

# The Half-Life of Policy Rationales: How New Technology Affects Old Policy Issues

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The justifications for many public policies are dissolving as technology advances. New detection and metering technologies are being developed for highways, parking, marine farming, and auto emissions, making property-rights solutions viable. Information becomes more accessible and user-friendly, suggesting that quality and safety are better handled by the private sector, undercutting consumer-protection rationales. As for public utilities, new means of producing and delivering electricity, water, postal, and telephone services dissolve the old natural-monopoly rationales for control and governmental provision.

Most market-failure arguments boil down to claims about market mechanisms being blocked by transaction costs. But technology has trimmed transaction costs and made the old rationales for government intervention increasingly obsolete.

Besides trimming transaction costs, technological advancement accelerates economic change and multiplies the connections between activities. It brings fundamental upsets to even our best understandings of current arrangements and their shortcomings. Thus, by making the economic system ever more complex, it makes the notion that regulators can meaningfully know and beneficially manipulate the system ever less credible.

Technology sets what may be called an intellectual half-life on policies and their justifications.

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## Introduction

Writers have occasionally noted that a policy's appropriateness depends on the current state of alternative technologies, and that technological changes make old policies obsolete and new policies worthwhile (Hayek 1979: 47; Rosen 1992: 68). Most market failure arguments boil down to claims about invisible hand mechanisms being obstructed by some kind of transaction costs. If technology trims transaction and production costs—by making it easy to charge users, define and enforce property rights, exit and utilize substitutes, gather information, gain assurance of quality and safety, enter and compete in markets—the invisible hand works better. We argue that *technological advancement tends to enhance the case for free enterprise policy*. It reduces the strength of market failure arguments and the case for intervention.

Our conclusion is bolstered by a second, Smith-Hayek, line of argument. Technology heightens the complexity of the economic system. The more complex a system, the less knowable it is, and the less likely government interventions are to benefit society.

Technological advancement might not enhance the case for free enterprise in every area of policy, but it does in many.

### Technology Works to Resolve Market Imperfections

Theories of market failure and governmental remedies are not absolute doctrine but depend on the institutional and technological context. The invisible hand—the nexus of voluntary social mechanisms—may fail, in a significant sense, if transaction costs obstruct gainful exchange. But better technology reduces such costs. Applications of market failure theory may be found to have a technological “half-life,” after which their validity dissolves.

Some would challenge the general claim, arguing that, just as technology enhances the knowledge and capabilities of private entrepreneurs, so it enhances that of public-spirited regulators and officials. Government becomes more effective because of technology. No doubt there is much to the challenge. Government agencies too can run highways as toll roads. Or, consider a common argument against regulation: that it introduces noncompliance problems and requires costly enforcement. Insofar as technology facilitates government monitoring and enforcement, the case for government regulation gains strength.

However, if both free enterprise and the government are technically capable of, say, producing tomatoes, the sheer incentive argument recommends free enterprise. Good government itself is a public goods problem (Tullock 1971); government often fails to do the good that it is technically capable of. The free enterprise system, on the other hand, generally creates for its participants incentives to pursue what is good for society. Hence, the incentive advantage recommends free enterprise, given technical and institutional workability.

### Technology Enables Metering, Excluding, and Charging

New technology is making it increasingly possible to define and enforce property rights, and to charge for the use of property. The following are examples of this expanding capability.

### *Highways and Parking*

It has traditionally been argued that charging for highway use or parking space would entail significant transaction costs, such as delays and inconvenience for motorists, the handling and securing of bulky cash, and costly or unsightly toll booths or parking meters. Yet these difficulties have been lessened considerably. On highways with electronic tolling, the charge is automatically recorded as the car rolls by, with no need to line up and stop. Highway users can now pay highway tolls as easily as they pay a monthly phone bill, weakening the case for operating highways as "freeways" and strengthening the case for privatization.

