

Structuring U.S. Innovation Policy: Creating a White House Office of Innovation Policy

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We propose that President Obama create an Office of Innovation Policy and provide it with authority to be able to have a significant positive impact on innovation policy.

U.S. policymakers are understandably focused on prodding the economy out of the current recession. There is a robust debate about how to achieve this goal, but a fairly broad consensus about the longer term: both theory and empirical evidence support the primacy of technological innovation in advancing long-term economic growth and, ultimately, human welfare. Innovation is also central to addressing the environmental and other challenges that can accompany economic growth. Thus questions of how to foster technological innovation are, quite properly, at the forefront of both scholarly analysis and policy debate.

Commentators have discussed at length a variety of substantive innovation inputs and incentives—for example, patents, trade secrecy, government funding and procurement, availability of venture capital, ownership of innovation “platforms” and “infrastructure,” science and engineering education, university technology transfer, competition, concentration, innovation prizes, and open and/or collaborative strategies. Identifying these substantive policies is important, but so too is analyzing how to design U.S. government institutions that have the best chance of successfully spurring innovation. And notwithstanding the growing attention to U.S. innovation policy, the issue of how

to structure U.S. innovation policy is a relatively under-examined area.¹ Discussions of specific legal/regulatory systems that have a significant impact on innovation (e.g., patents or anti-trust) tend to focus rather narrowly on the particular tools that might be available to agencies and courts that operate within that system.

This report conducts a broad examination of the relationship between federal regulatory institutions and U.S. innovation policy. We propose improving U.S. innovation policy by creating a White House Office of Innovation Policy (OIP) to review federal agencies’ actions that affect innovation.

We begin with a discussion of innovation’s importance to the future well-being of American society. We then discuss limitations of the current federal framework for making innovation policy. Specifically, the relative absence of innovation from the agenda of Congress and many relevant federal agencies—as well as interagency processes such as the centralized cost-benefit review performed by the Office of Information and Regulatory Affairs (OIRA) within the Office of Management and Budget (OMB)—manifests the confluence of two regulatory challenges: first, the tendency of political actors to focus on short-term goals and consequences; and second, political actors’ reluctance to threaten powerful incumbent actors. Courts, meanwhile, lack sufficient expertise and the ability to conduct the type of forward-looking policy planning that should be a hallmark of innovation policy.

Ultimately, our analysis leads us to propose that President Obama (or Congress, if Congress is willing) create a White House OIP that would have the specific mission of being the “innovation champion” within these processes. We envision OIP as an entity that would be independent of existing federal agencies and that would have more than mere hortatory influence. It would have some authority to push agencies to act in a manner that either affirmatively promoted innovation or achieved a particular regulatory objective in a manner least damaging to innovation. We also envision OIP as an entity that would operate efficiently by drawing upon, and feeding into, existing interagency processes within OIRA and other relevant White House offices (e.g., the Office of Science and Technology Policy). It is important to note that OIP would not be designed to thwart federal regulation; as a matter of fact, in some cases, the existence of OIP might lead to increased federal regulation (e.g., more Environmental Protection Agency regulations might pass muster under cost-benefit analysis if innovation-related effects were calculated).

WHY INNOVATION POLICY SHOULD BE A PRIORITY FOR THE U.S. GOVERNMENT

A. Why Innovation Is Important

In the long run, productivity is the key to economic growth. There is no natural limit on growth in productivity, and in fact, productivity growth has swung wildly among different countries. Many factors affect productivity growth, but innovation is particularly im-

portant. By “innovation,” we mean the development and deployment of technological improvements. This definition of innovation is not only tractable but it also comports with the most recent data on drivers of U.S. productivity growth. Specifically, the United States experienced average annual productivity increases of less than 1½ percent between 1980 and 1995, but it has averaged increases of more than 2½ percent since 1995.² The best explanation for the more recent U.S. productivity increases is the widespread diffusion of advances in information and communications technology.³

Innovation is highly cumulative—building on earlier discoveries and developments—and small changes in conditions at a particular time can have large future impacts on the course of innovation. Any current event can have an impact on later events, of course. But the failure to, say, tax a complex transaction at time T1 can be ameliorated by taxing it at time T2. If the government nets the same amount of constant dollars, then the difference of timing is small. By contrast, the failure to sufficiently encourage an innovation at time T1 may mean that innovators at time T2 lack a crucial building block and hence that the course of innovation is significantly retarded.

Notably, although our discussion equates innovation with technological change, “innovation policy” is in our view quite distinct from what might be called “technology policy” (over which the Office of Science and Technology Policy has jurisdiction). Innovation policy is both narrower and broader than technology policy. It is narrower in that it focuses on how to promote the creation and diffusion of technology, whereas technology policy encompasses a wider range of substantive policy goals (for example, non-instrumental concerns about civil rights and civil liberties). At the same time, innovation policy is broader in its range of regulatory components, in that innovation policy ranges beyond a focus on technology per se to encompass, for example, antitrust and education policy.

B. Why the U.S. Government Needs to Play a Role in Innovation

In light of innovation’s enormous importance to the future well-being of American society, a key question is what, if anything, the U.S. government should do to foster innovation. The answer cannot be “nothing.” At a minimum, the government needs to establish the legal institutions that allow for efficiency in both market

transactions and the formation of firms. Furthermore, optimal levels of innovation will sometimes—perhaps often—require government action beyond that involved in ordinary competitive markets.

Economists have long advanced good theoretical and empirical arguments for why markets will not allow innovators to capture a sufficient percentage of the welfare benefits they produce.⁴ With early-stage or large-scale research, the benefits may be too uncertain, long term, and diffuse to monetize, let alone control. Problems of uncertainty and lack of appropriability are less acute for more directed innovation, but even then controlling inexpensive copying is likely to be difficult. Consequently, government incentives for innovation—whether they take the form of patents, allocation to private parties of spectrum rights, prizes, research funding, tax incentives, or other mechanisms—are important.

More generally, in the last several decades the weight of economic authority has decisively turned against Robert Solow’s view that technical change is an exogenous variable that cannot be influenced by policy.⁵ Leading growth theorists like Paul Romer have demonstrated that innovation is endogenously determined and emerges as a consequence of knowledge externalities and spillovers; such externalities and spillovers, in turn, represent variables that many forms of government policy, including but not limited to subsidies, can affect.⁶

WHAT CURRENT U.S. GOVERNMENT POLICY GETS WRONG

A. Why Government Institutions Slight Innovation Policy

Absent measures designed to foster careful thinking about innovation, it will likely be systematically ignored and/or misunderstood by government actors. In the discussion that follows, we give examples of counterproductive U.S. regulatory behavior with respect to innovation.

A skeptic might note that counterproductive regulatory behavior is likely to be a pervasive phenomenon no matter what the substantive policy goal, but there are several reasons to believe that it will be even more pervasive in the context of innovation than in the context of other goals. First, almost by definition, innovation involves thinking about long-term outcomes,

many difficult to conceive. U.S. political actors have very little incentive to force themselves to think about long-term outcomes because they are unlikely to be around to reap credit (or blame). Relatedly, the political pressures of dealing with day-to-day exigencies lead many political actors to give short shrift to long-term outcomes and the role of innovation.

