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Optimizing Government for an Optimizing Economy

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Much entrepreneurial growth in the United States today emanates from technological advances that optimize through contextualization. Innovations as varied as Airbnb and Uber, fintech firms and precision medicine, are transforming major sectors in the economy by customizing goods and services as well as refining matches between available resources and interested buyers. The technological advances that make up the optimizing economy create new challenges for government oversight of the economy. Traditionally, government has overseen economic activity through general regulations that aim to treat all individuals equally; however, in the optimizing economy, business is moving in the direction of greater individualization, not generalization. An ever-more optimizing economy therefore demands an increasingly smart, optimizing government. To ensure that government can properly balance policy goals in the new economy, steps need to be taken now to enhance the technological and analytical sophistication of the government workforce, improve the government's information technology infrastructure, build stronger and more complete collections of data, and draw on policy lessons from other periods of technological innovations. In the optimizing economy, the government will continue to play a crucial role in protecting the public from market failures, but, to fulfill that role, government will need to follow the private sector's lead and build up its own capacity for optimization.

Optimizing Government for an Optimizing Economy

Cary Coglianese[*]

Across a range of sectors, entrepreneurial growth in the United States today stems increasingly from technological advances that facilitate the use of resources in ever more marginally effective and efficient ways. Rather than exploiting new resources altogether, many of the most captivating innovations in today's economy instead deploy technology to optimize the production or allocation of existing resources, goods, and services.

Consider several seemingly disparate examples. So-called sharing-economy firms like Uber and Airbnb find transformational ways to allocate to willing buyers otherwise under-used resources, such as private cars and extra bedrooms. Marketing firms rely more than ever on data mining to make highly targeted pitches to consumers, while supply-chain and delivery system optimization has streamlined manufacturing and retail markets. Major advances in health care now travel under the banner of "precision medicine," with health care professionals using sophisticated genetic screening and other data analysis to target treatments even more effectively to individual patients. Fintech firms promise to deliver financial products more accurately designed and priced to reflect underlying borrower risks and thus expand access to capital. These and other changes across the economy signal an important trend toward using technology to contextualize in ways that make possible more efficient uses of available resources.

The emergence of an optimizing economy holds important implications for public policy. Government must be able to keep up with fast-changing technological developments, fulfilling its important responsibilities to protect the public while also not impeding socially valuable changes in the economy. An optimizing economy, in short, depends on an equally optimizing government. Policymakers from all ends of the political spectrum should be able to unite behind efforts to optimize government, taking steps to strengthen governmental capacity to match better the most significant trends in entrepreneurship and economic growth.

I. The Optimizing Economy

All economic growth depends on finding optimal outcomes for society. In a general sense, then, the idea of optimization is hardly new. The American economy has long benefited from entrepreneurial efforts to optimize business activity, such as when assembly-line methods dramatically improved manufacturing efficiency around the turn of the last century. What is different today is how technology achieves optimization through increasing precision in matching goods and services to individual preferences and needs. Today's optimization is marked by a leap forward in individualization, as well as on a reliance on big data and advanced analytics to support greater contextualization and distributed activity. Major innovations with these characteristics are already starting to disrupt vital sectors of the economy, including transportation, energy, healthcare, and manufacturing. More looms on the horizon.[1]

The transportation service behemoth, Uber, may provide the most salient example of the kind of disruption that the new optimizing model can create. Uber and, to a lesser extent, Lyft are transforming transportation services throughout the nation's metropolitan areas by giving everyone with a smartphone the ability to find a driver willing to take them where they want to go. These companies are built on digital and networking technology that improves the allocation of existing resources by matching people who need transportation with people who have vehicles and time available.

In this same way, other so-called sharing-economy firms also make better use of resources that would otherwise go under-utilized. Airbnb, for example, matches homes and apartments that property owners have available with people who want a place to stay. In New York City alone, 416,000 guests took advantage of Airbnb from August 2012 to July 2013, which by one estimate translated into a loss in rental of one million hotel rooms during that period.[2]

The optimizing economy is broader than just sharing-economy firms. Conventional retail business also has been shaped dramatically by optimization. eBay optimizes retail sales by matching people who have items to sell with customers who want them. Amazon and Netflix use machine-learning to match customers better with products they likely desire. When customers go online to shop today, they now see displayed a

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[1]Many of these economic changes bear affinities with what Jeremy Rifkin describes as the "zero marginal cost society." Jeremy Rifkin. 2015. *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism*.

