Debt • Leverage • Domino effect • Stress test

To build a corporate empire, the manager must find the money to pay for it. The money comes in two forms: debt and equity. Debt promises a fixed rate of returns over a fixed time period. Equity promises nothing, just whatever is left after all others—including the manager—have taken their bites. The manager gets to determine the mix of debt and equity.

In this chapter I suggest that the manager prefers to grow the firm by debt, rather than equity. If unchecked, the binge for debt will just go on. The firm's capital structure will become highly leveraged, and that makes the firm "too" fragile.

The Meaning of Fragility

The notion of fragility involves a few basic concepts of finance. First, capital is all the money that the manager finds to build or buy capacity k. The money comes in two contractual forms: debt D and equity E. As a matter of definition, therefore, we can write:

$$\text{capital} : k = D + E \tag{7.1}$$

"Capital structure" means the two components of capital:

$$\text{capital structure} : (D, E) \tag{7.2}$$

"Leverage" means how many dollars of capital are riding on the back of one dollar of equity:

$$\text{leverage} : \frac{k}{E} \tag{7.3}$$

"Debt-equity ratio" means how many dollars of debt are riding on the back of one dollar of equity:

$$\text{debt} - \text{equity ratio} : \frac{D}{E} \tag{7.4}$$

It follows from these definitions that leverage equals the debt-equity ratio plus one.

The debt-equity ratio is a common measure of fragility. We can illustrate this. Each of the structures in Fig. 7.1 is made of six bricks in two layers. The lower layer is equity and the upper layer is debt. The first structure shows that five debt bricks are riding on one equity brick; therefore, it has a debt-equity ratio of 5. By the same token, the second structure has a debt-equity ratio of 1, while the third has a debt-equity ratio of 0.2.

Fragility is a matter of relativity: A bridge is fragile if it collapses on a windy day when other bridges stand firm, but it is not fragile when *all* bridges collapse as Hurricane Maria crosses town. So let's shake the ground below the structures in Fig. 6.1, gently at first but increasingly hard. Which one of the structures is most likely to collapse first? Most of us will say the top one, which has the highest debt-equity ratio.

Fig. 7.1 Debt-equity ratios. Source: Author's creation
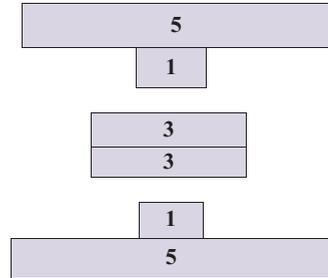
In 2008, for example, the ground shook hard. Many banks toppled. They all had relatively high debt-equity ratios. Deutsche Bank had the highest debt-equity ratio: 37. The event provided definitive proof that big banks are too fragile.

Why "Too" Fragile

Managers prefer to grow empires with debt rather than equity. There are three reasons for this. First, current equity owners may object to more equity funding, as it dilutes ownership and further aggravates the separation of ownership and control. Second, the manager is averse to equity funding anyway. Equity funding is likely to attract "activist investors." The manager views them as pure trouble. Third, a lot of investors prefer debt to equity in the first place. These investors know two things: They don't know the risk, and they don't like risk.

As debt grows, the empire grows, the need to service debt grows, and the need to issue new debt to sustain outstanding debt grows. A feedback loop begins. Meanwhile, the firm's fragility grows.

Figure 7.2 is essentially a picture of the Ponzi scheme. Shiller (2005) sees a lot of firms as "naturally occurring" Ponzi schemes. They are legal until they fall apart. A good example is Enron.

Another reason for fragility has to do with the "small world" in which big firms find themselves. They are famously linked with each other through "credit-default swaps." They are also "interlocked" through board directorships (Davis et al. 2003; Chu and Davis 2016). As a result of their small world, they are individually secure but systemically fragile. As Haldane and May (2011, p. 353) observe, a small world "can minimize risk for each individual bank, but maximize the probability of the entire

Fig. 7.2 The fragility
loop. Source: Author's
creation
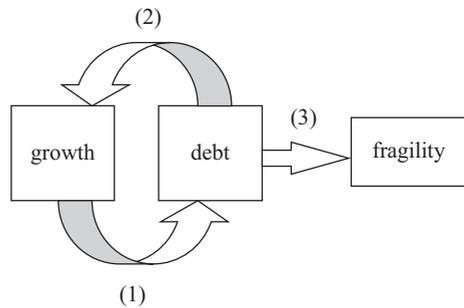
system collapsing." We can understand systemic risk by imagining that
there are many top-heavy brick piles and that they are all linked to each
other. When one pile topples during an earthquake, it brings down other
piles. They are like dominos falling on each other.

Reputation as a Constraint on Fragility

But there must be limits to the manager's pursuit of fragility. The
Modigliani-Miller Theorem, which says that we cannot explain capital
structure in the perfect world, suggests that we look for imperfections in
the real world to explain capital structure.

The imperfection that has received the most attention is one having to
do with information. I think that a form of imperfect information is "rep-
utation." What purpose does reputation serve? I have reputations only
because people do not know me perfectly. So people use my reputations as
heuristics to judge me. That is why I care about my reputations. Schelling
(1980) makes the same point in the context of military conflicts.

Reputation, therefore, serves to restrain leverage-hungry managers.
Common sense tells us that the manager who spends a lot of time in the
bankruptcy court should expect a bad reputation and lower future earning
capacity. Stiglitz (1972, p. 472) explains: "Even if the managers of the
firm have had a good record in the past, the stockholder must decide, in
the instance of a bad outcome, whether this is a matter of bad luck,
whether the investment opportunities in the industry are 'drying up,' or
whether the manager is no longer competent." For example, suppose that
a Board of Directors is considering two CEO candidates, A and B. They
are identical in all aspects except that A led a firm into bankruptcy a few
months ago. Who, A or B, do you think the board will favor? I think that

the majority of the board will want to offer the job to B. The reason can be boiled down to the fact that A has a bad reputation. Manager A can hardly fail to understand why.

This reputation effect therefore constrains the manager's enthusiasm for debt-financed growth. Indeed it can lead the manager to adopt a well-defined moderate leverage (Lee 1979).

Conclusion

The real world does not prove anything by theories; it proves by actions. When shocks come, things that break are "too fragile," by definition. This has inspired the U.S. Central Bank to come up with a "stress test" for some "large and complex firms" (U.S. Board of Governors, June 2018, p. iii). The test consists of a series of simulated shocks (ibid., p. 1):

> The adverse and severely adverse supervisory scenarios … feature U.S. and global recessions. In particular, the severely adverse scenario is characterized by a severe global recession in which the U.S. unemployment rate rises by almost 6 percentage points to 10 percent, accompanied by a global aversion to long-term fixed-income assets. The adverse scenario features a moderate recession in the United States, as well as weakening economic activity across all countries included in the scenario.

If a bank fails the stress test, then it is "too" fragile. Such a firm will be required to make changes and it may lose insurance underwritten by the government. In June 2018, 35 banks took the test. All passed except one. Guess which bank. (Hint: The initials are D. B.)

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Too Similar

Abstract Complex firms tend to be similar to each other. For example, many banks offer complex arrays of products and services, and yet the arrays all look similar. You can't pick out your bank from a lineup by merely looking at what it offers. In this chapter I suggest that similarity does not serve us well. Smallpox spreads faster when we are more similar. Panics and bubbles and chaos thrive when things around us look similar. I illustrate how firms become similar—too similar, rather—when managers pursue market share.

Keywords Similarity • The principle of minimum differentiation • The curse of similarity

There is a tango going on between complexity and similarity. Car companies offer complex and yet similar sedans. Banks offer complex and yet similar derivatives. Supermarkets offer complex and yet similar snacks. Big firms are complex and yet similar to each other. Haldane (2009) observes (his emphases): Financial crises "can essentially be explained by two structural features of the financial network. … They are *complexity* on the one hand, and *homogeneity* on the other."

Similarity does not serve us well. For one thing, epidemics are more likely when things are more similar. This is not just a matter of epidemiology, nor of bank failures, nor of tulip maniacs, but of everyday life (Shiller 2005, p. 157).

Hotelling's Complaint

Harold Hotelling was probably the first economist to complain about "the tendency to excessive similarity of competing commodities" (1929, p. 57):

> It leads some factories to make cheap shoes for the poor and others to make expensive shoes for the rich, but all the shoes are too much alike. Our cities become uneconomically large and the business districts within them are too concentrated. Methodist and Presbyterian churches are too much alike; cider is too homogeneous.

I don't know about shoes and churches, but I certainly share Hotelling's sentiment about ciders at grocery stores these days. They taste much the same: neither very sweet nor very tart, just boring. Hotelling and many after him have tried to explain this tendency toward "minimum differentiation." In this chapter I tell my story about it. My story differs from others in one detail: who run the cider mills. In my story, managers run the cider mills; in others, owners do. It seems to be a tiny detail, but it makes huge difference to what ciders we find in supermarkets.

Let's visit the cider market. Figure 8.1 is a snapshot of it. There, consumers have different tastes for cider, and their tastes are uniformly distributed on a line, from very sweet at one end to very tart at the other end. Each consumer buys a gallon of cider a week. Now, two cider mills are planning for the debut of their ciders. Both cider mills are run by professional managers. The managers know that rivalry in price never ends well and they try mightily to avoid it. They compete for market share instead. And the means to that end is taste.