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Second, the theoretical and empirical literature indicates that start-up firms are particularly likely to be the sources of breakthrough or disruptive innovation. On the theoretical side, economists from Joseph Schumpeter onwards have noted that such entrepreneurial firms may be more likely than incumbents with vested interests in existing products to be able to move outside routine tasks into “untried technological possibilit[ies].”⁷ As an empirical matter, the data indicate that significant innovations, particularly in fields like biotechnology and information technology, have been driven by new entrants.⁸ Unfortunately, incumbent firms are generally better organized and have more lobbying clout than upstarts.⁹

Even U.S. government institutions such as courts that are not constrained by political considerations are likely to systematically neglect innovation policy. The reason is that courts must act *ex post*, in the context of the limited information put forward in the particular dispute that is brought before them. In fact, even the U.S. Court of Appeals for the Federal Circuit, which is tasked with managing a system (the U.S. patent system) that has innovation as its sole reason for existence, has tended explicitly to disavow policy analysis. As a consequence of this disavowal, the patent system has embraced software patents of broad and often unclear scope without considering the patent thickets that such allowance would create for the highly cumulative process of software development.¹⁰ In contrast, patent scope with respect to genes has been relatively narrow even though a broader scope would arguably be more aligned with innovation goals, at least with respect to genes that cover therapeutic proteins.

B. Piecemeal Approaches to Innovation by U.S. Government Entities

Even when U.S. government entities like federal agencies and courts actually focus on innovation, they generally act without having much awareness of what other institutions faced with similar problems have done—much less coordinating with those institutions. Improving the awareness and coordination of innovation-related activities among federal agencies and courts could be tremendously helpful.

Consider as one example the recurrent debate among legal scholars and economic analysts over how best to regulate technology platforms—that is, basic or infrastructural innovation that is difficult to invent around and can serve as the basis for much future innovation. Embedded within this inquiry are several important subsidiary inquiries. First, a government regulator must make a threshold assessment of the degree to which the innovation in question is in fact a platform technology. Second, assuming that the regulator has determined that a given innovation is in fact a platform, it must determine whether the owner of the technology is likely to exploit it in a manner that is detrimental to innovation. Third, assuming that the regulator is worried that a monopolist will not optimally deploy its platform, the regulator will have to determine whether to act *ex ante*, before concrete problems have arisen, or *ex post*.

These economic questions arise with any platform-based innovation, no matter the science behind the platform or the specific applications to which it is put. When, for example, the U.S. Patent and Trademark Office (PTO) or the Federal Circuit makes a decision regarding the treatment of extremely broad claims in a patent on embryonic stem cells (a trio of such broad patents was granted and subsequently challenged), it might consider lessons learned by Federal Communications Commission (FCC) regulators that have considered the issue of property rights over (or compelled access to) platforms. The debates about the viability and contours of an essential facilities doctrine could help to inform a decisionmaker at the National Institutes of Health faced with the question of whether to declare that no patent rights should be sought on a particular genome sequencing project.

Platform technologies do not represent the only area in which multiple federal agencies are likely to have important arguments that other agencies should be listening to. The 2003 Federal Trade Commission (FTC)

report suggesting mechanisms for improvement of the patent system, for example, was motivated by the proposition that issues of competition policy and innovation policy overlap.¹¹ More fundamentally, every new area of technology represents another venue for deciding whether competition or quasi-monopoly rights is the best mechanism for promoting innovation. Yet in issue area after issue area, these policy challenges are addressed on an *ad hoc*, agency-specific basis.

The lack of coordination among agencies is particularly challenging for innovations that represent technological convergence and have wide-ranging applications. For example, the so-called “minimal genome” that synthetic biologists seek to develop (and on which Craig Venter has recently sought a patent) could be used in a wide variety of industries, ranging from clean energy to pharmaceuticals. Currently, innovation in energy and pharmaceuticals is regulated in the United States by a large number of different federal agencies—ranging from the National Institutes of Health and the Food and Drug Administration (pharmaceuticals) to the Department of Energy and the Environmental Protection Agency (energy).

With the abolition of the congressional Office of Technology Assessment in the mid-1990s, the ability of Congress to secure unbiased advice on questions of innovation policy is also quite limited. Moreover, even with unbiased advice, it is not clear that Congress would be capable of acting in a systematic manner with respect to innovation. Although the passage of the America COMPETES (Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science) Act is a positive sign, Congress’s failure to fund the act at authorized levels in the first year mitigates this success.

Federal agencies’ failure to coordinate innovation policy often leads to inconsistency and incoherence in federal policies. As an example, the PTO has insinuated itself into middle of the complex questions involving the regulation of “Voice over Internet Protocol” (VoIP) telephony by granting broad and possibly invalid patents over key elements of such telephony to a number of large incumbent providers, including Verizon, Sprint, and AT&T. The PTO almost assuredly had no particular intention to regulate the battle over VoIP. To the contrary, thinking about VoIP has been the province of the FCC, which views VoIP as a valuable alternative to local landline telephony.¹² Nevertheless, the

PTO's issuance of broad patents has allowed Verizon, Sprint, and AT&T to pursue via government-granted property rights what they have been unable to achieve via FCC regulation. These large incumbents filed suits based on broad patents that seriously damaged a much smaller start-up, Vonage, that has implemented VoIP successfully.¹³ If the large incumbent firms' patents are in fact valid, then some payment to Verizon, Sprint, and AT&T is appropriate. But the threatened remedy of injunctive relief—in the shadow of which Vonage settled the various lawsuits for large sums of money—conflicts with the FCC policy of promoting more competition in telephony markets.¹⁴

The PTO's intervention with respect to VoIP was largely inadvertent, but in some situations the failure to coordinate some aspect of innovation policy flows from federal agencies' conflicting agendas. This problem has arisen in U.S. spectrum policy. Although innovation in wireless services depends on the availability of radio frequencies, the management of these frequencies has been characterized by difficulties arising from the involvement of different agencies with competing goals. One might imagine that conflicts in spectrum policy would arise between the FCC (which manages the allocation of commercial spectrum) and the National Telecommunications and Information Administration (NTIA) (which manages the spectrum assigned to the government), and these agencies have indeed differed on spectrum policy. But the conflicts between these two agencies and the Department of Defense (the largest government user of spectrum) have been more notable and pitched.¹⁵ The Department of Defense resisted spectrum liberalization proposals put forward in the late 1990s and 2000, and it successfully thwarted attempts at revamping its spectrum allocations. Top spectrum officials agree that “the FCC, NTIA, and Congress have created a bureaucratic morass of [spectrum] regulations and oversight that impedes progress.”¹⁶

Given that different federal agencies have different missions, it is not surprising that there are both regulatory overlaps and regulatory lacunae. Both phenomena can lead to lack of coordination and inefficiency, as federal agencies often take actions in tension with those of another agency (in the case of overlaps) or take actions that are outside their core area of expertise and in the process do a poor job. An example of regulatory overlaps is the jurisdiction of multiple fed-

eral agencies over U.S. telecommunications mergers. Such mergers are reviewed by the FCC, as well as by the Department of Justice's Antitrust Division and the FTC. Those agencies often apply different standards and often reach differing results (for purposes of innovation and otherwise), leading to much wasted effort for regulators and the regulated parties.