[2] Kusisto, Laura. "Airbnb Cites its Role in City." 2013. *The Wall Street Journal* (October 21); Jeremy Rifkin. "The Rise of the Sharing Economy." 2014. *Los Angeles Times* (April 6). A study of Airbnb's impact on the hotel sector in Texas found that the entrance of Airbnb into this market reduced hotel prices, as well as contributed to up to a 10 percent decline in revenue for incumbent hotels. Georgios Zervas, Davide Proserpio, and John Byers. "The Rise of the Sharing Economy: Estimating the Impact of Airbnb on the Hotel Industry." Boston University School of Management Research Paper (May 7, 2015).

variety of products identified as likely to interest them in particular. Facebook and other social media firms provide data to support still more sophisticated micro-targeting.

Similar strategies that optimize through individualization are transforming medicine.[3] Lung cancer treatments, for example, now can be customized based upon the identification of specific individual genes.[4] This so-called precision medicine is also facilitated by sophisticated data analysis of health records—somewhat akin to what Amazon and Netflix do with consumer purchasing data. The national shift to electronic medical records will only enhance future health care delivery based on machine learning and more precisely targeted treatments.[5]

Retailers like Amazon not only optimize through more individualized marketing, but they also have significantly optimized their supply chain management, inventory control, and product delivery systems. Overall, e-commerce optimizes retail space, but even in its warehouse storage, Amazon proves itself a physical manifestation of the optimizing economy. Its inventory is stored not by product type, but instead by the precise size and shape of every item the company sells. Each item is given an identifying number and measured, and then complex computer algorithms direct where and how those items should be stacked based on physical dimensions.

The nation's congested highways represent a similar space-optimization challenge. Google's self-driving cars, while still in the earliest stages, portend a transportation future that eventually could optimize on time and energy. Once everyone has a self-driving car, slowdowns caused by accidents or by drivers trying to cut ahead in exit lines could be dramatically reduced. Optimizing the transportation system to reduce congestion could deliver important productivity gains as well as make people's lives markedly happier.[6] In addition, when everyone's cars start to do all the driving, human occupants may be able to focus their attention away from the road to other, more productive uses of travel time.

The future also may bring a highly distributed system of energy production built on solar panels and, to a smaller extent, micro-generators. Already these kinds of distributed energy technologies are being put into ever-increasing use; with the prices for solar cells dropping dramatically,

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[3] Jameson, J. Larry, and Dan L. Longo. "Precision Medicine—Personalized, Problematic, and Promising." 2015. *New England Journal of Medicine* (June 4); Francis S. Collins and Harold Varmus. "A New Initiative on Precision Medicine." 2015. *New England Journal of Medicine* (February 26).

[4] Buettner, Reinhard, Jürgen Wolf, and Roman K. Thomas. "Lessons Learned from Lung Cancer Genomics: The Emerging Concept of Individualized Diagnostics and Treatment." 2013. *Journal of Clinical Oncology* (May 20).

[5] Hawgood, Sam, India G. Hook-Barnard, Theresa C. O'Brien, and Keith R. Yamamoto. "Precision Medicine: Beyond the Inflection Point." 2015. *Science Translational Medicine* (August 12).

[6] See Ike Brannon and Mike Gorman. "How Investment in Transportation Infrastructure Boosts Productivity." 2015. *The Hill* (September 23).

individuals are now not only powering their own homes, but also seeking to sell excess energy back to the grid. Full implementation of distributed energy production will depend ultimately on advances in energy storage technology; however, the prospect of using currently untapped roof space in cities around the country to produce energy holds significant optimizing potential.[7]

These are but some of the more prominent examples of the emerging optimizing economy. They reveal how significant parts of the economy's trajectory will be influenced by optimization, and they illustrate optimization's three main features: customization or individualization; the use of machine learning and other sophisticated forms of data analysis; and the reliance on distributed resources, such as data or distributed energy. These three characteristics underlie the great promise the optimizing economy holds for improving society—but they also create major challenges that government must confront.