What tastes can we expect in this market with two cider mills? It will not take long to see that the two ciders will taste very similar, both situated at the center of the taste line, with 50% market share each. The ciders taste neither very sweet nor very tart.

Fig. 8.1   Two cider mills. Source: Author's creation

THE MEANING OF SIMILARITY

We all are pretty good at detecting similarity visually. For example, we see similarity in Fig. 8.2.

There are two dots clustered at the center of a line. They look totally similar. We also see two similar dots in each of the markets in Fig. 8.3.

In some market shapes, similarity is a little harder to see. Figure 8.4 is an example.

A, B, and C are three cider mills in a town that has the shape of a line. They make ciders that taste between "extra tart" to "extra sweet." The cider market, therefore, has the shape of a square. Ciders A and B taste different, but they have the same geographic location, while A and C taste the same, but have different geographic locations. So we cannot say that B is similar to C just because B is similar to A and A is similar to

Fig. 8.2 The line market. Source: Authors creation

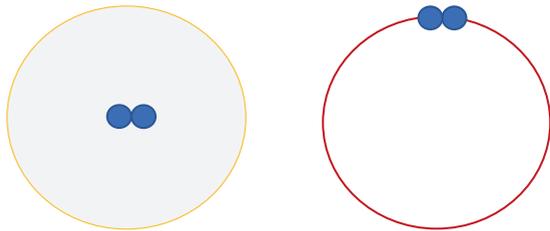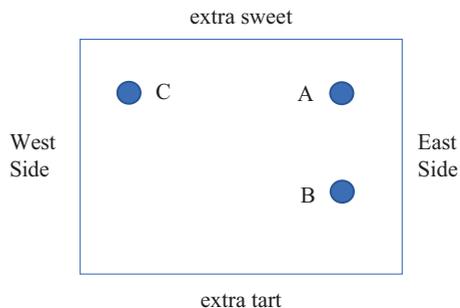**Fig. 8.3** The disc and the circle markets. Source: Author's creation

Fig. 8.4 The plane market. Source: Author's creation

C. This "non-transitivity" property has long been noted by psychologists who study similarity (Tversky 1977; Tversky and Gati 1978).

The point here is that our perception of similarity depends on the shape of market. But what makes me see the shape I see for a market? It is a matter of intuition, but also my information about it. Over time, I learn to find the simplest shape that serves my purpose, just as a carpenter learns to find the simplest tools to make a chair.

Why "Too" Similar

Reason 1: Personal Cost

One reason why firms are too similar is that similarity is bad for consumers who have dissimilar preferences. Consider the similar ciders that Hotelling complained about. In Fig. 8.1, consumers and their tastes being uniformly different, the average customer makes a compromise in taste that is 1/4 of the length of the line. The social cost of two similar ciders, therefore, corresponds to 1/4 of the length of the line. Compare that with the social cost of two dissimilar ciders in Fig. 8.5.

Each cider still has 50% of market share, but they are no longer similar. For consumers, the average compromise in taste is 1/8 of the line, which is only half of the average compromise when the two ciders taste the same. (I assume that every consumer on this line, even those at the east and west ends of town, drinks one gallon of cider a week.) This new situation is better for consumers and no worse for the two cider mills in the market.

But this more efficient configuration just isn't going to happen. As the managers are competing for market share, their ciders will end up at the center of the line: They will taste the same.

Reason 2: Systemic Cost

Another reason for too much similarity among firms has to do with the epidemiology of contagion. Similarity invites contagion.

extra
sweet

extra
tart

Fig. 8.5 Efficient ciders. Source: Author's creation

Two cars appear identical in gizmos, and I want to buy just one car. How do I figure out which car to buy? The answer seems simple enough: buy the one with the lower price. That is, use price as the heuristic. Indeed, price is a fast-and-frugal heuristic. The theory of perfect competition is based on that heuristic.

Now, what if prices are also similar as a result of tacit agreement among managers? A buyer then must resort to other heuristics to decide which product to get. This in turn prompts sellers to engage advertisers and marketers, who know how to frame products so as to gain psychological advantage in our minds. Not only is this kind of persuasive advertising wasteful, it also sets the market up for bubbles and that sort of things.

Conclusion

We have noted four bodily symptoms of the obsession with dominance. Of the four, similarity is the most serious. This sounds outlandish, as similarity is the foundation of a "perfectly competitive market," where homogeneity among firms prevails. How can similarity be bad for efficiency when it is good for competition?

My answer is that total similarity is not the end of the story, because perfect competition is not a stable state of a market. A manager in that market will not be content with dividing up a market equally with others. Each will engage in framing of all sorts, in order to gain an advantage over others. Framing is the realm of marketing, where psychology reigns. Framing makes products appear different, thereby creating complexity in our perception. As we see more complexity, we make more use of fast-and-frugal heuristics. Meanwhile, we become unwitting contributors to waves, bubbles, and chaos.

To these epidemics we now turn.

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Epidemics

Waves

Abstract Mergers tend to come in waves. A wave begins with one merger, which triggers a few other mergers, which trigger still more other mergers. I illustrate how mergers and acquisitions in a market can spread like a wild fire. I also comment on the good, the bad, and the ugly that are left in the wake of a merger wave. All these implications are derived from the assumption that managers pursue dominance, rather than someone else's interest such as profit or stock price. It is surprising how far-reaching the implications are.

Keywords Merger waves • Small world

If we look closely at a market, we will see mergers. Moreover, we will see mergers forming what seem to be waves. One merger triggers another, which triggers yet another, and so on. We also see that merger waves respect no market boundaries: They spread from one market to another, from one sector to another, and so on. By popular accounts, the U.S. economy has seen six such merger waves in the last 200 years, starting with what is known as the Trust Movement.

In this chapter we stand up close to a market and watch merger waves. We ask why a merger wave comes about. We also ask if merger waves are good, or bad, or both.

I suggest that merger waves come about because managers pursuit dominance. Using that hypothesis, I can illustrate the history of a merger wave easily and simply. Much of the chapter reiterates what I observed earlier in a paper on merger waves (Lee 2013).

THE HISTORY OF A MERGER WAVE

Phase I: Once Upon a Time

Consider financial services. Suppose the whole array of financial services can be represented by a line, and consumer preferences are uniformly distributed along it. Each consumer buys one unit of service. When you buy a service that is not exactly your preference, you incur a cost proportional to the distance between your preference and that service. It is as if you have to move along the line and pay a transportation cost proportional to how far you move.

Let's say that in the beginning there are four firms, each offering a service represented by a specific location on the line. Also, assume that, through their network links, the firms have agreed to limit competition by fixing prices. Outside that agreement, the firms are free to compete for market shares. A firm can move its products on the line and always has the option of merging with another firm. Under these conditions, the four firms are paired at ¼ and ¾ of the line in Fig. 9.1:

Each firm has ¼ of the market. The average distance that a consumer travels to get to the closest (i.e., the most preferred) product is 1/8 of the length of the line. Figure 9.1 depicts an equilibrium, where none of the firms have incentive to relocate unilaterally.
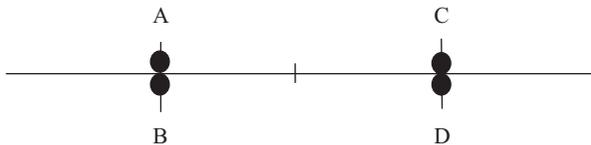

Fig. 9.1 The market before mergers. Source: Author's creation

Phase II: Two Firms Merge

To increase market share, a firm must take customers away from other firms by repositioning its product, and it can do this only by acting in concert with another firm. When repositioning products, a firm has limited foresight: It expects other firms to respond by repositioning products, not by merging themselves.

Now look at Fig. 9.1 from the point of view of C and D. Though they each have a product, the two products are identical to each other. They together have half of the market. If they merge, they can reposition the products and perhaps increase their combined market share. Considering possible responses of A and B, they may decide that the optimal strategy is to reposition brands C and D as in Fig. 9.2. The merged firm CεD has increased their combined share from ½ to 4/6. This new configuration is an equilibrium because neither A nor B has the incentive to move unilaterally.

Phase III: The Other Two Merge

In Phase II, where C and D merged, both A and B lost market shares. Each had ¼ before, but has only 1/6 now. To regain lost ground, they can merge themselves into AεB and coordinate the repositioning of their two brands. Figure 9.3 shows what happens afterward.

You will notice many changes in the market.

1. Firms have become fewer, from four to two.
2. Firms have become bigger, from each with 25% of the market to each with 50%.
3. Firms have become more complex, from each having one product to each having two products.
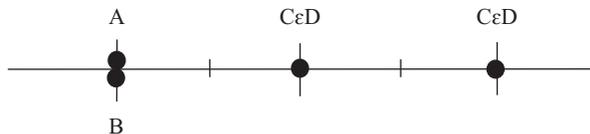
Fig. 9.2 The market after C and D have merged. Source: Author's creation
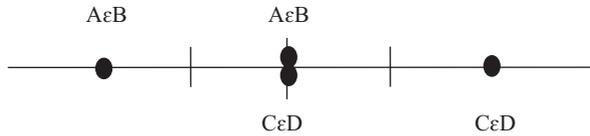
Fig. 9.3 The market after A and B have merged also. Source: Author's creation

4. Firms have become more fragile. The mergers, initiated by the managers, are likely to have involved one firm acquiring the other firm's equity by new debt or leveraged buy-out.
5. Firms have redesigned their products.

