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Ruling the Waves

CYCLES OF DISCOVERY, CHAOS, AND WEALTH FROM THE COMPASS TO THE INTERNET

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DEDICATED TO
RAY VERNON
(1913–1999)

Who would have hated
anything too sentimental. . . .

standards and that these standards can serve both to advance an industry and to protect it.

Finally, the story to date of the music industry raises interesting questions about the relative power of new and established firms—the pirates and those from whom they would hope to steal. In most of the stories we've seen, it is the pirates who morph over time into establishment figures, shaping the rules of their new game and redefining the terms of engagement. Certainly this was the case with Sir Francis Drake, with the British East India Company, with Bill Gates, and Rupert Murdoch. In the digital music industry, by contrast, matters seem to have run in the opposite direction. If BMG absorbs Napster and converts it to a fee-for-service model, or if EMI and Sony continue to pursue start-ups such as CDnow and mimic their operations, then the established firms may wind up swallowing the pirates before they can do that much damage. To be sure, the case of online piracy means that illicit downloads will always occur in teenagers' bedrooms and college dorms. Large-scale pirates will flourish in their usual offshore lairs and renegade musicians will flaunt their independence by circumventing the labels. But the labels themselves will also evolve, purchasing the rebel players as their venture capital begins to dissolve and developing new models of online commerce.

In the end, therefore, the online music industry may well be regulated by a combination of private and public forces. Firms will set industry standards; governments will enforce them; and even diehard music fans will eventually accept some revised notion of property rights in a digital age. This isn't the future that Chuck D has touted, of course; it isn't a world where music is free and record labels fade into commercial oblivion. It is, however, a world that aligns with what the political history of technology suggests. Markets need rules if they are to survive, and power—slowly sometimes, ironically perhaps, and often unfairly—flows to those who make the rules.

CHAPTER 8

Surfing the Barbary Coast

In 1993 the Nobel Prize for Economics went to Douglass North, a seventy-three-year-old professor who was then teaching at Washington University in St. Louis. North was in many respects an unlikely candidate for the esteemed Swedish prize. He worked in the field of economic history, something of a backwater for economists, and his work displayed little of the mathematical pyrotechnics that graced many of his colleagues' papers. Instead, North's work was a bold and meticulous account of economic development—of how civilizations had grown over thousands of years and why some, but only some, had prospered. And his conclusions, for an economist at least, were radical. For North suggested—insisted, really—that markets never prospered in the absence of a state. Individuals, he claimed, could regulate their businesses perfectly well in a small or traditional society; larger groups could

form guilds or associations that would guide transactions as markets first grew. But eventually, if these early markets were to develop into large, efficient, and impersonal enterprises, then states had to step in, creating the rules and institutions that successful commerce demanded. Or, as North expressed it: "Undergirding . . . markets are secure property rights, which entail a polity and judicial system to permit low cost contracting."[1]

It is tempting at the turn of the twentieth century to dismiss North's findings as irrelevant, to argue that breakthrough technologies have laid the path towards a new social order and severed the historical link between market and state. North, after all, was writing about ancient markets and had only a peripheral interest in technology. He didn't know about cyberspace when he crafted his theories and, like most everyone else, had no idea that it was coming. Perhaps, then, there is no reason to believe that his view of history should still apply. Perhaps, as the cyberlibertarians argue, there really is something different about the digital age, something that reverses North's proffered connection between business and politics. Maybe we really are standing at the edge of history, looking forward to a time when, as one computer columnist predicted, "the exodus of the productive will . . . touch off a revolution that will result in the practical separation of commerce and state, a radical, outrageous, earth shaking development that will be a tremendous threat to the existing social order and will challenge the moral underpinnings of all governments as they are now conceived."[2]

The stories here, however, suggest otherwise. They suggest that despite the latest round of prophecy, despite the euphoria and venture capital and buzz, the advent of cyberspace is nothing but another arc along technology's frontier. This isn't to say that the Net is not radical, for it is. And it's not to argue digital technologies won't change the way we work and play and organize our societies, for they will. What the stories of this book suggest, though, is that the emergence of cyberspace is not an unprecedented event. The development of both the printing