An example of a regulatory lacuna is the FCC's attempt at protecting television producers' copyrights via copy control mechanisms known as “broadcast flags.” Content owners expressed fears about unauthorized sharing of their programming once such programming became digital, and they lobbied the FCC to require devices capable of receiving digital television signals to recognize the broadcast flag created by content producers. The FCC had little background or expertise in matters of copyright and copy control, and indeed it had no obvious jurisdiction: Congress never saw fit to give the FCC authority over consumers' use of television receivers after the completion of a broadcast transmission.¹⁷ But content producers correctly thought the FCC would be sympathetic to their concerns, and as a result, the FCC mandated the broadcast flag, resting not on any explicit grant of jurisdiction over copying or copyright but instead on its “ancillary jurisdiction.”¹⁸ The U.S. Court of Appeals for the D.C. Circuit vacated the FCC's order as beyond its jurisdiction. Beyond the jurisdictional problem, however, there was good reason to doubt the wisdom of the FCC's approach. The broadcast flag responded to a problem that had not yet arisen by imposing significant restrictions on the architecture of consumer equipment and thereby making legal copying and use more difficult. The FCC had regulated outside its area of core expertise at the behest of a politically powerful constituency that feared that otherwise their concerns would go unheeded, and the result was a regulatory venture that diverted government attention from more appropriate means of limiting piracy.

In other cases, the organic statutes enacted by Congress explicitly create tensions between federal agencies. As matters currently stand, for example, patents are interpreted not simply by the PTO and the courts that review the PTO but also by the International Trade Commission (ITC). The PTO interprets patent applications and patents under the Patent Act, but the ITC interprets patents in the context of its own organic statute, the Tariff Act. Under section 1337 of the Tariff

Act, the ITC can block imported articles that infringe U.S. patents held by domestic industries. Moreover, according to the ITC, because it has a different source of statutory authority, it is not always bound by the patent interpretations that the PTO and the courts develop when they interpret the Patent Act. To the contrary, the ITC claims it should receive deference to its legal interpretations even when its interpretations diverge from those that might be rendered under the Patent Act. The ITC's argument has been accepted by the very court, the Federal Circuit, that reviews the PTO.¹⁹

C. Limitations of Current Federal Mechanisms for Centralized Review of U.S. Regulatory Actions

To the many scholars who have studied the last 25 years of presidential efforts to exercise greater centralized control of federal agency actions, some of the problems discussed in the prior section will have a familiar ring. In the past, there have been some efforts to exert greater centralized control over regulatory actions. One question that arises, therefore, is the extent to which current mechanisms of centralized review of federal agencies' actions could support the development of a coordinated set of innovation-friendly policies—at least in those cases where the inconsistency is not created by Congress, and courts do not act at cross-purposes with such coordination.

Presidential efforts to exert greater centralized control have typically been promoted as attempts to counter the parochialism of federal agencies and to harmonize conflicts between such agencies, particularly in the area of risk regulation. The most systematic mechanism through which greater presidential control has been pursued is a series of executive orders imposing the somewhat controversial requirement that federal agencies conduct cost-benefit analyses of major regulations. Centralized review of these analyses is then conducted by OIRA, an office within OMB. OIRA's reviews of agencies' cost-benefit analyses began with the Reagan administration and have continued in some form through succeeding administrations.

The details of OIRA's review have varied somewhat depending on the administration—for example, the Clinton administration introduced greater transparency into the OIRA review process by requiring, inter alia, public disclosure of all communications between OIRA personnel and individuals not employed by the executive branch. But the basic principles have re-

mained the same. To the extent that OIRA finds a “significant” federal regulation inconsistent with its cost-benefit analysis, it can return the regulation to the promulgating agency (which can then revise or withdraw it). Although OIRA's analysis does not always trump that of the agency, it does dominate. Lower-level disputes between OIRA staff and staff at the rulemaking agency are resolved by the OIRA administrator. Only if an agency head disagrees with the OIRA administrator is there a real fight—in that case, the OMB director or the agency head brings the dispute to the attention of the President, who is responsible for its resolution. OIRA is staffed by career policy analysts with various types of social science expertise. Its only political appointee is the OIRA administrator; in the Obama administration, the OIRA administrator is legal scholar Cass Sunstein.

The reason OIRA has not maximized net regulatory benefits is because it has failed to think proactively about government-wide priorities, including innovation.

Proponents of OIRA review might argue that innovation-related benefits and costs can, and should, be addressed as part of the more general cost-benefit review done by OIRA. In support of this argument, they might note that although existing executive orders require federal agencies to engage in a variety of specialized analyses (addressing, inter alia, the impact of their regulations on the environment and on small businesses), agencies often fail to perform those analyses.²⁰ They might also contend that putting innovation into the global cost-benefit analysis is not only more parsimonious but also quite possibly preferable as a normative matter: specifically, because innovation is not the only value that federal regulation may seek to promote, putting innovation into the larger context of an overall cost-benefit analysis is affirmatively desirable.

We agree that innovation-related impacts of federal agency actions can, and should, ultimately be folded into a larger cost-benefit analysis. But that does not necessarily mean that analysts within OIRA itself are best suited for providing guidance about, or reviewing, the “innovation module” of the larger cost-benefit analysis. In fact, even proponents of OIRA do not claim OIRA has fully achieved a system in which net regu-

latory benefits are maximized. In significant part, the reason OIRA has not maximized net regulatory benefits is because it has failed to think proactively about government-wide priorities, including innovation.²¹

Perhaps in response to the widespread criticisms of OIRA's current regulatory review process, the Obama administration recently announced plans for, and invited comments on, a new executive order for regulatory review.²² Several of the comments submitted mention the importance of using dynamic analyses that emphasize technological innovation.²³ Unfortunately, current OIRA staff may be particularly ill equipped to look at dynamic innovation impacts.

The executive order creating the CTO position does not give it power to coordinate, rationalize, and spur agency action. We believe an explicit grant of such power is necessary for an innovation policymaker to have real impact.

Circular A-4 (OIRA's most recent guidance to administrative agencies on how to perform cost-benefit analysis) does mention estimating regulatory benefits and costs "based on credible changes in technology over time,"²⁴ but its discussion of this issue is very sparse. Circular A-4 does not give any sense, for example, of how "credibility" should be gauged given the existing state of the technological art. Nor does the circular discuss with any sophistication the costs and benefits of alternative regulatory mechanisms for stimulating innovation. The circular's major contribution in this regard is a statement that regulatory performance standards are generally superior to engineering or design standards because they "give regulated parties the flexibility to achieve regulatory objectives in the most cost-effective way."²⁵ Although this statement is correct as far as it goes, it does not make the obvious point that performance standards are also superior because they have the capacity to stimulate innovation. The failure of Circular A-4 to mention this point may reflect a larger lack of concern with, or knowledge of, long-term innovation effects. OIRA's lack of guidance is particularly striking given the substantial literature that models the economic effects of technical change, both under the assumption that it is exogenous and that it is policy-induced.

Finally, OIRA's organizational role, which is limited to cost-benefit analyses of major proposed federal regulations, is ill-suited for the more varied roles that would need to be played by our proposal for innovation-friendly policy. Many of the major government actors whose actions affect U.S. innovation act primarily through adjudication (whether internal agency adjudication or judicial adjudication) rather than rulemaking. So although OIRA could implement the centralized focus on innovation that we envision, it is by no means the only option, nor is it the best one.

Notably, the Obama administration recently created via executive order a Chief Technology Officer (CTO) position. Under the executive order, the CTO serves as both an assistant to the President and as an associate director of the Office of Science and Technology Policy. Although the executive order does not specify the duties of the CTO, President Obama's announcement of Aneesh Chopra as CTO indicated that a component of the CTO's job description would include promoting technological innovation in the private sector. This is a useful step forward. However, the executive order creating the CTO position does not give it power to coordinate, rationalize, and spur agency action. As we discuss in Section IV, we believe an explicit grant of such power is necessary for an innovation policymaker to have real impact.