Phase IV: Merger into Monopoly

Finally, AεB and CεD merge, bringing the wave to an end. The new firm becomes a monopoly. The dominance is total. And the managers are satisfied.

As to the matter of product variety after the merger finale, there are several possibilities. The simplest is total consolidation, whereby all but one product are discontinued. Or, at the other extreme, the products are left where they were before the finale merger, as in Fig. 9.3. Now that managers feel as if their mission has been accomplished, they have no more incentive to reposition the products in any way.
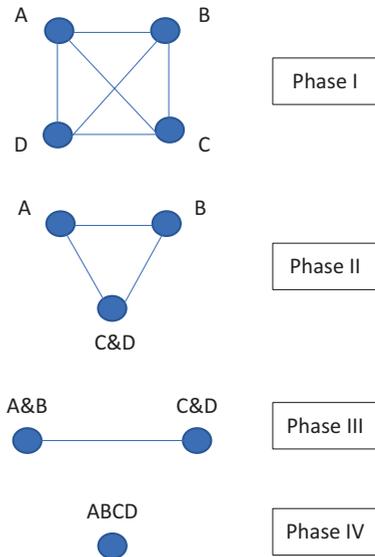
A Smaller World

In the wake of a merger wave, firms become bigger and more fragile. What else can we expect? For one thing, we can expect a smaller world among these firms. A world becomes smaller when the average degree of separation among those who live in it becomes lower (Watts 1999). To illustrate, let's use the simplest network diagrams for the four phases of the merger wave (Fig. 9.4).

Now let's count the degrees of separation in each of the four phases (Table 9.1).

For each network, the average degree of separation is the sum of the degrees of separation divided by the number of links between any two different firms (Table 9.2).

Fig. 9.4 The phases of
a merger wave. Source:
Author's creation

The average degree of separation declines from one to zero. The world becomes smaller.

Why does a smaller world matter, though? In a small world, the systemic risk of contagion is large (Haldane and May 2011; Gai et al. 2011).

A Bigger World

During the merger wave, firms have become fewer, bigger, and more complex. We have noted also that the varieties of product have changed. Let's think about that for another moment. From the point of view of consumer welfare, what matters is not just the number of products, but also where they are positioned in consumer's perception of the market. A small number of varieties that are positioned thoughtfully may benefit consumers as much as more varieties positioned randomly. If a merger wave improves the positions, then we may say that it expands consumers' choice set. In this sense, a merger wave has made the economic world bigger.

Let's ask, therefore, how the merger wave above has changed product differentiation and whether as a result consumer welfare has gone up or down. According to Figs. 9.1, 9.2, and 9.3, the average distances

Table 9.1 Degrees of separation in a merger wave

I	A	B	C	D
A	0	1	1	1
B	1	0	1	1
C	1	1	0	1
D	1	1	1	0
II	A	B	C	D
A	0	1	1	1
B	1	0	1	1
C	1	1	0	0
D	1	1	0	0
III	A	B	C	D
A	0	0	1	1
B	0	0	1	1
C	1	1	0	0
D	1	1	0	0
IV	A	B	C	D
A	0	0	0	0
B	0	0	0	0
C	0	0	0	0
D	0	0	0	0

Source: Author's creation

Table 9.2 Average degrees of separation in a merger wave

	Phase I	Phase II	Phase III	Phase IV
Average degree of separation	12/12 = 1.00	10/12 = 0.83	8/12 = 0.67	0/12 = 0.00

Source: Author's creation

traveled by consumers are 1/8, 1/12, and 1/12, respectively. Using the inverse of distance as a proxy for the size of choice set, we may say that the economic world has become bigger during much of the merger wave.

Now consider how the merger wave has changed similarity. In our line model, we can measure the similarity between two firms by the distance between them. In Fig. 9.1, there are four firms and the six distances among

them are 0, 0, 1/2, 1/2, 1/2, and 1/2. In Fig. 9.2, there are three firms, of which C&D alone has two products. Let us say the position of C&D on the line is the average of the distances of its two products from the left end of the line. Then the three distances among the three firms are 0, 1/2, and 1/2. In Fig. 9.3, there are two multiple-product firms. There is only one distance between them: 1/3. In all three figures, therefore, the average distance among firms is equal to 1/3. The similarity index does not change during the merger wave. While a mere example, this makes the point that a merger wave may change the economic world and the financial world in different ways.

Conclusion

Firms exist in more than one world. A merger, therefore, can make one world smaller and another bigger, one world better off and another worse off. In this chapter, we have considered two worlds: the financial world and the economic world. In the financial world, we can see how mergers bring firms close to each other, thereby making that world smaller. In the economic world, we can see how mergers drive firms farther apart, thereby making the economic world bigger. Thus, as firms merge, financial panics and bubbles become more likely, and yet products become better aligned with consumer preferences. Such a tradeoff does not necessarily exist during the entire course of the merger wave, however. In our example, systemic risk rises successively, but product alignment improves only in the beginning.

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Bubbles

Abstract In this chapter I suggest that markets in which firms are complex and yet similar are prone to bubbles. Facing similarity and complexity, we tend to make decision by the herding heuristic. Managers are aware of our tendency to herd, and they frame their products and services accordingly. That is to say, managers try to make bubbles. I illustrate this argument. I also draw parallels between a bubble and a Ponzi scheme. They are pretty striking. Before closing I wonder if bubbles have any redeeming virtue when firms are too big, too complex, too fragile, and too similar. I manage to discover some.

Keywords Bubbles • Herding • Ponzi schemes

In *Memoirs of Extraordinary Popular Delusions and the Madness of Crowds*, Charles Mackay (1841) turned the spot light on bubbles: the Mississippi Scheme, the South-Sea Bubble, the Tulipomania, the witch hunt, beard and hair fashions, the crusades, duels, and so on. In *Maniacs, Panics and Crashes: A History of Financial Crises*, Charles Kindleberger (1989) exposed—and expounded—more bubbles. Then, in *Irrational Exuberance*, Shiller (2005) hunted down more and warned us about others around the corner. Today, thanks to them, we see bubbles everywhere. We find them even in labs where every effort is made to exclude them (Smith et al. 1988).

In this chapter we will take several lessons from Robert Shiller. We will ask him if bubbles are made from managers' obsession with dominance, among other questions.

What Is a Market Bubble?

Many of us, in an attempt to ward off paranoia, are asking: What is a bubble anyway? Shiller (2005, pp. xviii, 2) defines a market bubble as "a situation in which temporarily high prices are sustained largely by investors' enthusiasm rather than by consistent estimation of real value." He thinks of market bubbles simply as "naturally occurring Ponzi processes." A Ponzi scheme starts with someone telling a story about getting crazy rich by putting money down on something. A bubble starts in the same way. In both cases, the story begins to circulate and catch our attention. We jump on the bandwagon. The word of our jumping on the bandwagon spreads and holds ever more attention among ever more people. More people jump, more money pours in, and more of us get rich.

In short, bubbles are made from our love of the wisdom of crowds. Here is a true story. One day, I was sitting at a gate area for a flight out of Detroit Metropolitan Airport. I got there much ahead of the departure time. After a while I noticed, all of a sudden, a line forming at the gate counter. I had not heard any announcement about my flight. Still, as the line continued to grow, I stood up and joined it. I asked the person in front of me what the line was about. He said that he did not know; he joined the line only because he saw a line. Then I looked behind me and saw another person in line. I asked her why she joined the line. She said she did not know; she was wondering why I joined the line. Until today, I still wonder how the line got started. Who started the bubble?

Similarity Makes for Bubbles

Robert Shiller makes no secret of his strategy for hunting bubbles: Look in places where things are similar (ibid., p. 157; I added the emphases on "similar" and "similarly"):

> A fundamental observation about human society is that people who communicate regularly with one another think *similarly*. There is at any place and in any time a *Zeitgeist*, a spirit of the times. It is important to understand the origins of this *similar* thinking, so that we can judge the plausibility of theories of speculative fluctuations that ascribe price changes to faulty thinking.

If the millions of people who invest were all truly independent of each other, any faulty thinking would tend to average out, and such thinking would have no effect on prices. But if less than mechanistic or irrational thinking is in fact *similar* over large numbers of people, then such thinking can indeed be the source of stock market booms and busts.

Part of the reason people's judgments are *similar* at *similar* times is that they are reacting to the same information—the information that was publicly available at that time. But, as we shall see in this chapter, rational response to public information is not the only reason that people think *similarly*, nor is the use of that public information always appropriate or well reasoned.

As we have noted, managers who pursue dominance tend to offer similar prices, products and services. Confused, consumers then look for other ways to make choice. Managers soon notice and start to frame their products, often with help from Madison Avenue.

Example 1: Shiller's Tale of Two Restaurants

Shiller (2005, p. 160) tells a story of a bubble among restaurants. Taking liberty of embellishment, I retell his story as follows. You are visiting a small town in Alaska, well-known as a tourist destination. The town has two restaurants: Pancake Heaven and Pancake Paradise. Not only do they have similar names, they are next to each other, they look similar from outside, they offer similar menus, and they charge similar prices. So you look for signs of dissimilarity. It so happens that both have untainted windows. As you look into them, you notice that Pancake Heaven is considerably more crowded. So you decide to eat there. (Here, you are using the heuristic called "herding.") As other tourists look into the windows too, they choose to join you. The line outside of Pancake Heaven gets longer. By eight o'clock in the morning, Pancake Heaven is full, while Pancake Paradise next door remains almost empty, picking up only customers who are being crowded out of Pancake Heaven (Fig. 10.1). We have a bubble in the making.