[1]Douglass C. North, "Institutions," *Journal of Economic Perspectives* 5, no. 1 (Winter 1991), pp. 97–112.
[2]Bill Frezza, "The Crucible of Radical Capitalism: How the Information Revolution Will Transform the Politics of Power," *DigitalLiberty*, August 1994. (http://www.digitaliberty.com/crucible.html)

press and the compass, for example, had jarring, long-term effects; so did the invention of telegraphy, railroads, steamships, and radio. In all of these cases, the technology of the time seemed just as awesome as the Net does today. There were pioneers who stole the public's imagination, pirates who stole their loot, and prophets who foresaw utopia in the technology's advance. Yet as these technologies evolved, they traced much the same pattern as North might have predicted. They grew from small communities of like-minded inventors, were shaped for a glorious time by entrepreneurs and private rules, and in the end fell fully—or at least largely—under government's sway. The pirates of the Caribbean, for example, succumbed to the power of Britain's navy while the great telegraph companies were eventually standardized and regulated. The airwaves were ruled by a string of bureaucratic agencies, and even Murdoch's BSkyB was gradually reined in by the government it once scorned. In each of these cases, therefore, the ebb and flow of innovation led over time to a period of rules, a period when governments stepped into the evolving market and created some kind of stable framework around it.

In cyberspace, a very similar process is already underway. On both sides of the Atlantic, for instance, governments have indicated that the basic rules of competition—the same rules that stymied Marconi and dogged Western Union—will apply just as strictly across the new technologies. They have begun, as the case of MP3 demonstrates, to stumble towards new definitions of property and new means of enforcement. They have started to address major social issues such as privacy and to drag a handful of old policies—on consumer fraud, accounting conventions, and so forth—into the new space. In most parts of the world, at least, governments have not actively tried to regulate or police the Net. They haven't imposed censorship (with a few select exceptions) and they have not yet tried to raise taxes.[3] They have, however, begun to establish some basic rules: rules of property, of competition, of consumer protection and criminal behavior.[4] Standard procedure along the final tracks of the frontier.

[3]Taxes may be coming soon. See Howard Gleckman, "The Other Tax Battleground of 2001: The Internet," *BusinessWeek*, February 19, 2001, p. 49.
[4]For an interesting discussion of how these rules are evolving in Asia, see Ang Peng Hwa, "Policing Asia's Internet," *Asian Wall Street Journal*, September 7, 2000, p. 8.

Admittedly, there are some reaches of cyberspace that are likely to resist formal rules forever; there are some ways, as described below, in which cyberspace may prove as radical and ungovernable as the printing press. But in the broadest political sense, the most remarkable thing about cyberspace may be just how unremarkable it actually is. For there will be rules in cyberspace, and governments will help to craft and enforce them. Why? Because even along this wildest of frontiers, pioneers need property rights, and standards, and some basic understanding of what constitutes fair and foul play. And the only entity that can sustain and enforce these rules is the state.

Of Politics and Property

At one level, the connection between state action and property rights is no surprise. Indeed, political philosophers have underscored this link for centuries, maintaining that a fundamental function of the state—perhaps, in fact, *the* fundamental function—was to ensure the sanctity of its citizens' property. Cicero expounded upon it; Machiavelli promoted it; and the U.S. founding fathers took it as the very basis of their constitution.[5] In a provocative new book, Hernando de Soto takes these arguments even further, arguing (with echoes of North) that it is an absence of property rights, rather than economic mismanagement or bad luck, that has caused many parts of the world to languish for centuries in poverty.[6]

What is more surprising, perhaps, or at least less obvious, is

[5]There is a vast literature describing the relationship between states and property rights. See, for example, John A. James and Mark Thomas, eds., *Capitalism in Context* (Chicago: University of Chicago Press, 1994); Yoram Barzel, "Property Rights and the Evolution of the State," *Economics of Governance* 1 no. 1 (February 2000), pp. 25–51; John L. Campbell and Leon N. Lindberg, "Property Rights and the Organization of Economic Activity by the State," *American Sociological Review* 55, no. 5 (pp. 634–47); Harry N. Schreiber, "Regulation, Property Rights, and Definition of 'The Market': Law and the American Economy," *Journal of Economic History* XLI, no. 1 (March 1981), pp. 103–109; and Douglass C. North and Robert Thomas, *The Rise of the Western World: A New Economic History* (Cambridge: Cambridge University Press, 1973).