IN WHICH BRANCH SHOULD AN INNOVATION POLICYMAKER BE LOCATED?

A threshold question is in which branch of the U.S. government an innovation policymaker should be located. Creating an innovation policymaker in the judicial branch does not make much sense. The most plausible version of such a policymaker would be a court (or perhaps a few courts) that had an "innovation mission" and oversaw all innovation-related cases. Even with greater centralization, however, it is difficult to imagine courts with the expertise necessary to serve as innovation policymakers. And even if that level of expertise could somehow be achieved, Article III still stands in the way of any federal court acting as the ex ante policymaker that would be desirable in at least some cases.

As a policy matter, an innovation policymaker that improved congressional decisionmaking would appear quite attractive. A congressionally controlled regulator,

however, cannot exercise any actual power. Several U.S. Supreme Court cases—specifically, *Bowsher v. Synar*²⁶ and *Metropolitan Washington Airports Authority v. Citizens for the Abatement of Airport Noise, Inc.*²⁷—held that Congress could not delegate the power to execute laws to a person that Congress controls. The result of these cases is a flat prohibition on Congress delegating authority to modify or delay laws to entities that it controls. Congress still can and should have its own entity making recommendations about innovation (perhaps a revived Office of Technology Assessment). Input from such an entity could be valuable in persuading members of Congress as well as the general public, even if its legal impact was fairly modest. But the broader role of innovation policymaker cannot be played by an entity that Congress controls.

That leaves the executive branch as the most plausible home for an innovation policymaker. Although an executive branch entity would not be able to resolve problems created by the plain language of statutes, it could coordinate and promote a pro-innovation agenda that operated within the realm of federal agencies' delegated authority. Additionally, as we discuss further below, we would explicitly design our innovation policymaker—OIP—so as to avoid unnecessary proliferation of executive branch offices and, relatedly, agency obligations.

CREATING AN OFFICE OF INNOVATION POLICY

Having proposed that OIP should be located in the executive branch, we now turn to the specifics of OIP's operation: first, should OIP be centralized or decentralized; second, precisely how much legal authority should it have; third, what sort of analysis should it undertake; and fourth, how should it be created?

A. Degree of Centralization

The tradeoffs between centralized and decentralized regulators are well known. To oversimplify greatly, centralization allows for efficiency, coordination, and clarity, but at the possible cost of bad decisionmaking (whether due to the influence of powerful interests or otherwise). A centralized regulator might make a bad decision and adhere to it without ever squarely, or perhaps fairly, confronting alternatives. Decentralization through the placement of innovation offices in the relevant agencies allows for experimentation and hence

the opportunity to see real alternatives in action. But it achieves experimentation at the cost of a lack of uniformity, lack of interorganizational learning, lack of focus on the regulatory objective, potentially significant transaction costs for regulated entities subject to a welter of different regimes, and significant government costs arising from so many regulators covering similar ground.

There is no expert entity in the United States that looks at innovation generally. The system is entirely piecemeal. Even for proponents of a decentralized approach, this is extreme.

We do not seek to rehash the debate over centralization versus decentralization here. Our point is simply one of balance: U.S. innovation policy within (and outside of) the executive branch is currently at a decentralized extreme. Even the centralized appeals court for patent cases sees only a small portion of innovation-related issues (with perhaps the predictable result that its vision of innovation has historically been one in which patents are preeminent). There is no expert entity in the United States that looks at innovation generally. The system is entirely piecemeal. Even for proponents of a decentralized approach, this is extreme. Moreover, the costs of such radical decentralization seem particularly high with respect to innovation. Simply stated, it makes little sense to continue with a haphazard regime in which congressional legislation, agency action, and court decisions look at only one particular industry or innovation incentive, and none looks more broadly at policy through the explicit lens of spurring innovation.

A striking example of the difficulties entailed by decentralization is federal agencies' response to an executive order that requires them to analyze the impact of their decisions on federalism values.²⁸ Agencies have largely ignored this requirement—researchers found federalism impact statements in less than 1 percent of rulemakings, despite the fact that a much higher percentage of agency rules would seem to call for federalism analyses under the guidelines set forth in the executive order.²⁹ This finding does not necessarily mean that federal agencies have acted in bad faith. The problem may well be that agencies are unfamiliar with

federalism analysis and deem the resources entailed in acquiring the relevant expertise prohibitive. The point is simply that asking the existing federal agencies to take on new, overarching analyses—whether pertaining to federalism or innovation—is a tall order and one that may not be filled very well by the wide range of existing agencies.

What about the other extreme—complete centralization? For example, Congress could replace federal agencies that currently regulate innovation (whether by design or by default) with a new entity that would do their jobs and focus entirely on innovation. That is, Congress could eliminate agencies with a narrow focus on a particular industry or innovation incentive and replace them with a “Department of Innovation.”

Complete centralization would represent a massive, very costly change—the dislocation and transition costs would be great. In part because of those costs, complete centralization is very unlikely. It is difficult to imagine any realistic state of affairs in which Congress decided to abandon administrative agencies that have spent decades building up their own institutional knowledge, not to mention abandoning Congress’s own familiarity with the agencies.

Moreover, there are considerable advantages in having federal agencies with specialized knowledge. Regulation of areas like the environment, telecommunications, and drug safety is enormously complex. Thus it is unlikely that a policymaker with expertise in innovation generally (as opposed to, say, environmental issues specifically) would ever understand the intricacies of environmental regulation with sufficient depth to make the very finely calibrated decisions that implementation of environmental statutes requires.

Most importantly, many federal agencies that currently regulate innovation also pursue other, equally important regulatory objectives. Many FCC commissioners, for example, have viewed its “public interest” mission as including redistribution and the promotion of salutary programming. Although these objectives could conceivably be pursued outside an industry-specific context (for example, we might have an agency with the mission of “promoting redistribution”), such a re-orientation is difficult to imagine and seems undesirable.

We are left then with some advantages to a horizontal regulator (i.e., a regulator in charge of innovation wherever it may arise) and other advantages to vertical (or sector-specific) regulators such as the FCC (which considers innovation alongside other goals as it regulates telecommunications) or the patent system (which considers innovation—to the extent it considers innovation at all—only in the context of patents). Purely vertical regulation allows for greater expertise but also for tunnel vision and a failure to encourage innovation. In contrast, purely horizontal regulation encourages innovation but at the cost of sector-specific expertise and a focus on other goals.

Even if we reject complete centralization and complete decentralization, that still leaves a range of possibilities. Fruitful discussion of these possibilities is inextricably linked to a decision about how much authority OIP should have in the first instance. We turn next to this question.

B. What Authority Should OIP Have?

With respect to legal authority, some salient options include: authority to create and promulgate regulations; to amend regulations proposed by existing agencies (or, in the case of agencies like the PTO that act primarily via adjudication, other agency actions); to block proposed agency actions; to remand (but not permanently block) proposed actions for further consideration; to delay proposed actions for further review; and/or to review proposed actions with no authority to take any further action. OIP’s authority could also be enhanced via standards of judicial review—for example, making its decisions unreviewable, placing a presumption behind its recommendations, forcing the substantive agency to justify its action if the innovation policymaker disapproved of it, or asking whether the agency took a hard look at the innovation policymaker’s contrary suggestions.