Street parking is another service that entrepreneurs can charge for. Modern parking meters no longer require coins for fixed periods of time, but can electronically vary the charge and dispense with time restrictions. New in-vehicle meters with LCD displays operate like pre-paid phone cards; anyone with curbside space to rent could do so without even erecting parking meters. One could imagine turning on-street parking space over to private entrepreneurs or adjoining land owners, to rent by the minute using high-tech meters.

### *Lighthouses*

The lighthouse has long served as an example of a public good that cannot be supplied by purely voluntary means. Ronald Coase (1974) explored the history of lighthouse provision in Britain and showed that private entrepreneurs built, owned, and operated lighthouses, and made profits. Payments from ships for lighthouses were mandated at nearby ports, however, so, as David Van Zandt (1993) has explained, the arrangement depended in such cases, after all, on a form of taxation. Whatever the lessons of the historical experience, technology has dissolved any argument for government financing of lighthouse services. By virtue of radar, sonar, satellite-based electronic guidance, and the feasibility of scrambled or encrypted signals, the lighthouse is becoming largely antiquated as a navigational aid. Thus, technology has turned the canonical public good into a museum piece.

### *Marine Resources*

The foundation for the invisible hand is private property rights. New technologies are enhancing the ability to define, secure, trade, and enforce private property in marine resources. Just as ranchers and cattlemen in the American West secured and built up their property with such innovations as branding and barbed wire, today entrepreneurs can do likewise in oceans with the technologies of livestock herding, "fingerprinting," tagging, sonar, satellite tracking, habitat creation, fencing, gating, and guarding. Technology has strengthened the intellectual case for aquatic farming and ranching.

### *Air Pollution*

Common law traditionally treated air pollution as a nuisance, and that spirit concords with a policy of pollution charges, made feasible by technology. For

emissions from cars, the sensor technology developed by Donald Stedman measures pollution levels in the exhaust. When coupled with automatic license plate readers, the technology enables officials to send gross-polluting motorists a pollution bill. A direct polluter-pays approach is much more efficient than command-and-control methods such as smog check programs, alternative-fuel requirements, electric vehicles, and mandates on automakers. Although remote sensing is a program for regional governments to undertake, it is nonetheless a property-rights approach to the problem: It protects the public airshed from violation and leaves nonviolators undisturbed in the use of their own property. It is like protecting public buildings from graffiti by setting up video surveillance, rather than by placing restrictions on who can buy spray-paint and permanent markers at the local hardware stores.

### **Technology Facilitates Quality and Safety Assurance**

Many “consumer protection” interventions suppose that quality and safety assurance cannot be adequately provided by voluntary practices and the tort system. Consumers suffer from “imperfect” or “asymmetric” information, which makes for transaction costs in marketplace decisions. The cost of overcoming ignorance is high or even insurmountable, and, in consequence, consumers are vulnerable in a free market to false representations of quality and safety. Services that are hired infrequently or are especially hard to understand need to be restricted according to government approvals and permissions. This line of thinking justifies the Consumer Product Safety Commission, the Food and Drug Administration, the Securities and Exchange Commission, the National Highway Traffic Safety Administration, the Occupational Safety and Health Administration, and local and state occupational licensing, business licensing, and housing codes.

As consumers demand assurance, however, voluntary market processes find ways of supplying it. Service providers assure quality and safety by building and conveying a good reputation. They obtain certifications and seals of approval, seek affiliations with trusted sources, and develop a brand name. Consumers, for their part, also look to rating or recommending agents to ascertain reputations. All these methods and media depend on the generating, collecting, interpreting, formatting, storing, retrieving, and transmitting of information about service providers.

#### *Medical Services and Products*

Information technologies are enhancing quality assurance in medical care. Computer technology coupled with practice review and monitoring have given hospitals, clinics, health organizations, and insurers new means of evaluating practitioner performance. These institutions function as certifiers. Furthermore, because of the Internet and other media, consumers themselves are more able to gain pointed expertise, by learning of available therapies, tapping knowledge of fellow patients, and checking the credentials and affiliations of practitioners. The Internet provides consumers with both technical knowledge and

assurances. Also, rating organizations can develop a good reputation for conveying accurate assessments of sellers and manufacturers. Using the Net, consumers may look merely for the “thumb’s up” (or seal of approval), read detailed reviews, or click to another vendor who provides better assurance.