[6]Hernando de Soto, *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else* (London: Bantam, 2000).

how deeply the demand for property rights affects technology's advance. In the earliest stages of invention, property rights are often moot. Inventors such as Heinrich Hertz or Tim Berners-Lee push the limits of knowledge for its own sake, creating theories or devices that often have no direct commercial use. The fact that there may be no property rights in these theories or devices doesn't slow them, since profit is not generally the driving motive for their work. As the innovators give way to the commercial pioneers, however (and sometimes, to be sure, they are one and the same), the lack of property rights becomes distinctly more problematic. For now the game is about profit rather than knowledge, and to earn and keep the profits that they rightfully consider theirs, entrepreneurs must be able to employ their technologies freely and keep them from the grasp of competitive interlopers. They must have property rights, in other words, and some means of enforcing them. Without property rights, rival claims over the new market can rapidly disintegrate into chaos, stunting commercial development as it did in the early days of telegraphy and broadcast radio.

There are various ways in which these rights can be established. If the new technology is vested most directly in a physical device like a telegraph transmitter, existing patent laws can usually migrate toward the new arena. Such was the case with both telegraphy and radio, where fights among the pioneers were resolved through the normal patent reviews of U.S. and European courts. The procedures for establishing ownership were clear, rivals took their claims to court, and contests over property rights never truly clouded the technology's commercial future.

Matters become more complicated, however, when a technology reveals some previously untouched space. In these cases (think of oceanic exploration, broadcast radio, or satellite television), the property in question is bigger and broader than a single device or invention. It is a whole new realm, one without any clear demarcation or inherent forms of ownership. These are the cases that are most likely to slide into anarchy, as each of the pioneers struggles to maintain his own stake and keep interlopers at bay. Theoretically, it should be possible for the pioneers to resolve their squabbles amongst themselves.

They should be able, one might presume, to negotiate private contracts or protect their bit of turf. And sometimes, indeed, they can.[7] Usually, though, private schemes of either governance or enforcement fall prey to their obvious vulnerabilities. Tensions mount without an impartial arbitrator, and the physical costs of enforcement grow too high. Eventually, the largest of the pioneers (who have, after all, the most at stake) turn to the government, asking the state to provide a service that the market cannot. Such was the case with the U.S. broadcasting industry, for example, and with the early British trading companies. It also applies to the current world of digital music, although here the beseeching parties are the established firms and artists who fear that their existing rights will be trampled in a world of MP3.

However it occurs, the establishment of property rights is a crucial stage along the technological frontier. It clarifies relations that often will have been murky until this point and allows the successful pioneers to build their firms and markets in a more stable, less chaotic environment. It is a stage that is absolutely critical for a technology with commercial intent, and one that should make the Marxists proud. For as property rights are created, the state confers power—intentionally or not—to a discrete set of firms. And more often than not, the ones that receive this power are already the most powerful: the British East India Company, Microsoft (in its copyright fights with Apple), RCA in the 1920s, and the giant music firms today. These are the firms that lobby for property rights; that drag their innovation into patent courts and beseech the government to carve up disputed territories. They are the ones that use government to create a legal and enforceable system of rights, and then employ these rights as the very bedrock of their commercial strategy.

[7]An interesting example of private regulation along these lines occurred at the end of the nineteenth century, when diamond miners in the new fields of South Africa concocted an elaborate system for demarcating and protecting their plots. See Debora L. Spar, *The Cooperative Edge* (Ithaca: Cornell University Press, 1994), pp. 43–47. For a discussion of how private groups were able to monitor economic exchange before the emergence of a powerful state, see Avner Grief, "On Institutions that Facilitate Impersonal Exchange: From the Community Responsibility System to Individual Legal Responsibility in Premodern Europe," Stanford University Department of Economics Working Paper #97-016, 1997.