Pancake Paradise   *Pancake Heaven*

Fig. 10.1 Two restaurants at the center of town. Source: Author's creation

What is the cause of this bubble? Herd behavior, says Shiller. But a mystery remains: How does Pancake Heaven make us herd? Now it is time for a confession: I know the trick: The manager of Pancake Heaven once told me, in confidence, that she invites five locals to show up outside of her restaurant before seven o'clock in the morning every day. When the clock strikes seven, she lets them in and seats them at tables near windows. They get to have pancakes and coffee for free. But they must stay for an hour, until eight o'clock or at her discretion. This simple strategy pays off: The five locals attract tourists, who will attract other tourists, who will attract still more other tourists, until the restaurant is full. Meanwhile, the other restaurant picks up only the hungry customers who can't make it into her restaurant. This is how one manager makes a bubble.

You may think that the smart tourists, when choosing between the two restaurants, would look up customer reviews on their iPhones. But that does not work well. The reviews are written overwhelmingly by tourists who ate at Pancake Heaven, instead of Pancake Paradise. You don't learn from them how good or bad Pancake Paradise is.

Example 2: The Tale of Two Banks

Things can start to make a turn for the worse for no apparent reason, creating "negative bubbles" (Shiller 2005, p. 71). An example is bank run. Say one morning you hear that there is a run on bank X. You do not know much about bank X, only that it is similar to bank Y, where you have all your money. What do you do? If I were you, I would not waste any time on asking questions; I would run to bank Y and withdraw all my money. I expect a crowd forming outside the bank. I would hurry up.

Again, the culprit here is similarity. Haldane and May (2011, p. 353) put it this way: "(E)xcessive homogeneity within a financial system—all the banks doing the same thing—can minimize risk for each individual bank, but maximize the probability of the entire system collapsing."

To explain bubbles, Soros (2008) introduces the theory of reflexivity. The theory is built upon a feedback loop between "reality" and "imagination." It can be illustrated by Shiller's restaurants. The "reality" is that one restaurant has a line of customers waiting to get in and the other restaurant does not have any customers, inside or outside. The "imagination" is that the restaurant with the waiting line has better food and will get full quickly. There is a

imagination

reality as a function of imagination

imagination as a function of reality
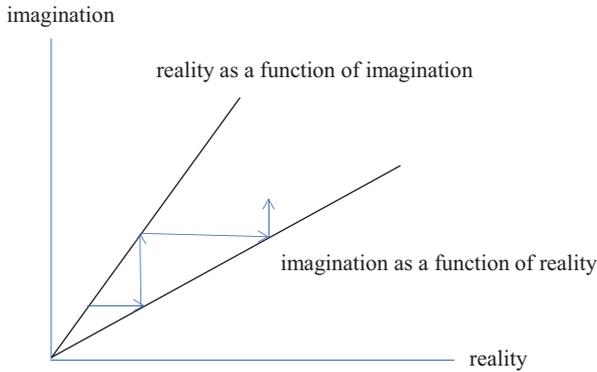
reality

Fig. 10.2 Reflexivity of bubbles. Source: Author's creation

feedback loop here: Reality drives imagination, while imagination drives reality. More customers check into the "more popular" restaurant; meanwhile, the popularity of the more popular restaurant draws more people in. The process is explosive, as Fig. 10.2 illustrates.

Social Media and Bubbles

Anyone who studies or makes bubbles knows how social media is a wonderful bubble-making machine. In essence, a social media is just a network in which a few members are prominent. They are movie stars and talk-show hosts, and other highly visible people. They take their place at the center of a star-shaped structure. Consider Fig. 10.3.

In this social media, all six of us are linked to the same center. Since we are not linked among ourselves, we do not cross-check information coming out of the center. And the center knows that we do not cross-check its information. Indeed the center has every incentive to feed us information that is too complex for any of us to do independent research on. That way, we all end up with knowing the same complex things that we do not really understand but the media center wants us to know.

Members of a social media tend to think and act alike. Similarity prevails; herd behavior rules (Shiller 2005, pp. 103–105; Kadushin 2012, chapter 9; Goyal 2007, chapter 5). The network is primed for bubbles.

Fig. 10.3 A social media. Source: Author's creation
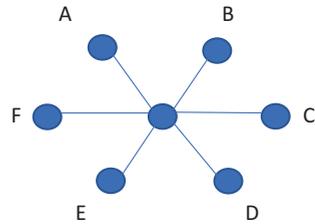
Fig. 10.4 Two restaurants apart. Source: Author's creation
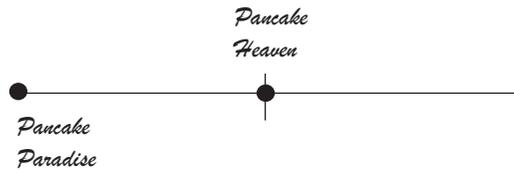
Bubbles Can Do Good

Bubbles are at once exciting, disruptive, bizarre, interesting, scary, and destructive. After all, bubbles are made out of delusions and the madness of crowds. But is it fair to conclude that a bubble has no redeeming virtue at all, not even temporarily? No, it is not fair. Take the tourist town mentioned earlier, where one of the two managers is creating a bubble. The other manager is hurting and will want to do something about it. One option is to move away from the bubbling restaurant next door, far enough that tourists cannot choose by herding. A move as such creates distance between the two restaurants, and that can be a good thing for customers. Let's say that the distraught manager of Pancake Paradise moves all the way to the west end of town, where Pancake Heaven is nowhere in sight (Fig. 10.4).

Now the two restaurants are different. This will benefit tourists. For one thing, the average tourist moves a shorter distance in town than before. (Here I assume that tourists enter town at all points along the line.) If the town is one mile long, then the average distance is 3/16 mile, instead of 4/16 mile. Also, the two restaurants may begin to offer different menus, which will please more tourists. Either way, we can say that the bubble has resulted in a better breakfast scene in town. That is a good thing about bubbles.

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Chaos

Abstract We avoid talking about chaos as if every chaos means the end of life as we know it. In fact, most chaos are local and ephemeral and non-fatal. In this chapter I show that chaos may come from something as simple as big firm managers' appetite for market share. I will also show that chaos may go just as quickly as they come. The theme that runs through my story is that chaos thrives on complexity and similarity. Given that firms are prone to these bodily excesses, chaos is here to stay.

Keywords Chaos • Order • Panics

In this chapter I suggest that managers' race for dominance, like all races, may produce chaos. I also suggest how order can emerge from chaos. Even the simplest market can be orderly one moment, chaotic the next moment, and orderly again in the moment afterward. A market does not have to be big and complex to exhibit chaotic behavior; a small, simple market can be chaotic.

What Is Chaos?

Good question. Physicists, chemists, and biologists have been asking the question (Gleick 1987). Economists, though a bit late to the party, have begun to ask that question, too. Baumol and Benhabib (1989, p. 77) give us a very clear answer: "Chaos, a case that is emphatically not pathological, but in which a dynamic mechanism that is very simple and deterministic yields a time path so complicated that it will pass most standard tests of randomness." They show that the time path of something in chaos can bear an uncanny resemblance to the cardiogram of a person suffering a massive heart attack. Georgescu-Roegen (1971, p. 142) puts it even more succinctly: "The idea of disorder arises in our minds every time we find an order that does not fit the particular purpose we have at the moment."

Chaos and Order

The Line Market

Managers A and B are considering where to locate their restaurants in a town that has the shape of a line. Each manager pursues market share. We know that both will choose to locate at the center of town, as in Fig. 11.1:

This market is stable, because neither manager wants to move the restaurant. There is order.

Now a third restaurant manager, C, comes to town, scouting for a location. The manager cannot assume that the A and B would happily move in order to share the market. So the best location is the spot next to A or B. Let's say manager C opens right next to B (Fig. 11.2).

Fig. 11.1   Order on a line. Source: Author's creation
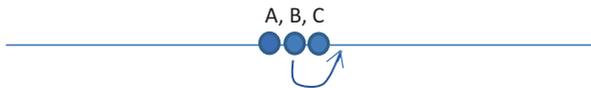
Fig. 11.2   Chaos on a line. Source: Author's creation

Fig. 11.3 Order on a line, again. Source: Author's creation

This is not a stable situation: Restaurant B is being squeezed on both sides, so its manager will want to leapfrog to the left of A or right of C. Then what happens? For as long as there are three restaurants, there is no end to the jockeying for position. There is chaos.

Chaos may disappear as quickly as it appears. To see how, let's introduce a fourth restaurant to town. We cannot predict what will happen afterward step by step, but we can foresee a state of the market that is stable, as in Fig. 11.3.

None of the four managers have the incentive to move their restaurants. So there is order, again.

The Circle Market

Now we may wonder if the on-again-off-again tendency of chaos in the line market would persist in a circle market. Consider Fig. 11.4, where there are two firms on a circle. The two firms have equal shares of the market, and neither can see how it could do better. So they have peace and quiet between them. Indeed there are an infinite number of peaceful ways for the two firms to position themselves on the circle. Order, therefore, is rule of day in this market.