II. Challenges for Government

At its core, the optimizing economy is based on contextualizing: doing a better job in matching or otherwise finding ways to tap into and exploit smaller, more distributed, but previously underused, resources. And yet, herein lies the fundamental conundrum for government. Governments do not have a standout track record when it comes to contextualizing; indeed, they are generally not even in that business. Lawmaking, for example, is the business of establishing rules, which are, by definition, generalizations, not context-specific judgments.[8] And in the enforcement and implementation of laws, government aims to treat people equally—the same, not different. Even if government does not always achieve this equal-treatment aspiration in practice, the orientation toward standardization still persists throughout government and resists movement toward customization. The upshot is a growing mismatch between the private and public sectors, a gulf not just between private interests and the public interest, but a chasm in methods and capacities. Entrepreneurship increasingly aims at greater and greater precision, while government regulation and administration continue to operate by broad generalizations and standard operating procedures.

The growing gulf in optimization propensity and skill between the private and public sectors should concern anyone, no matter one's political philosophy. It may seem that calling attention to the optimization mismatch fits most naturally with a critique of regulation as a burdensome barrier to innovation. After all, when state and local government officials invoke

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[7] For an overview, see Boston Consulting Group. 2014. *Distributed Energy: A Disruptive Force*.

[8] Schauer, Frederick, and Richard Zeckhauser. 2007. "Regulation by Generalization." *Regulation & Governance* 1:68–87.

existing regulations to resist disruptive innovations—such as Uber's networking dispatch services—that resistance fits into a narrative of regulatory stagnancy. But those who reject the critique of regulation as an unjustified drag on business and who, instead, worry that regulation is insufficiently protective of the public, ought also to be concerned about the optimization mismatch: new businesses and business practices, after all, bring with them new and different risks. If nothing else, the very newness of products and processes in the optimizing economy creates uncertainty about their impact on others and uncertainty over their quality. Think of how cybersecurity as a major policy problem simply did not exist twenty years ago.

But there is more than just the newness of optimizing innovations. Innovation by optimization actually may make hazards to the public harder to detect and prevent. Precision drugs, for example, have to be manufactured to more exacting standards if they are to be effective—which itself makes government's job in overseeing product quality that much harder. Moreover, the conventional standards by which government tests new drugs for safety and efficacy may prove ill-equipped for an era of precision medicine, as more targeted formulas and treatment protocols necessarily reduce the sample sizes upon which drug testing's statistical analysis depends.

The optimizing economy's penchant for distributing, as well as customizing, also may mean there could be many new sites of distinct harm that government will need to monitor. With the advent of 3D printing, for example, any individual with the necessary technology and know-how could begin to manufacture any number of products—even, potentially, new forms of biological substances or dangerous materials. The need for smarter, more sophisticated monitoring capacity by government seems likely to grow rather than diminish.

And yet, government also needs to tread carefully when confronting optimizing innovations, because even if they hold risks, they also hold the potential for making significant improvements in society. In the face of prospects for significantly improved health outcomes from precision medicine, for instance, drug regulators charged with ensuring safety and efficacy of new products also must not impede the development of better medicines. What society needs is an ever-more-optimizing government to come closer to matching an ever-more-optimizing economy.

At some fundamental level, of course, government officials always have had to confront a tradeoff between squelching technological innovation and overlooking new risks. Interestingly, balancing the benefits of government regulations with their costs is itself an optimization problem—although it has been one for which the federal government has only in the last few decades created robust institutional processes to try to solve.[9] Yet, no matter how well or poorly the federal government has

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[9] And, even then, the standards under which the institutional process of creating and reviewing benefit-cost analysis of major new regulations have shifted to some degree. In

reconciled regulatory benefits and costs in the past, in the years to come it will only become harder to regulate well. As the regulation of precision medicine illustrates, identifying and delivering regulatory benefits will become more complicated in the face of growing complexity and the contextualized nature of many business enterprises. Regulatory problems are likely to be subtler and much harder to detect overall. They likely will be more dynamic too, emerging from systems of economic transactions that are moving quickly—sometimes across borders.[10]