Giving an innovation policymaker the authority to unilaterally block or promulgate regulations or adjudications arguably places innovation above all other goals that administrative agencies have and, for that matter, turns administrative agencies into mere recommenders to the innovation entity. Such concentration of power in one entity, and the concomitant privileging of innovation above other goals, is excessive. Innovation

is tremendously important, and fostering innovation should be made an explicit goal of regulatory policy. But a goal does not mean the goal. Federal agencies (as directed by Congress) have many important goals—for example, distributional concerns, health and safety protection, and the like. Nothing in this report is meant to suggest that innovation should replace or overwhelm such other goals, and indeed we do not adhere to such a position. The burden of demonstrating that innovation should trump all other considerations is a very great one, and we do not believe that innovation—or any other single consideration—can meet it.

At the other end of the spectrum, an innovation policymaker that made recommendations with no legal consequences whatsoever also seems unattractive because such recommendations would be too easy to ignore. There are many entities—governmental and otherwise—that can and do make recommendations to Congress and to administrative agencies. Without the backing provided by some enforcement mechanism, those recommendations often have little weight. Merely making recommendations might make sense in those situations in which the recommender is bringing forward information that was entirely unknown to the relevant decisionmaker and the decisionmaker does not have a vested interest in ignoring that information. But in a significant number of contexts, including the innovation context, the initial decisionmaker will often have chosen a particular path with some awareness of information and arguments that would lead in a different direction. The problem is that the decisionmaker may suffer from tunnel vision or capture by powerful interests, or more generally be unduly influenced by interests relevant to its mission that are not consonant with the public interest. In those situations, unenforceable recommendations will likely produce very little. If we want our governing structure to take innovation policy seriously, it needs some actual power—some ability to alter the course of proposed regulations.

We thus reject the extremes of power (ability to block agency action versus hortatory power only). Between these extremes, there are a variety of options, and it would be folly to claim that there is one perfect choice among them. But we think that two axes are of particular importance, and thinking of the proposed innovation policymaker in the context of these axes does a fair amount of work.

The first axis is the likelihood of resistance on the part of the federal decisionmakers who would respond to the innovation policymaker. The discussion so far suggests that the innovation policymaker will propose better innovation policies than other decisionmakers will. Insofar as other federal entities can be expected to resist the innovation policymaker's policies—either out of bad faith or sincere but misplaced concerns—that resistance would counsel in favor of increased power for the innovation policymaker.

In the case of major regulations that are currently subject to cost-benefit review by OIRA, we propose that OIP provide the innovation “module” of the analysis.

This is a basic concern that arises whenever a government wants to reorient existing behavior. If the White House wants to push agency officials to do something they are only marginally disinclined to do, a mere recommendation, or a recommendation backed by a very mild sanction, likely would be sufficient to overcome the officials' resistance. A request that officials wear a security badge or wash their hands after using the bathroom might fall into this category. If, instead, there is reason to expect strong resistance on the part of agency officials, a bigger club—in the form of greater power—might be necessary. Effective integration of a previously segregated environment (like the U.S. armed services before 1948), for example, might require an integration enforcer with considerable powers to overcome the strong resistance of some agency officials.

The second axis addresses the same general concern with respect to the innovation policymaker: to what extent is the policymaker likely to be overeager, pushing broader regulatory solutions than would be ideal? As with the question regarding resistance from agency officials, this is a question about the likelihood of error compared with an ideal model that will never be obtained in reality. We know that there will be deviations from an ideal path, but in some cases the danger of overzealousness—whether in seeking to add regulations or block them—will be greater than in others. Insofar as that danger increases, it serves as an argument for limiting the innovation policymaker's powers.

As we have discussed, we do not favor giving OIP the power to block federal agencies' actions. Once the possibility of OIP blocking agency action is off the table, the danger posed by an overeager regulator is greatly reduced. If, as we propose, OIP cannot permanently block agency action, interest groups will be aware of that limitation. As a consequence, interest groups will have less incentive to influence OIP than they would if it could block regulations. This obviously means that OIP cannot altogether remake government policy in a fundamental way, but it also means that it cannot deliver regulatory gains to interest groups—and that means the danger of OIP overzealousness is diminished.

OIP should be authorized both to propose new agency action and respond to existing agency action. Federal agencies would be subject to a requirement that they consider and respond to OIP's analysis.

Turning back to the first axis, we expect some resistance to OIP's ideas. Federal agencies are familiar with the interests of those they regulate. By and large, these agencies have not focused on innovation per se and have not looked at effects of their actions on the U.S. economy as whole (as opposed to their slice of it). This fact is not surprising—indeed, it is part of the design of agencies—but federal agencies' lack of familiarity with the analysis we are proposing likely will create hesitation about adopting it. That said, we do not expect utter intransigence from federal agencies, because empirical evidence does not support the extreme vision of some public choice theorists: that government officials will always do the bidding of powerful interests who supply them with money, clout, or whatever they maximize. Well-funded groups have a great deal of influence—indeed, that influence is part of the reason that we do not propose that existing entities do the innovation analysis on their own—but influence is not control.

Still, the possibility of some agency resistance—whether in good faith (e.g., tunnel vision) or bad faith (e.g., capture by powerful interests)—cannot be dismissed. That possibility leads us to propose a mechanism through which OIP's policy position would be

made public, and federal agency officials would be obliged to respond to OIP's position publicly, even though such officials would not be obliged to implement it.

Specifically, in the case of major regulations that are currently subject to cost-benefit review by OIRA, we propose that OIP provide the innovation “module” of the analysis. OIP should provide this analysis ex post, as part of the OIRA review, and also ex ante, through guidelines to agencies that supplement the current, largely static analysis in OIRA's Circular A-4. In other contexts, where OIRA is not involved, OIP could also issue guidelines for thinking about impacts on innovation.

Moreover, OIP should be authorized both to propose new agency action and respond to existing agency action. Federal agencies would be subject to a requirement that they consider and respond to OIP's analysis. OIP's input could not force the agency to take any particular action. Rather, the agency would be required to consider OIP's analysis carefully, and to articulate a reasoned response that would become part of the record to which a court would look in the event of a judicial challenge.

At its core, our proposal is for a form of review that is quite common in administrative law—“hard look” review, in which a court considers whether an agency took a hard look at all the significant arguments and data, including those that did not support its position, in making its policy decisions. If a reviewing court finds that an agency failed to take such a hard look at an important argument or set of data, the court rejects the agency action and remands it to the agency for such consideration. The agency can adhere to its original position, but it must respond to the countervailing materials.

Our proposal is that OIP's input would be submitted to the agency and become part of the record before the agency. OIP's submissions would thus qualify as material at which the agency should take a hard look, and to which the agency would be required to respond. The agency could reject OIP's position, but it could not do so without demonstrating that it had considered OIP's ideas and analysis. And a reviewing court would play

the familiar role that it plays in hard-look review—determining whether the agency took a hard look at OIP’s submissions to the agency and thus effectively requiring the agency to show that it considered them.

There is no guarantee, of course, that the agency will in fact sincerely consider OIP’s input, rather than merely pay lip service to it. But that is always the danger of any system that does not mandate particular outcomes. And we believe the public nature of OIP’s input would be helpful. The fact that an innovation policymaker was publicly questioning a federal agency’s course of action would change the regulatory dynamic. The agency would have to articulate why the analysis put forward by OIP was unpersuasive, and we expect that such a requirement would have a disciplining effect and render some arguments harder to make.

OIP’s mandate should be to cast the widest possible net in terms of gathering information relevant to application of its decision principles.