Recall, for example, how Amos Kendall used his telegraph patents to lock new competitors out of the U.S. market, or how the largest radio stations prodded the government to allocate the spectrum so that the smaller and less profit-oriented concerns were essentially thrown out of the market. This is exactly what firms such as Amazon and Priceline.com have done more recently, attempting to bolster their market position by patenting everything from one-click shopping to name-your-price auctions.[8]

In cyberspace, of course, the problem of property is complicated by its intangible nature. It is harder to patent a concept than a device (as Amazon may eventually discover) and harder to establish ownership over things that cannot be touched, or felt, or seen. Problems of nationality also hound cyberspace, since property is essentially a territorial concept and physical boundaries are not necessarily fixed upon the Net. Yet the weight of these problems is balanced by the pressure of private demands. Firms like Amazon need property rights to preserve what might otherwise be a fragile market position; firms like BMG or Sony desperately need to keep the Napsters of this world from traipsing all over their music and artists and rights. To solve these problems, firms will inevitably pressure the state—through the courts, the legislature, and perhaps even international bodies such as the World Intellectual Property Organization—and the state, history suggests, is likely to respond. This isn't to say, of course, that violations will not occur; they will. There will always be people like Chuck D who revel in a world without rules and are liable to defeat whatever property rights eventually settle upon the Net. But the Net isn't only, or even largely, composed of renegades. It is composed of thousands of lawfully minded companies and millions of basically law-abiding people, many of whom enter cyberspace through large and well-regulated portals such as AOL. Will some of these users follow the pirates and ignore whatever property rights are eventually imposed upon the Net? Undoubtedly. But

[8]See, for example, Tim Jackson, "Inside Track: Amazon's Patently Unique Association of Online Ideas," *Financial Times*, November 14, 2000, p. 16; and May Wong, "Patently Protective? Dot-coms Grabbing Legal Title to What Some Consider Just Normal Practices," *San Diego Union-Tribune*, July 13, 2000, p. C1.

encryption and digital music are being hatched by industry consortia rather than the state; and even the registration of domain names has been left in the hands of ICANN, an independent private group.[11] In places like China, meanwhile, the state has been far more aggressive in setting explicit rules and standards for all kinds of digital conduct.[12]

Eventually, all of these systems and standards are bound to converge into some kind of global norm. Because the Internet is inherently an international technology, and because communications across it ignore territorial boundaries, it is difficult to imagine how a range of incompatible standards could coexist for too long. And so if the Net is to become the global powerhouse that its proponents foresee, it will need to develop a common set of standards before long, equivalent to the kind of cross-border standards that arose in telegraphy, radio, and transoceanic trade. It is too early to tell just how these standards will be established—whether they will be hammered out by government negotiators, crafted by international agencies, or simply imposed by the most powerful market players. But they are likely to emerge in any case, and to undermine the blissful anarchy that might otherwise rule the web.

In the case of competition, the road forward is somewhat easier to predict. For if we look at the cases of Microsoft and BSkyB, two of the most successful companies of the early digital age, it is clear that the old rules of competition have not died away with the new economy. On the contrary, despite the impact of network effects in the satellite television and software industries; despite the fact that industries like these need the kind of standard-setting that Gates and Murdoch provided, the

Privacy Legislation Expected," *Atlanta Journal and Constitution*, December 12, 2000, p. 10E, and Michelle Rafter, "Trust or Bust?" *The Industry Standard*, March 6, 2000, http://www.thestandard.com/article/display/0,1151,12445,00.html.

[11]ICANN, however, has also encountered a fairly predictable set of problems. Since its creation in 1998, the agency has been beleaguered by outside criticism and by its own inability to reach consensus. See Chip Bayers, "Mission Impossible," *Wired*, December 2000, pp. 130–50.