### *Money and Banking*

Electronic commerce can be extended to the private issuing of money, revitalizing the case to get rid of banking regulations. Critics of free-market banking suggest that the system would be marred by bank runs and panics, hyperinflation, embezzling, and counterfeiting. These are lapses of quality. Can banks meaningfully assure quality? Would a free banking system prevent such problems? Managing solvency and providing assurances of solvency are especially viable today. Up-to-the-moment financial statements and assessments can be generated and made widely available. Contractual arrangements giving banks options to delay redemption or withdrawal could be more easily posted, managed, and conveyed to worried depositors. Inflation and counterfeiting can be discouraged by rapid feedback mechanisms, such as adverse clearing. In an information age, reputation stays more current and counts for more.

Regulators claim that individuals suffer from an insurmountable ignorance about their own needs and the true quality of available options. Restrictions imposed in the name of quality and safety hamstring many important areas of business and everyday life. Yet in every instance new technology is making claims of information asymmetries and consumer vulnerability less and less credible and proving that the demand for assurance elicits supply.

### **Technology Dissolves Natural Monopoly Arguments**

The so-called public utilities—water, sanitation, electricity, natural gas, telephone, and cable television—have long featured an interconnected network or grid, by which water, gas, or electrons are distributed from central sources to users throughout the community. The construction and operation of the distribution system involve large up-front costs that are irreversible. Adding users to the system entails low marginal cost, and distributing product entails low current cost. Thus, in this standard portrayal, a single distribution system continues to enjoy economies of scale as it adds volume over time. The cost structure, therefore, will, in a free market, give rise to a single provider—a natural monopoly. The single provider may then charge high prices, produce low quantity and quality, and make excessive profits. Would-be competitors do not enter and bid down prices because, once they would have sunk investments into a competing system, the incumbent firm will lower its price and possibly bring losses to both firms. Hence no one would be foolhardy enough to challenge the monopolist. Upon this reasoning, regulators and interventionists have argued that government ought to supervise such utilities and control their prices.

Whatever the historical validity of the natural monopoly argument, it is clear that in many service areas technology has brought alternatives that belie the

traditional assumptions about costs and integration requirements. Furthermore, rapid change itself complicates the problem of regulators and planners.

### *Electricity*

The current electricity crisis in California is not the result of “deregulation” but, on the contrary, the restructuring of the industry that left in place restrictions on production, control, and pricing. Modern technology favors true deregulation of electricity. Increasingly viable is small-scale generation, powered by diesel, natural gas, or other fuels. On-site generators provide users—office buildings, factories, housing developments, or even single homes—with the option of creating their own self-contained loop. The costs of creating anew competing loops have also fallen by virtue of computer-controlled drilling and line laying, allowing workers to snake under streets and buildings without above-ground disturbance. Such developments dissolve the assumptions of high fixed and sunk costs. Entry and competition in the market would, in a free market, be very viable. Furthermore, technology has greatly advanced the possibility of combining electricity generation with steam power, heat, and air conditioning, and of combining electricity distribution with telecommunications, vastly complicating the job of any regulator who presumes to know how to improve upon the invisible hand.

### *Water and Sanitation*

Technology has also made more viable the on-site recycling of water. Homes, developments, businesses, and so on could, if permitted, often choose not to hook up to the centralized utility pipes. The substitute for transporting massive amounts of water via the grid, both to and from users (the latter to deal with waste water), is to develop on-site systems. Such systems would inventory raw water, treat water according to a quality hierarchy for local uses, and then recover raw water from the waste for inventory and reuse. On-site water and waste treatment involves refinement, disposal, and replenishment. So-called gray water could be treated and used for landscaping, cooling, fire fighting, and sanitation. The small amount of water for sensitive human uses, such as bathing, cooking, and drinking, would be distilled to a purity and a safety that the current one-quality-fits-all water systems could not hope to match. The “black water” from toilets and kitchen-disposal units would be treated and disposed of via sewage, vacuum truck, or other method. Depending on recovery rates, the system would need replenishment from rainwater catchments, trucked water, or other sources. Combining on-site utilities may yield economies of scope (the heat from an electricity generator could warm and distill water, for example).