Now suppose a third firm enters the market. After a period of adjustment, things quiet down. Figure 11.5 shows how the three firms are positioned. You will notice that one firm has half of the market, while the other two have one-quarter each. How did this inequality come about? The answer is history, or "path-dependency."

As Eaton and Lipsey (1975, pp. 32–33) point out, there are an infinite number of equilibriums on this circle with three or more firms. Firms do not always share the market equally. But at least there is always order. The circle market is immune to chaos.

The Disc Market

What about the disc market? Let's start with two firms on the disc. It would not take them long to realize that the center of the disc is the best

Fig. 11.4 Order on a circle with equal market shares. Source: Author's creation
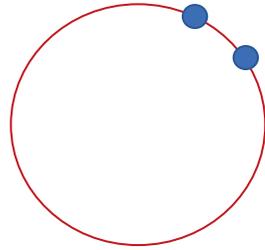
Fig. 11.5 Order on a circle with unequal market shares. Source: Author's creation
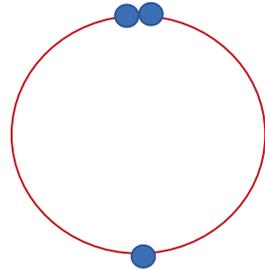
position for both of them, as Fig. 11.6 shows. At the center, each has half of the market, and there is no way to do better. There is, therefore, order in the market.

But we cannot count on order on a disc when there are more than two firms. Let's say that a third firm, C, enters the disc. It immediately positions itself slightly to the right of B, so as to gain 50% market share. Figure 11.7 is a snapshot of the market at that moment.

Firm B is getting squeezed terribly. Of course, it is not going to put up with no market share. It will leapfrog either A or C. It is not easy to see how order can come about on the disc: Firms will be constantly moving left, right, up, or down. The result is chaos. Eaton and Lipsey (1975, p. 40) study the disc market in depth. They find only chaos once the number of firms exceeds two.

Conclusion

With managers chasing dominance, a market can be pretty fickle. In what seems to be an orderly time, chaos can emerge at the blink of an eye. Similarly, in what seems to be a chaotic time, order can emerge suddenly.

Fig. 11.6 Order on a disc. Source: Author's creation
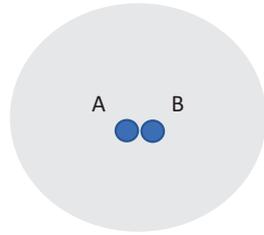
Fig. 11.7 Chaos on a disc. Source: Author's creation
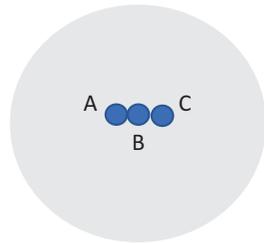
Colander and Kupers (2014, pp. 116–118) find the fickleness a defining characteristic of economic complexity. Gladwell (2002) tells many stories about it in and out of economics.

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Antibodies

Raiders

Abstract Corporate raiders go after firms that show the 4 Toos: big, complex, fragile, and similar. Raiders' mantra is: Undo these empires! They believe that the sum of the values of the parts of a corporate empire is greater than the value of the whole. I review both attack tactics and defense tactics in the battle between raiders and managers. Later in the chapter I introduce a simple model of how raiders search and pursue targets. I demonstrate that the model makes intuitively plausible predictions. I have learned to stop worrying that much about firms and to begin loving raiders. The chapter gives corporate raiders a lift to their rightful place in capitalism.

Keywords Corporate raiders • Targets • Defenses • The search curve • The pursuit curve

Corporate raiders salivate over firms that show the 4 Toos: too big, too complex, too fragile, and too similar. They want to take over these firms, restructure them, and resell them in parts. (For doing these things, they have been called "asset strippers.") They believe that the sum of the values of the parts is greater than the value of the whole.

Corporate raiders fill a CEO's heart with fear (*The Economist* 2015). I imagine that they appear regularly in a CEO's nightmares. Of course, managers do not sit idly by while waiting for the knock on the door. They are prepared to battle raiders.

In this chapter we construct a model of the battlefield, and then use the model to learn how raiders play a pivotal role in corporate governance.

A raider knows that diplomacy does not work in takeovers. Diplomacy soothes feelings but does not change minds. So a raider must take control of a firm in order to restructure it. A raider can do that in any of three ways. These can be illustrated in a network diagram like Fig. 12.1.

This map shows three routes for raid. The most direct is the route to the manager: Just ask the manager to leave the building and not come back. (The popular term for this route is *casual pass*.) A less direct route leads to the Board of Directors: Persuade the board to fire the manager. (The popular term for this route is *proxy fight*.) The third and least direct route takes the raider to shareholders: By purchasing equity or soliciting proxies, the raider gains a position from which to persuade the Board of Directors to fire the manager. (The popular term for this route is *tender offer*.) The raider may take these routes simultaneously or in sequence.

Over the last 30 years, raiders have been shifting their routes toward indirect ones. This is in response to changing defenses by managers. As in any battle, tactics of attack and defense interact and change over time.
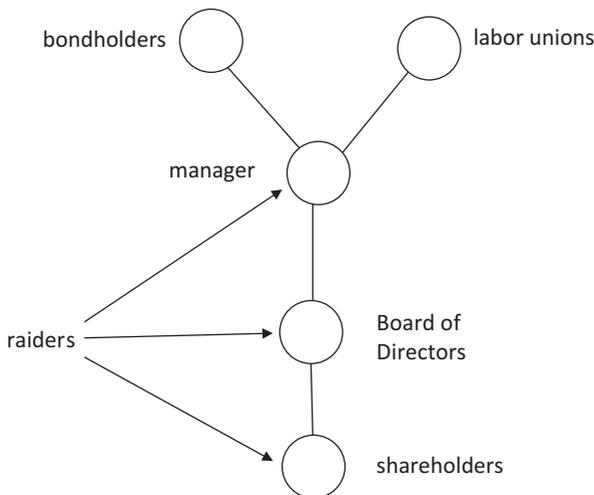
Fig. 12.1   Routes for raid. Source: Author's creation

DEFENSES

People become ingenious and resourceful when they come under attack. Managers are no exception. Table 12.1 summarizes the common defense tactics (Gaughan 2007).

Below is a letter template that I have drafted for managers who wish to warn approaching raiders.

Dear _____

I have reason to believe that you are interested in taking over my firm and having me fired.

Don't bother. I am ready to buy my firm myself. I will borrow to do it. Yes, it would be what you call a "leveraged buy-out." If you still don't give up, watch out. I am capable of turning into Pac-man. I can become the predator and make you the prey.

If you persist in your unwise pursuit, please be advised that you need to proceed with extreme caution. There are poison pills in what you are trying to swallow. For your good information, you won't make any money because at the first sign of your aggression I can issue more shares to dilute your position. I guarantee it. If you should persist in your aggression, please be advised that I have other ways of destroying the valuables you so yearn for. Have you ever seen a "scorched earth"? If not, you will.

Okay, I know you are tough too, so I am also prepared to make you an offer you can't refuse. Whatever shares you are holding in your hand, I will buy them from you at double what you paid. Just hand me those shares and go home. There is an envelope waiting. But understand that this is the only greenmail from me.

Finally, I suggest that you consult your Wall Street friends before making further moves on my firm. Be sure to ask about Williams Act. They will show you numerous state and federal laws against what you are trying to do.

Best wishes.

_____   _____
signature   date

Instead of confronting raiders, the manager may evade them by "going private." This tactic is a solution to a serious problem with being a public company: The shares are for all to buy. Raiders, in particular, can buy enough shares to gain a credible position. By taking the firm out of stock exchanges,

Table 12.1 Defenses against raiders

Defense Categories	Tactics
Preempt	leveraged buy-out;
	Pac-man
Turn Off	poison pills;
	scorched earth;
	super majority
Bribe Off	greenmail
Block Off	anti-takeover laws;
	state and federal regulation

Source: Author's creation

the manager can make it more difficult for raiders to launch an attack. It is not surprising, therefore, that the number of public companies of late has been dwindling, with about 3500 in the U.S. at this time. This is happening while the universe of big firms has been expanding.

The Battle for Control

Search

Raiders must search for targets. (Firms are targets only when they have caught raiders' attention.) Raiders are attracted by signs of defense. The reason is simple: Something is protected only when it is valuable. Defense, therefore, signals value. By this logic, we can draw a "search curve," as in Fig. 12.2. The curve is upward-sloping: As the prevailing level of defense spending rises, raiders will search harder for targets.

Pursuit

Once raiders have identified a target, they must decide whether to pursue it or not. Here, again, raiders must consider the strength of defense to be expected. When the defense is going to be strong, a successful raid is going to be difficult. Fewer raiders will pursue it. Also, each raider will pursue fewer targets when defense is stronger. Figure 12.3 shows a downward-sloping "pursuit curve."