The prospect of hard-look review by a court should be sufficient to require federal agencies to take OIP’s input seriously. But we also propose an additional backstop against agency recalcitrance in the form of remand of agency actions that ignore OIP’s input. This backstop would also be the relevant “stick” in cases where OIRA was involved. In effect, OIP would be able to conduct its own hard-look review, asking whether the agency (or OIRA) responded to its arguments and remanding the action if it failed to do so. OIP would be able to remand only once, so that a truly resistant agency could ignore OIP’s original submission and its remand, and then promulgate its action as it saw fit (subject, of course, to the danger of a court saying that it failed to take a hard look at OIP’s input). But that seems quite unlikely, given that the agency could avoid the time, energy, and litigation risk entailed in the strategy above by demonstrating that it seriously considered and responded to OIP’s analysis.³⁰

In this regard, the empirical analysis we have done (discussed further below) of some recent, innovation-related FCC rulemakings is instructive. The FCC was persuaded by the expert submissions of another gov-

ernmental entity that addresses telecommunications policy—the NTIA—even without a formalized role for the NTIA in the FCC’s rulemaking process. Creating a formal role for OIP in agencies’ decisionmaking processes, complete with a requirement that agencies take a hard look at OIP’s input, will make it only more likely that agencies will take OIP’s submissions very seriously.

The example of the NTIA’s comments highlights another aspect of OIP’s involvement. Like OIRA, OIP would participate in the rulemaking process, rather than waiting until an agency’s rulemaking process was complete in order to give its input. Requiring OIP to wait (as a court must) until an agency completes its rulemaking process might entail significant delays in the already lengthy rulemaking process. And insofar as the agency was persuaded to change its rulemaking, some of the agency’s earlier work would have been for naught. Having OIP give its input during the formation of the agency’s rule would allow for much more efficiency, and reduce the chances of OIP’s analysis adding a lengthy delay in the rulemaking process.

C. What Sort of Analysis Should OIP Undertake, and What Procedures Should It Use?

The previous discussion gives shape to the sort of analysis OIP should undertake. The primary bases upon which OIP might criticize proposed agency action would be twofold. First, OIP might find that the agency action in question was aimed at promoting innovation but did so in a manner that was flawed or at cross-purposes with the actions of other agencies. Second, OIP might find that the action in question aimed to achieve a goal other than innovation but that the agency could achieve that goal in a manner less damaging to innovation. OIP would also have the important role of providing the innovation component to OIRA’s cost-benefit analysis of major regulation.

The principles that OIP would use for its analysis would be quite parsimonious, which should also help to avoid undue delay. Again, the idea would be not so much that individual federal agencies could not use the principles, but that such agencies would not necessarily have the motivation and expertise to use the principles appropriately. The most important principle (which might, in certain cases, represent the entirety of OIP’s analysis) would simply be whether, on balance,

the proposed regulatory action maximized the sum of innovation incentives for all innovators, both current and future.

For example, a compulsory access regime for a particular platform technology might address blockages to optimal improvement caused by one of the many exceptions to the “one monopoly profit”/“internalizing complementary externalities” principle.³¹ To that extent, the compulsory access regime could improve incentives for future innovators. On the other hand, to the extent that the compulsory scheme undercompensated the platform innovator, it might decrease incentives for future platform innovators (including innovators that might come up with alternative platforms). More immediately, if the platform was not purely a knowledge platform (e.g., if it was a physical platform such as broadband cable), compulsory access might decrease incentives to maintain or improve the platform.

OIP’s mandate should be to cast the widest possible net in terms of gathering information relevant to application of its decision principles. OIP would seek input from other agencies—both regulatory and funding agencies. It could also learn from nongovernment actors, including familiar sources like think-tanks and academics, along with less familiar ones like prediction markets and other means of harnessing the wisdom of crowds.³²

In considering the procedures OIP should use, we might ask whether administrative law requirements that are intended to secure public input—in particular, public comments—should apply to OIP. With respect to transparency, the answer is clear. At a minimum, transparency requirements similar to those imposed on OIRA during the Clinton administration should apply. And as we noted above, OIP’s input would be part of the record before the agency and thus would be publicly disclosed. There is of course the question of compliance. Commentators have complained that OIRA’s compliance with transparency obligations has been incomplete. OIP would presumably have a greater interest in transparency than does OIRA: unlike OIRA, OIP would not be able to block agency action, so OIP’s authority would flow from the degree to which it could persuade others to accept its views. Because it would have somewhat less inherent power than OIRA, OIP would need to make greater use of the “bully pulpit.”

Implicit in the discussion above are basic elements of OIP’s procedures—gathering information, conducting analysis, and communicating its ideas. These are the core aspects of almost any decisionmaking process for any entity. The real question is whether OIP’s processes would include the central distinctive element of the informal rulemaking process under the Administrative Procedure Act (APA): the requirement of a process pursuant to which members of the public can comment on proposed federal regulations. Neither agency decisionmaking nor judicial review of agency actions requires a comment process, so its costs and benefits in the context of innovation regulation are worth careful consideration.

Creation of an innovation policymaker via executive order is the most attractive, and feasible, path.

There is a longstanding debate among commentators about the benefits of the comment process. Kenneth Culp Davis, for instance, praised the notice-and-comment process as “one of the greatest inventions of modern government,” because it allows citizens to participate in the lawmaking process.³³ David Baron and Elena Kagan have suggested that “notice and comment often functions as charade” and that “notice-and-comment rulemaking today tends to promote a conception of the regulatory process as a forum for competition among interest groups, rather than a means to further the public interest.”³⁴

The central cost of the comment process is straightforward: the relevant agency’s time in reading, assessing, and, when appropriate, responding to the various comments. Even if comments turn out to add little, the agency has to read and assess them in order to make that determination. That alone is a substantial use of agency resources. Then there is the time and energy required to demonstrate that the agency has taken a hard look at whichever arguments and data in the comments a court may later find significant and thus require an agency response.

The more difficult issue involves evaluating the benefits of comments. We took a close look at the comment process in three recent FCC proceedings relating to innovation to see what role it played there. The rulemakings involved media ownership rules, proposals

for broadband Internet services over power lines, and the use of “white spaces” in the broadcast spectrum (frequencies used as buffers and thus not occupied by transmitters) by new services. All three of these FCC proceedings attracted significant public interest and large numbers of comments from individual citizens. We chose them on the theory that the increased amount of public comment was likely to present the strongest case of individuals’ impact on the rulemaking process. For each proceeding, we examined who submitted comments to the FCC; how often those comments were inconsistent with the economic interests of the commenters; how often the comments contained arguments or information that was not contained in earlier comments; whose comments the FCC responded to in its resulting order; and whose comments the FCC agreed with in its resulting order.

Our conclusions from our review of the comment process for these three FCC proceedings are not encouraging. We found that comments were submitted disproportionately by well-organized groups. None of the comments was against the economic interests of the relevant commenters. And the vast majority of comments from private and public interest groups, and virtually all the comments from private citizens (which were mainly form letters), were duplicative of comments that had already been submitted. In contrast to the literal duplication entailed in form letters, the comments from organized interest groups used different words and different phrasing. But when we looked closely at the substance of the points that commenters made, we found a very high degree of duplication. The words differed, but the arguments did not.

The bottom line is that the comment process yielded little more than we might expect from a bare-bones lobbying process. The ideas and information that seemed important (both to us in reading the comments and to the FCC in responding to them) could be expected to be made by any given lobbyist on a particular side of the issue. All the other comments on the same side added little.