### *Postal Services*

Postal service has long been a government monopoly in the United States and most countries, and one could well argue that there was never a good eco-

conomic reason for this. Modern technology makes a free-market position stronger than ever, since postal communication now competes with alternatives such as faxes, email, and the Internet. Such alternatives make price-gouging fears especially far-fetched. Express mail is already provided by private competitors, and the Internet provides for electronic bill paying and the transmission of documents with electronic signatures. The removal of monopoly protection for the USPS would enable a consolidated contracting of the distribution of goods to rural areas, enabling a company to deliver newspapers, packages, and mail in one delivery.

### *Telecommunications*

Telephone line and television cable networks have been regarded as natural monopolies because laying down multiple grids would duplicate great and uneconomical fixed costs. Long ago, J. Maurice Clark (1923:321) concluded, however, that telephone companies showed no economies of scale, "but rather the opposite." The monopolization of telephony in the United States resulted chiefly from government policy that restricted competition and mandated regulated telephone rates (Thierer 1994). Technology has further weakened any claim of natural monopoly. Fiber optic line and drilling technology make competing lines more viable than ever. Wireless telephones and satellite television transmissions provide expanding dimensions of competition. Technology is blurring the lines of telephony, cable television, and Internet service. Change is rapid, and the hazard of regulatory fossilization is greater than usual.

### **The Complexity/Unknowability Argument**

While admitting some symmetry in the effects of technology, we believe that there is an important asymmetry that goes against government. Any form of government intervention or enterprise depends for its justification on an understanding of what the private enterprise economy would otherwise be lacking or failing to achieve. Justification for occupational licensing depends on consumers being unable, in a regime without licensing, to obtain quality and safety assurance. Utility regulation depends on theories of natural monopoly. Government activism is predicated on a belief that regulators or planners can *know the economy well enough* to restrict, manipulate, or supplement it beneficially.

Yet, after Adam Smith and Friedrich Hayek, the classic argument against government intervention is, aside from incentive problems, that the economy is too complex to know, and therefore too complex to direct or manipulate in a beneficial manner. Like the spontaneous patterns of roller skating in a roller rink, the more complex the system, the more mischievous is the notion of centralized control. In a complex system such as that of 200 skaters in a roller rink, we ought to rely on decentralized decision making. After all, even if the rink is without bound the increased complexity does not pose a comparable problem for the individual skater. He does not interpret the whole; he utilizes pointed knowledge in pursuing opportunities of his particular time and place.

Technology enhances government's ability to gather, collate and convey information, to monitor actions, identify transgressions, and enforce compliance. Technologies expand the informational capability of government. But technology accelerates economic change and multiplies the connections between activities. It integrates dimensions, connects multitudinous variables, and, moment-by-moment, alters constraints and opportunities. To know market arrangements—either those current or those that would exist under alternative policy—such fundamentals would have to remain unchanged for the time being. Yet technology makes the whole economy—that which is to be known—far more complex. It brings fundamental upsets, now and again, to even our best understandings of current arrangements and their shortcomings. After all, society includes the thoughts and potentialities of private individuals and organizations, each of whom has likewise enjoyed vastly expanded informational capabilities.

In his recent book *The Lexus and the Olive Tree*, Thomas Friedman relates comments from a friend that illustrates the contest between informational capability and complexity. He quotes Leon Cooperman, former director of research for Goldman, Sachs:

“When I joined Goldman Sachs in 1967 . . . I was the head of research and I hired analysts. In those days, a typical analyst covered seventy-five companies . . . I was recently talking to one of the analysts I had hired back then and he told me he was terribly overworked now because he had to cover twelve companies. I just laughed. Only twelve companies? But you have to look into those twelve companies so much more deeply now in order to get some edge that it takes up all of his time.” (Cooperman quoted in Friedman 1999: 101-102)

One might imagine that, because of today's high speed data access, computation, and so on, the analyst would have enhanced informational capabilities, enabling him to cover *more*, rather than fewer, companies. But his informational capabilities do not keep up with the complexity of the world to be analyzed.