[12]See, for example, Bruce Einhorn, "Big Brother May Crush China's Web Dreams," *BusinessWeek*, February 14, 2000, p. 64; Lorien Holland and Trish Saywell, "Plugging a Sieve," *Far Eastern Economic Review*, February 10, 2000, p. 20; and Bruce Einhorn et al., "China's Tangled Web," *BusinessWeek*, July 17, 2000, pp. 56–58.

weight of their presence still proved too heavy for the industry to bear. In the end, a widespread coalition of firms and state authorities determined that both BSkyB and Microsoft had not, in fact, played fair, and that the scope of their activities was simply too wide and too forceful. They determined, in other words, that Sky and Microsoft—like Marconi and Western Union before them—had exceeded the boundaries of permissible competition, even if those boundaries had not been explicitly extended into their sphere of operation. The implications of this movement are clear: in the United States and the European Union, at least, rules of antitrust will apply in cyberspace.

How these rules will be implemented, of course, is more mysterious. In the wake of the Microsoft case and protracted bouts with Sky, governments on both sides of the Atlantic may decide to use competition policy as an ever-present weapon, something to wield against firms that threaten to become too big or too powerful in the new economy. They may decide to join forces in this quest (indeed, early steps in this direction are already underway[13]) or to impose their notions of competition and antitrust upon the rest of the world economy. Once again, it is simply too early to tell just how this development will play out. If we project from the historical record, though, two probabilities stand out: first, that states will use antitrust to regulate the final stages of the technological frontier; and second, that private firms will solidly support this kind of intervention. For antitrust is in many ways the last gasp of the pirates—a way for embattled entrepreneurs to attack in the courts what they have already lost in the market.

Return to Partenia

Since this book began in the dusty sands of the Sahara, it is only fitting that it should end there, amidst the chat rooms and free expression of the renegade Gaillot. Because it is

[13]See Deborah Hargreaves, "US, EU Discuss Anti-Trust Cooperation," *Financial Times*, October 7, 1999; Guy de Jonquieres, "Crackdown on Hard Core Cartels Urged," *Financial Times*, June 6, 2000, p. 16; and Deborah Hargreaves, "Brussels and Japan Agree Competition Pact," *Financial Times*, July 20, 2000, p. 2.

critical to see that despite all the evidence of governments and rules, despite the prediction that rights will settle into cyberspace and order will replace chaos, Partenia still stands. Not even the Pope has been able to quash the irrepressible Gaillot or steal him from his outpost on technology's frontier. How can we explain this?

The answer lies with the motive behind Gaillot's message. Many of the other pioneers in this book—most of them indeed—have come to the frontier in search of profits. The conquistadores, Marconi, Sarnoff, Murdoch, and Gates—all were men of business. Great men, as it turns out, men who could see opportunities through the haze of change and knew how best to seize them. These were the pioneers who both broke the rules and needed them, the ones who wanted property rights and standards and laws once they had settled their businesses on what before was virgin turf. In all these cases, therefore, what drove the demand for rules were the dictates of commerce.

In Partenia, however, there is no commerce. Gaillot isn't trying to make money from his site, or to carve out any sort of competitive position. He is instead quite literally a man with a mission, a man who is using cyberspace as a conduit for ideas rather than a means of commerce. And this is the crucial difference. For when cyberspace, like any new technology, is used to conduct business and make profits, it will need rules. And when it is used simply to transmit ideas, it may not.

This simple distinction belies a much greater difference, one that has run quietly through all the stories told here. Most technologies, especially during their start-up days, have several possible uses. Radio could be used by navies or awestruck boys; it could transmit military messages or gossip or opera. The compass was used by both wanderers and conquerors, and satellites can transmit news and information as easily as "The Simpsons." If, as a technology evolves, its dominant use is noncommercial, then many of the rules described in this book will not apply. People don't need property rights, after all, if they're not trying to make a profit or establish ownership. And they don't care about competition policy if they're not in the business of competing. When these conditions apply—that is, when large

chunks of a new technology are dedicated to noncommercial uses—then chaos becomes a more acceptable state of affairs.

The potential for chaos is particularly true, it appears, with regard to information. When technologies truly expand the scope of information flows, they enable all kinds of new activity—commercial as well as noncommercial—to thrive. They create new modes of interpersonal activity and, theoretically at least, ways for communication to slip around the established channels of authority. Because such possibilities can threaten the state, governments will often try to nip these new technologies in the bud, to stop the information flows before they become a real threat. We have seen this dynamic repeatedly: when the British smashed Marconi's radio, and the FBI halted encryption, and the Church banned Gutenberg's press. What is most interesting about these seizures, though, is how rarely they work. The British government did not stop the spread of radio; the FBI was not able to control encryption; and the Church could not stop Gutenberg. In a book that's all about rules, therefore, these cases stand as stark exceptions—cases where the pirates did in fact get away.