Fig. 12.2 The target search curve. Source: Author's creation

the search curve

defense spending
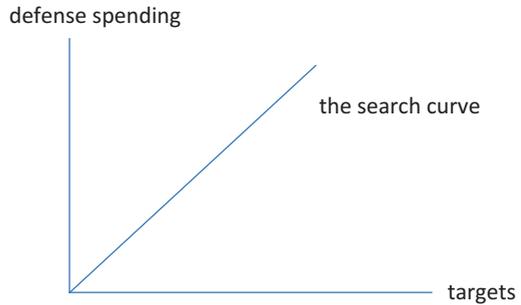
targets

Fig. 12.3 The target pursuit curve. Source: Author's creation

the pursuit curve

defense spending
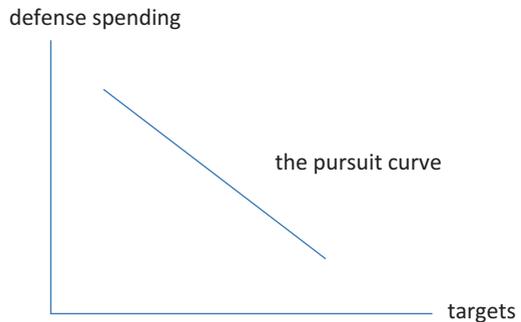
targets

The Battle Equilibrium

What levels of search and pursuit will prevail? We may loosely use the language of supply and demand. When raiders pursue more targets than they have identified, we may say there is more demand than supply. As Fig. 12.4 illustrates, at the relatively low defense level d_1, the "demand" for targets is so strong that it exceeds the "supply" of targets. Managers face more raids than they have assumed and prepared for. Naturally, they will spend more on defense. At the relatively high defense level d_2, raiders see more valuable targets, but they pursue fewer of them because of lower success rate. Facing fewer raids, managers will lower their spending on defense.

Fig. 12.4 The
battlefield. Source:
Author's creation
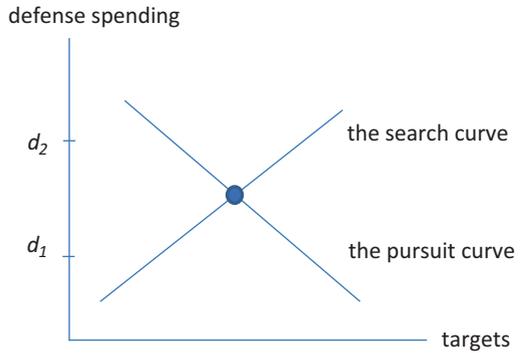
Fig. 12.5 How more
potent poison pills
change the battlefield.
Source: Author's
creation
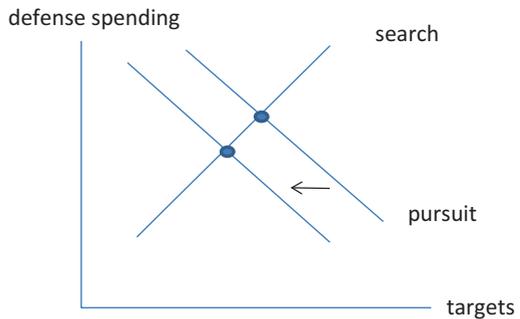
Some Comparative Statics

Let's check the theory above against our intuition.

First, imagine that managers have invented more potent poison pills, without additional spending on defense. What will happen to the prevailing level of defense among firms and the number of raids? My gut feeling is that these new poison pills will result in a reduction in actual raids and a relaxation of defense on the part of managers. The theory, meanwhile, predicts that the new poison pills will deter pursuits overall, so the pursuit curve will shift to the left, as in Fig. 12.5. The results are fewer raids and a lower level of defense spending. Bingo.

To double check the theory against intuition, imagine that more managers are taking their firms private. What will happen in the battlefield? My gut feeling here is that there will be fewer raids being launched and the remaining managers will strengthen their defense. The theory, meanwhile,

Fig. 12.6 How going private changes the battlefield. Source: Author's creation

defense spending

search

pursuit
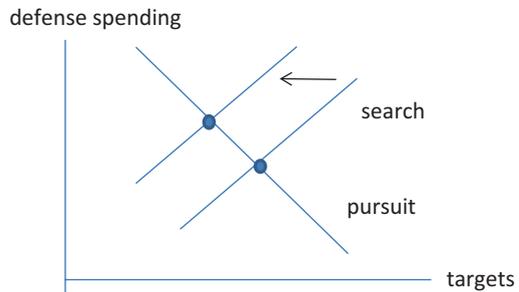
targets

says that "going private," by reducing the field of targets, will make raiders' target search less productive. The yield will go down. As Fig. 12.6 shows, the lower yield translates into a shift of the search curve to the left. The results are fewer raids in the aggregate and higher defense spending among remaining managers. Bingo again.

CONCLUSION

We have ambivalent feelings toward corporate raiders. In particular, they seem bent on destroying things. That feeling has to do with our sense of "loss aversion." We are prone to see a corporate empire as both a monument and a living organism. When someone tries to demolish a monument, we instinctively feel a sense of loss. When a raider cuts up a firm, fires workers, and sells the firm piecemeal, we feel sympathetic. We are terrified by the sight of a structure being torn down, even when we know it is wobbly. We do not stop to think if the structure has been good or bad for us. We are used to it and we just hate to see it gone.

Regardless of our private inner feelings, raiders do perform a public service. Without raiders, we ourselves would need to keep an eye on managers. But there is the rub: We won't. Each of us evades that responsibility, hoping that others will take it on. So we end up with a tragedy of the commons: runaway managers.

From corporate raids, I have learned to see a ray of hope for capitalism.

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CHAPTER 13

Trustbusters

Abstract Antitrust agencies patrol the main streets and the back alleys of industries in search of violations of antitrust laws. I review the two main forms of antitrust violation: structural and behavioral. In the second half of the chapter, I turn to tactics that managers use to evade and thwart antitrust agents. The tactics belong to four categories: structural, behavioral, legal, and "capturing." Before closing, I suggest that trustbusters and managers always have the option of changing the game that they play: stop fighting and go for arbitration. That is, they may seek regulation instead. This suggests that antitrust and regulation are two sides of the same coin.

Alongside private raiders, antitrust agencies patrol the streets of industrial organizations. While private raiders are nimble, antitrust agencies are powerful. For one thing, an antitrust agency has the backing of laws and the resources to litigate and to seek remedies. In 1911, the U.S. antitrust busters succeeded in breaking a big holding company by the name of Standard Oil of New Jersey into 33 pieces. It is doubtful if a private raider could have been able to do that then, or can do that today.

Table 13.1   The 4 Toos and the U.S. laws against them

The 4 Toos	*U.S. antitrust laws*
Too big	Section 2 of the Sherman Act;
	Section 7 of the Clayton Act
Too complex	Section 7 of the Clayton Act;
Too fragile	Section 2 of the Sherman Act;
	Section 7 of the Clayton Act
Too similar	Section 1 of the Sherman Act;

Source: Author's creation

Antitrust agents go after collusion, monopolization, and mergers that "tend to create monopoly" or "substantially lessen competition." The U.S. antitrust laws may be matched with the 4 Toos of modern corporations, as in Table 13.1.

In the final analysis, antitrust agents do a lot of the same things that raiders do: breakups, divestitures, and reorganizations. Meanwhile, the manager has two broad counterstrategies: evade and thwart. They work in much the same ways in antitrust as in other arenas of criminal justice.

In this chapter we take a closer look at the tactics, their interactions, and the battle. Among the outcomes, there are the expected and, more interesting, the unexpected.

How to Seek

Antitrust agencies look for problematic structures and behaviors.

Structural Targets

There are telltale signs of violations in a network. Three firms can form either of two networks (Figs. 13.1 and 13.2):

The first is a *cycle* network. It has no center. This structure is common among cartels. The second is a *star* network, with the center firm coordinating the two peripheral firms. It is essentially the structure of a "holding company" or "trust." Standard Oil of New Jersey in 1911 was a trust. So was U.S. Steel in 1920. Both came under scrutiny by antitrust agents.

An antitrust agent finds it easier to attack the cycle network, rather than the star network. In the examples given earlier, there are three links in the cycle network, while there are only two in the star network. Three links present greater exposure than two.

Fig. 13.1 A cartel.
Source: Author's
creation
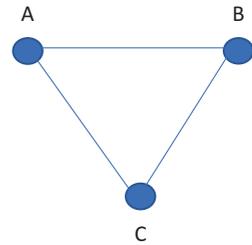
Fig. 13.2 A trust.
Source: Author's
creation
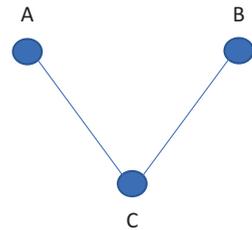
Behavioral Targets

U.S. antitrust agents go after three behaviors that are specifically outlawed:

- Collusion (Section 1 of Sherman)
- Foreclosure (Section 3 of Clayton; Section 2 of Sherman)
- Discrimination (Section 2 of Clayton, as amended by Robinson-Patman Act)

These behaviors, however, are not always transparent, so they tend to be more difficult to target.

How to Hide

Just as managers can defend themselves from raiders, so they can defend themselves against trustbusters. The tactics don't have colorful names like "poison pills" and "greenmails." But they have the same purposes: evade or thwart.

Structural Tactics

When a cartel comes under attack by antitrust, cartel members may respond by merging into a single company. This makes sense because, while collusion is illegal, agreement within a single legal entity is not illegal. It is no more illegal than a conversation among family members about what to have for dinner. (Of course, the mergers may raise the specter of monopolization, so the organizers will have to consider that risk.) *Addyston Pipe and Steel v. United States* (1899) illustrates this structural defense. The iron-pipe producers were brought to court for collusion, and they decided to merge even before the court rendered a decision (Bittlingmayer 1982). The Clayton Act, which would have stood in the way of the merger, did not exist then.