Regulators also will face challenges in controlling regulatory costs, potentially finding it more important than ever to minimize cumulative and overlapping regulatory burdens. According to the Office of the Federal Register, the size of the federal rulebook has grown nearly 2000 percent since 1950.[11] Although it is not clear whether this growth is itself a problem—compared to what should 2000 percent be judged? —such growth does indicate the complexity of the regulatory system, as well as the potential for increased cumulative regulatory costs. Michael Mandel and Diana Carew have argued that accumulating regulations bring more than just increased costs to businesses; they also increase the possibility of undesirable interactions between regulations and potentially can decrease the amount of upper-level management attention devoted to further business optimization and growth.[12] In some areas of regulation, such as food safety and financial services, concern persists that regulations already overlap with each other or are administered by different government agencies in an uncoordinated fashion.[13] Such concerns seem only likely to grow in an optimizing economy. Uber, after all, faces disputes today over whether its drivers fall into the category of employees, who are subject to labor law protections, or the category of contractors, who are not.[14] Other firms offering optimizing innovations may find that they cut across a variety of regulatory categories. Moreover, as firms increasingly build optimizing business strategies, the relative importance of overlapping regulatory authorities to their success may only increase. Overlapping jurisdictions and

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1981, President Reagan formalized White House review of major regulations, directing in Executive Order 12,291 that the benefits of regulation generally "outweigh" their costs—a formal expression of optimization. In 1993, however, President Clinton replaced the Reagan executive order with one of his own (Executive Order 12,866) that has been retained by subsequent presidents and that requires, instead of full optimization, that regulations' benefits "justify" their costs.

[10] See, e.g., Cary Coglianese, Adam Finkel, and David Zaring, eds. 2009. *Import Safety: Regulatory Governance in the Global Economy*.

[11] Office of the Federal Register, Code of Federal Regulations (Total Volumes and Pages 1950–2104). Available at https://www.federalregister.gov.

[12] Mandel, Michael, and Diana G. Carew. "Regulatory Improvement Commission: A Politically-Viable Approach to U.S. Regulatory Reform." 2013. Progressive Policy Institute.

[13] See Cary Coglianese. "There's an Easy Way to Untangle Regulatory Knots." 2015. *Los Angeles Times* (March 31).

[14] Steinmetz, Katy. "Why the California Ruling on Uber Should Frighten the Sharing Economy." 2015. *Time* (June 17).

the accretion of regulation layered upon regulation may be more easily tolerated in a "satisficing" era than in an optimizing one.

III. Optimizing Government

The growing mismatch between complex contextualization in the economy and an accumulated set of rule generalizations in the government may be one of most significant challenges for governance of the U.S. economy in the decades to come. What might be done to bring government and the regulatory system into greater alignment with emerging innovations in the economy, so as to regulate more smartly an economy that is itself only growing smarter?

First and foremost, an optimizing government needs an analytically sophisticated workforce.[15] Since at least the 1980s, though, it has been clear that the federal government confronts a shortfall in talented managers and leaders. As Paul Volcker's National Commission on Public Service noted then, "too many of the nation's senior executives are ready to leave government, and not enough of its most talented young people are willing to join."[16] It is no longer just a matter of stemming the tide of out-flow from the ranks of governmental service. Today, government needs a new type of talent in-flow as well, one that brings even greater analytic capacities to the oversight of the optimizing economy. The federal government needs human analytic capacity capable of understanding, tracking, and responding to new risks and new business practices in ways that do not impede productive innovations for society. If one of the answers to declining American competitiveness is, as Michael Porter and colleagues have recently suggested in the context of regulating unconventional oil and gas development,[17] the greater use of performance-based and management-based approaches to regulation, government will need to have the distinctive human infrastructure in place to establish and implement these approaches in ways that actually work well.[18]

Second, the federal government's information technology infrastructure needs to rise to the task. Aging computer systems are well known,[19] but perhaps nearly as important and more challenging will be to find ways to combine databases across the federal government and use

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[15] Coglianese, Cary. "Regulatory Excellence as 'People Excellence.'" 2015. *RegBlog* (October 23).