In 1879, Cliffe Leslie, an Irish economist and keen expositor of Adam Smith, wrote: “[T]he movement of the economic world has been one from simplicity to complexity, from uniformity to diversity, from unbroken custom to change, and, therefore, from the known to the unknown.”<sup>1</sup> In later years Friedrich Hayek took the point further: the economic world has moved not merely to the unknown, but to the *unknowable*. The effect of technology is asymmetric in the epistemic situations in which it leaves, respectively, private actors versus social planners (such as those at the FDA or the Anti-Trust Division). *Technology's heightening of society's complexity outstrips its heightening of the social planner's informational capabilities.*<sup>2</sup> Hayek, like Smith, drew a lesson for policy: Except in the most clear-cut cases of systemic harm like air pollution, the supposition that government officials can figure out how to improve upon the results of decentralized (i.e., voluntary) decision making becomes more and more outlandish. In his Nobel lecture, Hayek (1974) called that supposition the *pretense* of knowledge. As intellectuals who ponder the complex work-



ings of the social world, we really know little aside from one hardy fact: If those who participate in an activity do so voluntarily, each is probably bettering his or her own condition. The more complex the system, the more skeptical we ought to be about claims to knowledge that go beyond and against that hardy fact.

There are, then, two ways in which technological advancement enhances the case for free enterprise: (1) It reduces the costs that had obstructed (actually or supposedly) invisible hand mechanisms, and (2) it makes the economic system ever more complex, and makes the notion that interventionists can meaningfully know and beneficially manipulate the system ever less credible.

### **Policy Areas in Which the Conclusion May Be Doubtful**

Some cases seem to go against the general tendency. Technology might make it especially difficult to secure and appropriate the value of one's intellectual products, such as basic scientific research, patents, software, music, and writings, because current technology vastly facilitates the replication of "knock-offs" and sharing without authorization. The situation might call for stepped-up government enforcement of patents and copyrights (whether one considers that government intervention or property rights enforcement), or more interventionist measures such as subsidization of knowledge and cultural products – akin to European television subsidies financed by taxes on television ownership (a policy that DeLong and Froomkin 2000 sometimes seem to favor). However, unauthorized replication might, too, have a short technological half-life, as new technologies develop methods to foil unauthorized replication.

It may be argued that technology favors expanded government control of pollution because it enhances the effectiveness of detection, measurement, impact assessment, and enforcement. However, common law traditionally treated air pollution as a nuisance, and direct polluter-pays policies keep to that spirit. If government uses new technologies to define and enforce property rights in water, air, or animal resources, that might be seen as defensive Nightwatchman functions compatible with the principles of free enterprise.

National security is another area where technology might suggest a larger role for government. Capabilities to create advance quickly, but, alas, not as quickly as capabilities to destroy. New destructive capabilities in arms, biotechnology, and, eventually, nanotechnology might recommend vigorous national security measures. Again, depending on the measures, we might not deem them "government intervention" but rather Nightwatchman functions.

Improved technology, as previously mentioned, might improve regulators' knowledge of particular sets of activities, and recommend more interventions such as anti-trust restrictions. Decades ago, Kenneth Arrow wrote: "Indeed, with the development of mathematical programming and high-speed computers, the centralized alternative no longer appears preposterous. After all, it would appear that one could mimic the workings of a decentralized system by an appropriately chosen centralized algorithm" (Arrow 1974: 5). Even though few today advocate "the centralized alternative," many still feel that by virtue of information technology government can actively manage or guide signifi-

cant portions of the economy. Again, however, the growth of the complexity of the whole ought to humble even our latest technologies of knowing and intervening. Even at the level of piecemeal intervention such as anti-trust policy, justification relies on a pretense of knowing that such interventions are likely to improve in the whole upon what the un-intervened system would produce.