Short of merging completely, firms may reduce some links or modify the entire architecture of their network. Consider the practice of "price leadership." Suppose the cartel at the present time is a complete network among four members, as Fig. 13.3 illustrates. There are six links, each going two ways. So there are 12 messages being transmitted each time the cartel wants to get agreement on something. Now the cartel can transform into a star network, as Fig. 13.4 illustrates. At the center is the price leader; at the peripheral are the price followers. There are only three two-way links and, therefore, six messages to be transmitted. In this way, the exposure to antitrust attack is cut in half.

The U.S. automobile industry used to have a star structure for setting prices. When the time came to announce price changes, one of the "Big Three" companies would act as the price leader. For many years, Chrysler acted as the leader, even though it was much smaller than General Motors and Ford Motors. Other means of tacit collusion are "phases-of-the-moon" method (Baker and Faulkner 1993) and "basing-point pricing" (U.S. v. U.S. Steel 1920).

Fig. 13.3 Cartel without a leader. Source: Author's creation
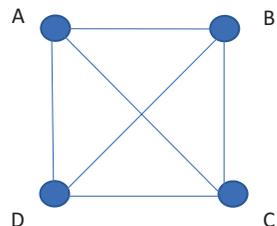
Fig. 13.4 Cartel with a leader. Source: Author's creation
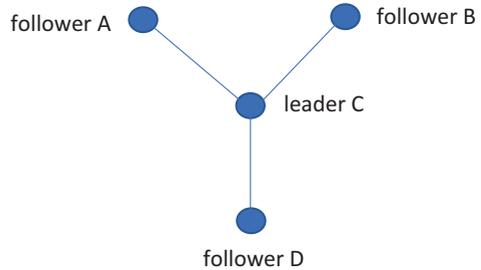
There are even more subtle structural tactics. Consider "credit-default swaps" again. These are co-insurance contracts among firms, which make it possible for firms to help each other as if they were members of a holding company. Credit-default swaps are not all that different from basing-point pricing or market-division agreements.

Behavioral Tactics

Instead of changing structure, a cartel may simply modify behavior. One way to do that is to make agreements harder to detect. Instead of throwing parties to celebrate the signing of agreements on pricing fixing and market division, invite members to meet at golf clubs over food and drinks. In the case of the U.S. Steel cartel, that worked well (U.S. v. U.S. Steel Corporation 1920). The court judges felt sympathetic for producers who had to consort at "Gary Dinners" in order to iron things out. The judges felt that a successful cartel would not have to socialize members to that extent. So U.S. Steel got off the hook.

If meetings are still too risky, try conversations. A conversation conveys a wide range of emotions and information (Shiller 1995). It is more effective in eliciting cooperative behaviors than a letter or an email (Lee 2010). Businessmen and politicians are willing to go to great lengths to have a conversation with each other. This is particularly true in situations where coordination is critical. In the 1966 case of the lysine cartel, the court judges learned that members had traveled to Tokyo, Paris, Mexico City, Hong Kong and Hawaii, in order to have conversations.

The Game of Hide-and-Seek

One way to visualize the hide-and-seek game is to imagine two interacting populations: firms and antitrust agents. Firms are constantly trying to hide from antitrust agents, while antitrust agents are constantly seeking out firms for violation of laws. The two populations do not sit down and negotiate; they react to each other.

The two activities—seeking and hiding—form a feedback loop: Seeking goes up when hiding goes up, and vice versa. Figure 13.5 illustrates the loop by means of reaction curves.

The firms' reaction function shows how hiding varies with seeking, while trustbusters' reaction function shows how seeking varies with hiding. In both cases, more of one activity brings about more of the other. So when firms try harder to hide, trustbusters try harder to seek. And when trustbusters seek harder, firms hide harder. These are reasons why the reaction curves are sloped upward. Also note that neither of the curves starts at the origin. The assumption there is that there is a minimum level of one activity even when it appears that there is none of the other activity. So seeking continues even when it appears that there is no hiding. And firms will continue to hide, even when they see no seeking. Figure 13.5 shows that the hide-and-seek game may settle into point C or a Cournot equilibrium (Lee 1980a).
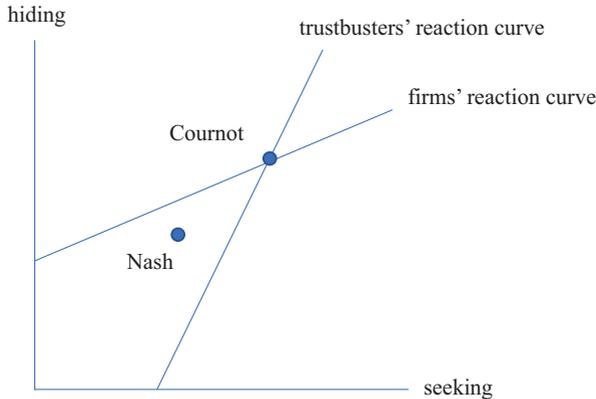
Fig. 13.5 Antitrust games (Cournot and Nash). Source: Author's creation

CONCLUSION

People can agree to change the games they play. Suppose that both managers and antitrust agents are tired of playing hide-and-seek. They can sit down at the table and negotiate. In particular, they can agree to submit to arbitration. The arbitrator is a regulator, commonly known as a commission with an alphabetical name. The commissioner presumably has expertise in finding "fair" solutions in conflict situations. In return, both managers and antitrust agents will put their arms down and refrain from open hostilities toward each other. Figure 13.5 shows the Nash Solution as the commission's decision. Both trustbusters and managers find it superior to the Cournot equilibrium (Lee 1980b). The 1943 case *Parker versus Brown* comes to mind. It involved a raisins cartel. The court judge ruled that antitrust agents must keep their hands off the cartel, because the cartel was under the auspices of the state of California. Indeed the top administrator of the cartel was a state employee.

Managers have another option. They can build revolving doors to capture antitrust agents and regulators. Capture has always been popular (Stigler 1971; Peltzman 1976; Baumol 1983; Stiglitz 2012; Lindsey and Teles 2017; Pearlstein 2018; Wu 2018). Public servants are, after all, just people. Given the right incentives in a confrontation, people change side. There is now evidence that even antitrust judges are just people like you and me (Bechtold et al. 2019).

Capture is a fascinating phenomenon of industrial organization. In the Appendix, I build a model to explore the dynamics of it.

APPENDIX: A MODEL OF REGULATORY CAPTURE

In this Appendix I present a model of an economy in which managers capture regulators. Again, the model is interesting because it has properties that are not quite obvious.

The model describes the ecology of two interacting populations: managers and regulators. The ecology is perfectly described by the Lotka-Volterra model of predators and preys (Kemeny and Snell 1972). In the simplest version of the model, there are two linear differential equations, one describing the evolution of regulators (R) and the other the evolution of managers (M):

$$dM \,/\, dt = a_1 M - a_2 RM \qquad\qquad (13.1)$$

$$dR \,/\, dt = -b_1 R + b_2 RM \qquad\qquad (13.2)$$

All four coefficients in these two equations have positive values:

a_1: Attracted by the success of current managers, aspiring managers appear at a rate proportional to the size of current managers. This is a birth rate.

a_2: At any moment, some managers become prey to regulators at a rate proportional to the intensity of their interaction. This is a death rate.

b_1: At any moment, a proportion of regulators will have outgrown their usefulness to managers, lose their political and financial support, and atrophy. This is also a death rate.

b_2: At any moment, new regulators emerge at a rate proportional to the intensity of interaction between managers and regulators. New regulators appear because managers try to recruit regulators who will suppress rivalry, or because new regulators emerge to compete with existing regulators for a piece of the pie. This is a birth rate.

The most interesting property of the ecology is that it is circular. In Fig. 13.6, the ecology moves counterclockwise on a loop. (The precise loop on which the ecology travels is a matter of historical accident.)
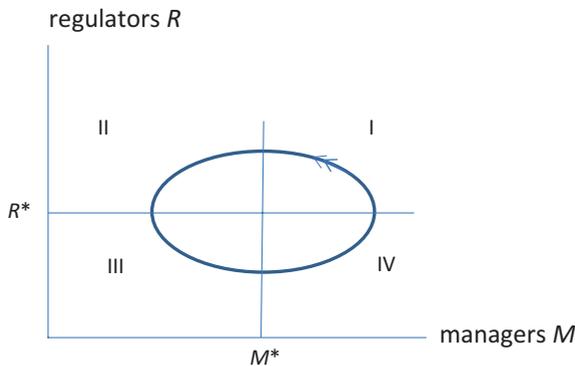
Fig. 13.6 Phases of regulatory capture. Source: Author's creation

A loop has four phases:

Phase I: Regulators rise; managers decline.
Phase II: Regulators decline; managers continue their decline.
Phase III. Regulators continue to decline; managers turn the corner and begin to grow.
Phase IV. Regulators stage comeback; managers continue to grow.

Since the economy circulates like a horse on a race track, it is convenient to speak of average values once around the track (Kemeny and Snell 1972, p. 29). These values may be found by solving for the "equilibrium" of the two differential equations Eq. 13.1 and Eq. 13.2:

$$M^* = b_1/b_2$$
$$R^* = a_1/a_2$$

The striking lesson here is: The population of managers over a cycle depends entirely on the characteristics of the population of regulators, and vice versa.