Which brings us back to Partenia. As stated at the outset, Partenia exists in many spots. It is in Libya and Algeria, in the Sahara and in cyberspace, everywhere and nowhere. Mostly, though, Partenia exists in the world of ideas. It is a place that has nothing to do with profits or commerce and everything to do with Gaillot's own thoughts and those of his visitors. If Gaillot's site were trampling onto the boundaries of someone else's commerce, there is a good chance that, over time, it would be ruled and regulated and constrained. This, for example, is precisely what happened to the radio boys of the 1910s and the independent radio stations of the 1920s. It's what happened to the Homebrew Club and is likely to befall Napster. In all of these cases, the free flow of information was ultimately compromised by problems of property rights and congestion: other people wanted access to a common resource and, armed with profits and greater political clout, they tended to get it.

If, however, the evolution of technology leaves distinct niches of noncommercial activity, these niches may be able to

live in a relatively free, relatively unregulated environment. They may be able to disdain rules of property or competition and flourish quite happily under chaos. Most important, as the case of Gaillot demonstrates, they may be able to challenge the power of existing authorities, using information to sneak around the state.

And this, indeed, may be the central legacy of the Net. For like the printing press, the Net has both commercial and noncommercial uses. There are thousands of ways in which people can make money in cyberspace, and thus thousands of reasons why these people—at some stage, at least—are going to want the state to provide rules that protect their commerce. At the same time, though, there are also thousands of ways in which information can flow freely in cyberspace: in e-mails and electronic newsletters; in dissident reports and political critiques; in Chuck D's online music and Gaillot's Partenia. So long as the purveyors of this information do not harbor commercial intent, they may be able to avoid the rules that are likely to settle elsewhere in cyberspace. They may be able to stream their information around the authorities who would otherwise constrain them and create what could truly be a digital revolution.

The impact of this revolution—ironically perhaps—is likely to hit hardest away from the technological centers of the West. It will hit in China and the former Soviet Union, in Burma and Iraq, in Saudi Arabia and anywhere else that governments have tried to control the free flow of information. It will be, in this sense, more like the printing press than any of the other technologies described in this book—a way for ideas to escape the traditional bounds of power. The power of the printing press in this regard, though, came largely from the context in which it was hatched. In Europe of the Middle Ages, information was a tightly controlled commodity, tied to the Church and available to only a tiny scholarly elite. When the printing press arrived, therefore, it carved a path of circumvention that had never before been possible. A similar dynamic is likely to surround the Internet in places where governments—like the medieval Church—still try to control what their citizens read and know and think. In these places, it should act over time like an amplified version of satellite television, enabling information to seep

around older methods of containment. To be sure, governments may well try to impose whatever technological or legal fixes they can muster; they may try, as Singapore and China already have, to ring their nations with proprietary networks or track and censor communications that flow along them. Such efforts, however, are almost certainly doomed to fail. For technologically, the Internet is a porous web, and if people in China or Iraq want to get information from sites in Silicon Valley, even the most omnipotent of governments will be hard pressed to stop them.

Notice, though, that the anarchy inherent in this relationship does not extend to all corners of the Net, or even to all corners of the world. Sometimes, as in the case of Partenia, people will see and use the Net as a way of distributing information that has no price. Like the lovers who used telegraphy to send encoded notes, and the radio boys who used the ether to gossip and tell tales, these people will be able to seize the new technology's anarchic side. They will be the ones who truly can revel in anarchy and who can use cyberspace to get around the tired laws of nation states. It is critical to realize, however, that these people are not the only denizens of cyberspace. Instead, as we have seen, cyberspace is populated mostly by the same folks who live in the real world: by consumers who want to shop, and parents who want to protect their children, and artists who have no desire to give away their work for free. As these citizens make their claims heard, the state is likely to respond. And its response, more often than not, will take the form of rules.