Finally, it might be argued that technology will make government more transparent and hence more accountable. We may put more trust in government because any abuse or outrage will be more readily exposed and investigated (Brin 1998). This optimistic factor surely has some validity; there has been a profusion of web sites supplying information about candidates, their positions, the voting records, their contributors, and so on. One may argue that technology will facilitate public discourse, public understanding, and participation in direct democracy. Perhaps government can be made more accountable and reliable through “electronic town meetings,” in which each citizen may delegate their voting rights to proxies (as in shareholders’ meetings). If government were thereby improved, the case for activism would be strengthened.

Our conclusion, therefore, makes no claim to entirety or universality. We do not say that technology favors the case for free enterprise in all areas of policy. We submit a hypothesis that says “tends to,” “mostly,” “usually,” “in general” . . .

### Concluding Remarks

The appropriateness of alternate policies depends on the state of technology. As technology advances, the intellectual case for specific policies changes. Thus, technology imposes on policies and their justifications what may be called an expected intellectual half-life. The faster technology advances, the shorter will be the half-life policy rationales.

This paper suggests, more specifically, that technological advancement usually favors the effectiveness of free enterprise over government intervention. If that is the case, interventionists especially need to concern themselves with the intellectual half-life of their positions, lest they promote policies appropriate yesterday but no longer appropriate today or tomorrow.

Just as policy depends on the state of technology, so technology depends on policy. The technological advancements help solve social problems. In doing so, they bring affected parties some kind of profit. Technological advancement is itself a member of the invisible hand, the invisible hand’s tending of its current shortcomings. Voluntary social mechanisms and technological advancement enjoy a complex dialectic of mutual improvement.

### Notes

1. Cliffe Leslie [(879): 224. He writes also: “And just in proportion . . . as industry and commerce are developed, does the social economy become complex, diversified, change-ful, uncertain, unpredictable, and hard to know, even in its existing phase” (p. 223).
2. See Roger Koppl (2000), who writes, “the level of complexity is likely to outstrip our analytical engine” (105).

## References

- Arrow, Kenneth. 1974. "Limited Knowledge and Economic Analysis." *American Economic Review* 64: 1-10.
- Brin, David. 1998. *The Transparent Society: Will Technology Force Us to Choose Between Privacy and Freedom?* Reading, MA: Addison-Wesley.
- Coase, Ronald H. 1974. "The Lighthouse in Economics," *Journal of Law and Economics* 17, October: 357-76. Reprinted in Cowen 1988.
- DeLong, J. Bradford and A. Michael Froomkin. 2000. "Speculative Microeconomics for Tomorrow's Economy." On DeLong's webpage: <http://econ161.berkeley.edu/>
- Friedman, Thomas L. 1999. *The Lexus and the Olive Tree*. New York: Farrar, Straus and Giroux.
- Hayek, Friedrich A. 1979. *Law, Legislation and Liberty: Volume 3, The Political Order of a Free People*. Chicago: University of Chicago Press.
- Hayek, Friedrich A. [1974]. "The Pretense of Knowledge" (Nobel lecture). In Hayek's *New Studies in Philosophy, Politics, Economics and the History of Ideas*. Chicago: University of Chicago Press, 1978.
- Koppl, Roger. 2000. "Policy Implications of Complexity: An Austrian Perspective," in *The Complexity Vision and the Teaching of Economics*, ed. D. Colander: 97-117. Northampton, MA: Edward Elgar.
- Leslie, T.E. Cliffe. 1879. "The Known and the Unknown in the Economic World" (originally published in *Fortnightly Review*, June 1). Reprinted in *Essays in Political Economy*. London: Longmans, Green, & Co., 1888: 221-42.
- Rosen, Harvey S. 1992. *Public Finance*. Third edition. Homewood, IL: Irwin.
- Tullock, Gordon. 1971. "Public Decisions as Public Goods," *Journal of Political Economy*, 79, no. 4: 913-918.
- Van Zandt, David E. 1993. "The Lessons of the Lighthouse: 'Government' or 'Private' Provision of Goods." *Journal of Legal Studies* 22, January: 47-72.