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CHAPTER 14

Creative Destructors

Abstract Creative destructors are firms that *create* new taste, new products, new technologies, and new organizations; meanwhile, they *destroy* old taste, old products, old technologies, and old organizations. (The popular name for them today is "disruptors.") In this chapter I ask how creative destructors change market shape, market size, and dominance. I build a simple model of "the perennial gale of creative destruction." The model shows that creative destruction can promote welfare at a point in time as well as over time. That is to say, static efficiency and dynamic efficiency are compatible: there is no tradeoff between them. No apologies are necessary by anyone.

Keywords Innovators • Imitators • The gale of creative destruction • Static efficiency • Dynamic efficiency

On any day, firms are creating new tastes, new products, new technologies, and new organizations. On the same day, firms are destroying old tastes, old products, old technologies, and old organizations. Joseph Schumpeter (1950, p. 84) called this relentless process of simultaneous creation and destruction "the perennial gale of creative destruction." This gale has been catching a lot of attention ever since.

Take the energy market today. There are new ways of generating electricity: natural gas with carbon capture, solar, wind, geothermal, and biomass. At the same time, coal-burning power plants are going the way

of the dinosaurs. The gale of creative destruction is moving through the energy market for sure.

Or take the automobile market today. Funny as it may sound, automobiles are finally beginning to be "auto," delivering their century-old promise. Self-driving cars and buses are seriously disrupting the prevailing car models. They are even getting involved in road accidents. So the gale of creative destruction is certainly active in the automobile market.

The medical-care market has been under gale watch, too. For a common physical or mental ailment, there are several drugs. For every handicap, there are several instruments. After a facial cream proves popular, it attracts generics. The generics then crowd out each other, sometimes also the original. The gale of creative destruction is cutting a path through every pharmacy for sure.

In this chapter I look at the gale of creative destruction as another countervailing force against the 4 Toos of firms: too big, too complex, too fragile, and too similar. I learn surprising—and encouraging—lessons.

THE ECOLOGY OF INNOVATION AND IMITATION

Consider the ecology of two interacting populations: innovators and imitators. Innovators bring forth new products, and imitators copy them. Figure 14.1 is a snapshot. It shows three distinct product clusters, each consisting of two firms (perhaps the innovator and an imitator).

We measure the intensity of innovation by the total number of product clusters and the intensity of competition in a cluster by the number of firms in it. These two measures correspond to dynamic efficiency and static efficiency, respectively.

Fig. 14.1 A snapshot of a market. Source: Author's creation
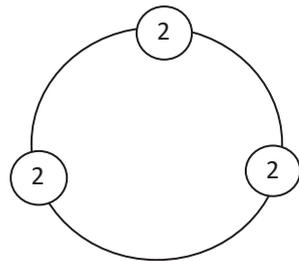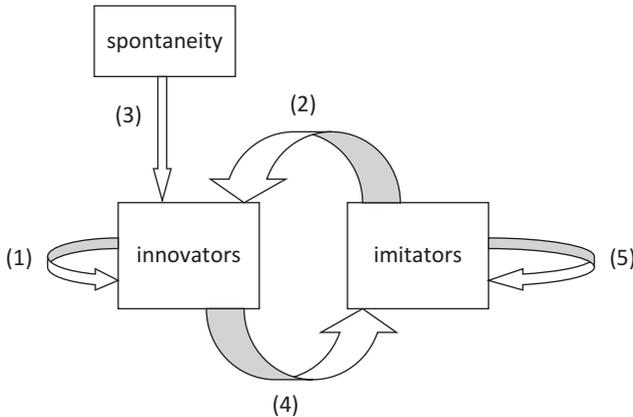
Fig. 14.2 The five forces in creative destruction. Source: Author's creation

Dynamic efficiency and static efficiency are linked by five forces of the gale of creative destruction: three impinging on innovation and two on imitation. Figure 14.2 depicts the five forces in a feedback loop between innovators and imitators.

Force 1: Innovation Cascade

When a new product becomes established, it emits a message automatically: There is food and water out here. That signal attracts more new products. Call it a "pull effect." Scherer (1980, pp. 428–429) thinks the innovator has a "push effect," too: "Once he does so, he threatens the market shares of other industry members, precipitating a spiral of relations that ends with each seller introducing its countervailing new product at an earlier date than would have been the case in the absence of rivalry."

Force 2: The Destruction of Whole Product Clusters

Under siege by imitators, a new product may fail to establish itself, and an old product may also fail to hold on. Entire product clusters may disappear.

Force 3: Spontaneous Innovations

As Schumpeter (1934, p. 66; 1939, p. 73) notes, innovations may occur regardless of prevailing market conditions. Spontaneous innovations have to do with education in arts, languages, sciences, and social sciences. Also, they have to do with law and order, perceptiveness of the people, entrepreneurship, concern for recognition and material well-being, and capital market.

Force 4: The Emergence of Imitators

Imitators are never far behind innovators. The more innovators they see, the faster imitators appear and begin to compete for market share.

Force 5: The Exit of Imitators

As a product cluster gets crowded, some imitators drop out of it.

These five forces together drive the gale of creative destruction. Now imagine that the gale settles into a "steady state." In a steady state, new products continue to appear, while old products continue to disappear. The macro pattern does not change, even though the micro details continue to be in flux.

How Creative Destruction Changes Efficiencies

Is the gale a good thing, or not? Schumpeter himself (1950, p. 83) suspected that there might be a tradeoff: "A system—any system, economic or other—that at every given point of time fully utilizes its possibilities to the best advantage may yet in the long run be inferior to a system that does so at no given point of time." His remark has set off a search for the tradeoff.

Imagine that the gale changes in intensity or direction, the cause being advances in machine learning. Demand is being created and destroyed, products are being introduced and obliterated, and firms are entering and exiting the market. As a result, the market shape will change. Let's take two snapshots of the market, over a period of, say, a decade. Superimposed in Fig. 14.3, the snapshots look like an expanding ring.

Fig. 14.3 Market as an expanding ring. Source: Author's creation
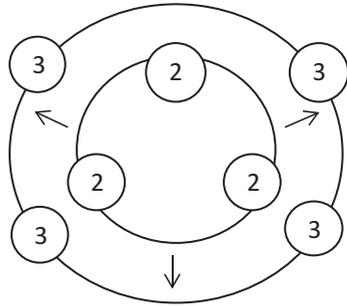
The expanding ring shows that the market has changed in three ways.

(a) The market has expanded: there are more consumers in it now.
(b) The number of product clusters has increased from three to four.
(c) The market share of the average firm has declined from 1/6 to 1/12.

These changes suggest that the market has become more efficient: "Dynamic efficiency"—measured by the number of clusters—has gone up, and so has "static efficiency"—measured by the number of firms in a cluster. There is no tradeoff evident here.

In the Appendix, I explore a linear model of the feedback loop. Table 14.1 summarizes what I find.

The model shows that static and dynamic efficiencies respond similarly to changes in the market environment. Here are five scenarios:

1. A faster pace of innovation cascading will promote both efficiencies. An example is a surge in the demand for fashions.
2. An uptick in the ability of imitators to discourage innovators will dampen both efficiencies. An example is patent trolling.
3. A spontaneous innovation by itself will enhance both efficiencies. An example is internet.
4. A greater speed of imitation will reduce both efficiencies. An example is a court ruling that weakens patent protection.
5. A rise in the rate of attrition among imitators themselves is good for both efficiencies. An example is a stronger law against collusion.

In sum, there is no tradeoff evident in the model.

Table 14.1 Dynamic and static efficiencies

	Dynamic efficiency	*Static efficiency*
Force 1 Innovation cascading	+	+
Force 2 The destruction of products	–	–
Force 3 Spontaneous innovation	+	+
Force 4 Speed of imitation	–	–
Force 5 Attrition among imitators	+	+

CONCLUSION

What can imitators and innovators take away from this analysis of the perennial gale of creative destruction? For imitators, they may conclude that no apologies to innovators are necessary. For innovators, they may conclude that no complaints about imitators will stand the test of time. In the end, the gale of creative destruction makes everybody a winner.

As a concerned student of industrial organization, I conclude that creative destruction may very well restrain the 4 Toos: too big, too complex, too fragile, and too similar. It may very well be an antidote to the manager's obsession with dominance.

APPENDIX: A MODEL OF THE GALE OF CREATIVE DESTRUCTION

Figure 14.2 depicts the gale of creative destruction as a feedback loop. The simplest mathematical formulation of the gale consists of two linear differential equations:

$$\frac{dN}{dt} = a_1 N - a_2 \left[\frac{M}{N} \right] + a_3 \tag{14.1}$$

$$\frac{dM}{dt} = a_4 N - a_5 \left[\frac{M}{N} \right] \tag{14.2}$$

where

N is the number of innovators;
M is the number of imitators;
t is time;
a's are the five forces of the gale.

The first equation captures three forces impinging on innovation, while the second equation captures two forces impinging on imitation.

We may examine several properties of this market, such as time path, stability, and convergence or non-convergence. I will focus on the "steady state," where neither the number of innovators nor the number of imitators changes.

$$N = \left(\frac{a_3 a_5}{a_2 a_4 - a_1 a_5} \right) \tag{14.3}$$

$$M = \left(\frac{a_4}{a_5} \right) \left(\frac{a_3 a_5}{a_2 a_4 - a_1 a_5} \right)^2 \tag{14.4}$$

The comparative statics are reported in Table 14.1.

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