In sum, the results of the available theoretical and empirical work, including our own, strongly suggest that an APA-style public comment process is not essential, or even particularly helpful, for purposes of improving innovation regulation.³⁵

D. How Should OIP Be Created?

One big advantage of our proposal over other possible mechanisms for improving U.S. innovation policy is that, while it can be implemented via legislation, it can also be implemented by executive order. The President can (and often does) create new offices via executive order, and giving a new office the authority to submit materials to agencies raises no constitutional issues.

The only constitutional concern raised by an OIP created by the President through executive order would involve the President’s ability to authorize OIP to remand regulations back to independent agencies, as opposed to executive agencies. Some executive orders on federal regulation have refrained from giving entities like OIRA the ability to block regulations issued by independent agencies, authorizing such power only with respect to executive agency regulations.³⁶ However, there is no case law holding that giving an entity created by executive order the power to block independent agencies’ regulations would be unconstitutional.³⁷ In any event, we are not proposing a veto (which OIRA effectively has), but instead what amounts to a delay. OIP can remand only once and cannot force the agency to do anything, so an agency that refused even to read OIP’s input would be subject only to a delay in promulgating its regulation. The weight of commentary indicates that such a procedure would not violate the separation of powers. So although Congress could eliminate any question by passing legislation giving this power to OIP, we do not believe that would be necessary.

The advantage of having an OIP that can be created by executive order is quite significant. Indeed, creating OIP by executive order makes it much more likely that an effective OIP will in fact be created. There are several reasons. One is the simple fact that it is easier to persuade the President to promulgate a policy than to persuade veto-proof majorities in the House and Senate. Another reason is that there is widespread agreement that the President is more politically accountable to the national public than Congress. As a result, the President has greater reason to be concerned about the overall health of the national economy. And the innovation with which we are concerned may well negatively affect some regions of the country even as it helps others (the costs and benefits of innovation are sometimes geographically lumpy). Simply stated,

the President's broader electoral constituency makes him more responsive to majoritarian preferences than Congress. As a result, creation of an innovation policymaker via executive order is the most attractive, and feasible, path.

It also bears noting both that the proposed OIP should face less danger of capture by powerful interests than other institutions do and that the absolute danger of such capture would be reasonably low. We have already noted two reasons for this: OIP will not be able to block regulations, and it will have both an obligation and an incentive to operate transparently. But another reason is significant as well: OIP's broad scope will make capture more difficult, and therefore less likely. The classic case of capture arises when an agency (or congressional committee) covers one or two industries. The major incumbents from those industries (or from advocacy groups with an interest in these industries) can band together and exert a huge amount of influence. That is the story, for instance, with respect to broadcasters' decades-long influence at the FCC. An entity that takes a cross-cutting approach to all regulation is less subject to the power of a few major stakeholders precisely because there will not be a few major stakeholders. Some of the entities affected by OIP will of course be powerful, but they will also be diffuse and they will not necessarily be repeat players, making it less likely that they will find it worth their time and energy to organize themselves much better than citizens groups are organized. Thus the logic of collective action should not produce the results that we see with more narrowly focused agencies.

CONCLUSION

Promoting innovation is a critical goal of U.S. public policy, and it can take many forms: direct investment, tax incentives, procurement, etc. One crucial element of U.S. innovation policy that has been given short shrift, however, is structuring federal regulatory policy so that it promotes—or at least does not retard—innovation. Currently, there is no formal process within the executive branch to ensure that this happens.

There is no perfect mechanism for improving U.S. innovation policy, but we conclude that the best approach would be to establish an Office of Innovation Policy that could serve as an innovation policymaker within the U.S. government. Thus we propose that President Obama create OIP by executive order and provide it with enough authority to be able to have a significant positive impact on innovation policy, but without giving it so much power that it can run roughshod over the other agencies.

We believe OIP should have sufficient power to have the experiment be meaningful, and that OIP should be able to continue indefinitely if the experiment works out well.³⁸ Some might question the significance of our proposal. Isn't creating OIP a fairly small change to the system? Certainly adding OIP to the existing mix is a smaller change than jettisoning the existing substantive agencies in favor of a new agency with authority to regulate, and increase, innovation in all fields. But we believe that implementing this proposal will significantly change the regulatory environment. First, an entity focused on innovation would add an important new voice to the regulatory conversation. There would now be an entity speaking clearly and forthrightly on the centrality of innovation. Second, and more important, OIP would not merely have a voice: it would be able to remand agency actions that harm innovation. It would also have as part of its mission proposing regulation that benefits innovation. This is no small matter. Indeed, it would change the regulatory playing field overnight.

To those who might oppose an OIP on the grounds that making predictions about the future is very difficult—and experts are often wrong when they make such predictions—our response is straightforward: Agencies are already making predictions about the future (whether consciously or not) when they make laws that affect innovation. They are simply doing so in a manner that is unsystematic, haphazard, and subject to undue influence by well-funded incumbents. We can do better.

ENDNOTES

1. For one exception, see Robert D. Atkinson and Howard Wial, *Boosting Productivity, Innovation, and Growth Through a National Innovation Foundation* (Washington, D.C.: Information Technology and Innovation Foundation and Metropolitan Policy Program at Brookings, April 22, 2008) <www.itif.org/files/NIF.pdf>.
2. Dean Baker and David Rosnick, “Usable Productivity” *Growth in the United States: An International Comparison, 1980–2005* (Washington, D.C.: Center for Economic and Policy Research, June 2007):7, 11.
3. Harald Edquist and Magnus Henrekson, “Technological Breakthroughs and Productivity Growth,” in *Research in Economic History*, Vol. 24, ed. Alexander J. Field, Gregory Clark, and William A. Sundstrom (United Kingdom: Emerald Group Publishing, 2007); William Nordhaus, *The Sources of the Productivity Rebound and the Manufacturing Employment Puzzle*, NBER Working Paper No. 11354 (Cambridge, Mass.: National Bureau of Economic Research, 2005); Dale W. Jorgenson, Mun S. Ho, and Kevin S. Stiroh, *Productivity: Vol. 3—Information Technology and the American Growth Resurgence* (London; Cambridge, Mass.: MIT Press, 2005); Erik Brynjolfsson and Lorin M. Hitt, “Beyond the Productivity Paradox,” *Communications of the Association for Computing Machinery* 41(8) (1998): 49, 50. For a summary of this and other literature on the effect of IT and productivity, see Robert D. Atkinson and Andrew S. McKay, *Digital Prosperity: Understanding the Economic Benefits of the Information Technology Revolution* (Washington, D.C.: Information Technology and Innovation Foundation, March 2007) <www.itif.org/files/digital_prosperity.pdf>.
4. Gregory Tassy, *The Technology Imperative* (Cheltenham: Edward Elgar, 2007).
5. Robert D. Atkinson and David B. Audretsch, *Economic Doctrines and Policy Differences: Has the Washington Policy Debate Been Asking the Wrong Questions?* (Washington, D.C.: Information Technology and Innovation Foundation, September 2008) <www.itif.org/files/EconomicDoctrine.pdf>.
6. Paul Romer, “The Origins of Endogenous Growth,” *Journal of Economic Perspectives*, 8(1) (1994): 3, 20–21. For example, geographically based industry clusters may be particularly important for producing, and taking advantage of, externalities and spillovers. Government policy can play a role in encouraging such clusters. Atkinson and Wial, *op. cit.*, 2008:13–14. Atkinson and Wial also cite economic research on market failures that may cause entire industries (e.g., the healthcare sector) to lag behind in the adoption of new technologies. *Id.* at 12–13.
7. Joseph Schumpeter, *Capitalism, Socialism and Democracy* (New York: Harper and Row, 1942): 13. See also William J. Baumol, *The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism* (Princeton: Princeton University Press, 2002): 57–59 (describing the significance of the entrepreneur in facilitating innovation); and Michael Carrier, *Innovation for the 21st Century: Harnessing the Power of Intellectual Property and Antitrust Law* (Oxford: Oxford University Press, 2009) (discussing recent work by Clayton Christensen and others on why established firms are unlikely to pursue disruptive innovation). Carrier and many others have also discussed the manner in which disruptive technologies can threaten the business models not only of incumbent technologists but also of adjunct industries, such as purveyors of copyrighted material. Like incumbent technologists, well-financed copyright holders are likely to have disproportionate influence over regulatory processes.
8. Zoltan J. Acs and David B. Audretsch, *Innovation and Small Firms* (Cambridge, Mass.: MIT Press, 1990): 12–23; and David B. Audretsch, *Innovation and Industry Evolution* (Cambridge, Mass.: MIT Press, 1995): 35–38. And to the extent citations to firm patents are a measure of an invention’s significance, it is noteworthy that, in recent years, small-firm patents have been more likely than large-firm patents to be in the top 1% of frequently cited patents. CHI Research Inc. (Hadden Heights, New Jersey), *Small Serial Innovators: The Small Firm Contribution to Technical Change*, prepared for Office of Advocacy, U.S. Small Business Administration, Washington, D.C., Feb. 27, 2003: 10 <sba.gov/advo/research/rs225tot.pdf>.
9. Robert D. Atkinson, *The Revenge of the Disintermediated: How the Middleman Is Fighting E-Commerce and Hurting*