[16] National Commission on the Public Service. 1989. *Leadership for America: Rebuilding the Public Service*.

[17] Michael E. Porter, David S. Gee, and Gregory J. Pope. 2015. *America's Unconventional Energy Opportunity*.

[18] Coglianese, Cary. "Management-Based Regulation: Implications for Public Policy," in Gregory Bounds and Nikolai Malyshev, eds. 2010. *Risk and Regulatory Policy: Improving the Governance of Risk*; Cary Coglianese, Jennifer Nash, and Todd Olmstead. 2003. "Performance-Based Regulation: Prospects and Limitations in Health, Safety, and Environmental Regulation." *Administrative Law Review* 55: 705–729.

[19] Jack Moore, "The Crisis in Federal IT That's Scarier Than Y2K Ever Was," 2015. *Nextgov* (November 20).

machine learning to make regulation and other governmental functions smarter. New analytic tools give regulators an ability to optimize their own regulatory resources better. For example, analysis by Adam Finkel and Richard Berk at the Penn Program on Regulation has shown that the federal Occupational Safety and Health Administration could improve its targeting of inspection resources dramatically by combining and applying machine learning to disparate governmental and private-sector datasets. In an economy increasingly propelled by machine learning and other optimizing analytics in the private sector, it makes sense that regulators need to rely on these techniques, too.[20] Some agencies, like the U.S. Environmental Protection Agency, are starting to consider how new remote sensing and other technology can be deployed for improved regulatory monitoring, but the government has many miles still to travel in this direction.[21]

Finally, an optimizing government should learn from the past in order to chart a better path forward. Society has faced innovations and new risks before. Yet in the past, new technologies have sometimes been given either a regulatory "free pass," emerging with little government oversight but leaving public harms in its wake—as with much economic development in the nineteenth and early twentieth centuries—or, at the other extreme, new innovations have sometimes been blocked altogether. Both approaches are decidedly non-optimizing—even clunky—in the context of today's economy. And yet, remnants of these approaches still persist in public policy responses to new innovations in the economy.[22] The government can afford neither to give a complete regulatory free pass to new innovations that pose potential risks, nor to adopt complete bans on valuable new business models and practices. Government's proper aspiration lies somewhere between these extremes. Smarter regulation—which requires still smarter regulators—optimizes by regulating just enough, in the right ways.

Conclusion

What stands in the way of more optimal government? Significant resource constraints, bureaucratic and political entrenchment, and a status-quo bias—all of these are and likely will remain major impediments for some time to come. But they need to be confronted and overcome. Public

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[20] Coglianese, Cary and David Lehr. Forthcoming. "Regulating by Robot: Administrative Decision-Making in the Machine-Learning Era," *Georgetown Law Journal*.

[21] Giles, Cynthia. 2013. "Next Generation Compliance." *Environmental Forum* (September/October).

[22] One of the more salient examples comes from the energy sector, where technological advances have enabled extraction firms to find natural gas in literally fine-grained ways by using hydraulic fracturing—or fracking—to extract previously trapped energy resources. The federal government exempted unconventional natural gas development entirely from certain environmental regulations under the so-called Halliburton amendment. Several states, including New York, have gone to the other extreme and have enacted complete bans on this method of energy extraction.

policy challenges in an optimizing economy certainly will be no easier than ones in the past; however, they will prove decidedly insurmountable if nothing is done to counteract the growing mismatch between governmental capacity and private-sector innovation. Policy action must become smarter than ever before.

The path forward to expanded entrepreneurship and economic growth involves new, creative forms of optimization. Indeed, an American economy based on natural resource and labor abundance may already be on the decline, and, if so, the economy of the future will, by necessity, be built on optimizing what is left. With significant portions of the economy already based on an imperative to optimize, and with businesses rapidly advancing in precision and analytic sophistication, government will only be able to fulfill its responsibilities by becoming more optimizing itself.