In cyberspace, though, the greatest pressure for rules is not likely to come from consumers, or parents, or even artists. Instead, it will come from the same direction in which it usually hails, and from the same groups that tend to dominate politics along most technological frontiers. It will come, that is, from private firms, and from those who have cast their commercial lot with the Net. Some of these people, particularly in the early phases of the frontier, may have sounded an awful lot like Gaillot. They may have trumpeted their freedom from government's yoke or prophesied a world of itinerant ideas and untaxed trade. As the technological cycle unwinds, however, and the pirates turn bourgeois, the joys of anarchy pale before the demands of

profit. The pioneers want property rights, as we have seen; they want standards and competition laws, and they turn to the state as private regimes fail. It is this commercial pressure that compels the state to regulate what was once untamed turf, and to create rules on top of chaos.[14]

There is a delicious irony in all this, a twist that would have made Marx smile. For it turns out that even as capitalism shifts and evolves, even as technologies push both business and society far beyond what was once even barely conceivable, the patterns of power remain unchanged. There are exceptions, of course, and people like Martin Luther and Gaillot who can use new technologies to break the binds of power without hoping to profit by them. But once commerce enters the game, it appears, the players demand both rules and a state to enforce them.

It is impossible to predict, of course, how the technological cycle will play out over time. It may continue in an endless wave of rules, with each successive technology eliciting its own political struggle and custom-made regime. The entire cycle could migrate, theoretically at least, to the international level, or it could pit firms and governments against a newly emboldened band of consumers.[15] Its duration will shrink, almost certainly, as the pace of technology increases, and it could disappear entirely.

Already, though, there are signs that some of the impending revolutions will unfold much like the present ones. In biotechnology, for example, an initial round of innovation rapidly gave way to a surge of commercialization, led by pioneers such as

[14]This phenomenon has been described somewhat more formally as "regulatory capture," a process in which firms or industries demand regulation in order to advance their own economic interest. The standard treatment of this process is George J. Stigler, "The Theory of Economic Regulation," *Bell Journal of Economics and Management Science* 2 (Spring 1971), pp. 3–21. See also Sam Peltzman, "Toward a More General Theory of Regulation," *Journal of Law and Economics* 19 (August 1976), pp. 211–40; Gary S. Becker, "A Theory of Competition Among Pressure Groups for Political Influence," *Quarterly Journal of Economics* 98 (August 1983), pp. 371–400; and Richard Posner, "Taxation by Regulation," *Bell Journal of Economics and Management Science* 2 (Spring 1971), pp. 22–50.

[15]For a provocative argument along these lines, see Noreena Hertz, *The Silent Takeover: Global Capitalism and the Death of Democracy* (New York: Random House, 2001).

Craig Ventner of Celera and companies like DoubleTwist and Incyte.[16] As one might imagine, these pioneers clamored almost immediately for some system of genetic rights or patents; and they were met in the halls of power by an equally committed set of lobbyists, arguing against property rights and in favor of a strict regulatory regime. Different rules on both sides, to be sure, but rules all the same. A similar process seems likely to emerge in space, once technology's advance clears the way for the next round of exploration, expansion, and eventually, commerce.

Standing at the start of the twenty-first century, though, it's difficult to imagine what revolutions the coming decades will bring. Perhaps politics will, in the end, fall prey to technology. Perhaps nation states will disintegrate like feudal lords, leaving some new form of authority—or even anarchy—in their wake. Maybe innovation is itself the key to governance, full of possibilities for new structures and more efficient forms. Or maybe not. At this moment in time, it's simply too early to tell, for any long-term predictions will bear the stain of our preconceptions, of our own view of what the past means and the future is certain to bring. And thus we are left like Prince Henry of Portugal, sitting alone at the edge of world and dreaming of MP3.

[16]See Tom Abate, "Seeing Green in Genes," *San Francisco Chronicle*, August 28, 2000, p. B1; and Esther Dyson, "DoubleTwist's Program: The Human Genome's Equivalent of Napster," *Los Angeles Times*, August 7, 2000, p. C2.