American Consumers (Washington, D.C.: Progressive Policy Institute, January 2001) <www.ppionline.org/documents/disintermediated.pdf>.

10. Mark A. Lemley and David McGowan, “Legal Implications of Network Economic Effects,” *California Law Review* 86 (1998): 479, 524; and James Bessen and Michael J. Meurer, *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk* (Princeton, New Jersey: Princeton University Press, March 2008): 187–214.

11. Federal Trade Commission, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy* (Washington, D.C.: October 2003).

12. See Federal Communications Commission, *In the Matter of IP-Enabled Services, Notice of Proposed Rulemaking*, WC Docket No. 04-36, 19 F.C.C.R. 4863, 4864–68 (March 10, 2004) <askcalea.net/pet/docs/20040310.fcc.04-28.pdf>: “[T]he changes wrought by the rise of IP-enabled communications [including VoIP] promise to be revolutionary . . . to reduce the cost of communication and to spur innovation and individualization.”

13. “Despite a widespread belief among industry observers that the carriers’ patents were invalid or not infringed, Vonage ultimately settled all three cases for around \$200 million, about a quarter of its annual revenue. Since settling the lawsuits, Vonage’s marketing expenditures have decreased and its subscriber growth has slowed, though the company has staved off bankruptcy for the time being.” (internal quotation omitted): Stuart J.H. Graham and Ted Sichelman, “Why Do Start-Ups Patent?” *Berkeley Technology Law Journal* 23(1) (2008):1063, 1080-81.

14. A vast amount of economic literature documents how the potential for hold-up created by injunctive relief allows patent holders to extract more in licensing fees and/or settlements than the actual contribution made by their patents.

15. Lynnette Luna, “Spectrum Quandary Puts 3G at Risk,” *Telephony.Online* (July 23, 2001):10 <telephonyonline.com/mag/telecom_spectrum_quandary_puts/> (discussing tensions among the FCC, NTIA, and Department of Defense on spectrum policy).

16. Bob Brewin, “Cellular Carriers, DOD Debate Spectrum Needs,” *Computerworld*, (April 8, 2002): 61.

17. *American Library Association v. Federal Communications Commission and United States of America*, 406 F.3d 689, 691–92 (United States Court of Appeals, District of Columbia Circuit, 2005).

18. Federal Communications Commission, *In the Matter of Digital Broadcast Content Protection: Report and Order and Further Notice of Proposed Rulemaking*, MB Docket No. 02-230, 18 F.C.C.R. 23550, 23563–64 (Nov. 4, 2003), vacated in part, reviewed in part sub nom. *American Library Association*, 406 F.3d at 708.

19. *Kinik Co. v. International Trade Commission*, 362 F.3d 1359, 1361, 1363 (Federal Circuit, 2004) (noting the ITC’s belief that recently enacted defenses to infringement in the Patent Act do not apply to infringement actions before the ITC, and finding that the ITC is entitled to Chevron deference in its belief that certain defenses provided by the Patent Act are not available in infringement actions before the ITC).

20. Nina A. Mendelson, “Chevron and Preemption,” *Michigan Law Review* 102 (2004): 737, 782–86 (discussing agencies’ failure to engage in the analysis of their rules’ impact on federalism as required by executive order).

21. Robert W. Hahn and Cass R. Sunstein, “A New Executive Order for Improving Federal Regulation?: Deeper and Wider Cost-Benefit Analysis,” *University of Pennsylvania Law Review* 150(2002):1489, 1522: “One of our primary concerns is that no institution in government has yet vindicated the hopes of those who believed that cost-benefit analysis could be used to help promote better priority-setting, block senseless rules, and spur agency action when justified.”

22. Office of Management and Budget, *Federal Regulatory Review: Request for Comments*, 74 *Fed. Reg.* 8819 (Feb. 26, 2009) <edocket.access.gpo.gov/2009/pdf/E9-4080.pdf>.

23. Jonathan B. Wiener, “Ten Ideas to Improve Regulatory Oversight,” slide presentation at the annual meeting of

the Society for Risk Analysis, Boston, Mass., December 10, 2009 <www.reginfo.gov/public/jsp/EO/fedRegReview/publicComments.jsp> (noting need to improve “future ex ante impact assessment methods” by looking at technological innovation and dynamic analyses more generally).

24. Office of Management and Budget, *Circular A-4* (Regulatory Analysis) (Washington, D.C., 2003): 37 <www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

25. *Ibid.*, 8. See also *ibid.*, 16: “Within a command-and-control regulatory program, performance-based standards generally offer advantages over standards specifying design, behavior, or manner of compliance.”

26. *Bowsher v. Synar*, 478 U.S. 714 (1986).

27. *Airport Auth. v. Citizens for Noise Abatement*, 501 U.S. 252 (1991).

28. Executive Order No. 13132 (Federalism), 64 *Fed. Reg.* 43255, 43255–56 (Aug. 4, 1999) <edocket.access.gpo.gov/2009/pdf/E9-4080.pdf>. For earlier executive orders similarly requiring agencies to perform federalism impact analyses, see Executive Order No. 12612, 52 *Fed. Reg.* 41685 (Oct. 26, 1987) and Executive Order No. 12372, 47 *Fed. Reg.* 30959 (July 14, 1982).

29. U.S. General Accounting Office, “Federalism: Implementation of Executive Order 12612 in the Rulemaking Process,” testimony before the Committee on Governmental Affairs, U.S. Senate, Washington, D.C., May 5, 1999: 4 <www.gao.gov/archive/1999/gg99093t.pdf> (finding that only five federalism impact assessments had been prepared for the over 11,000 final rules agencies issued between April 1996 and December 1998); Mendelson, *supra* note 20, at 783 (finding five published federalism impact statements among 600 proposed and final rules during one quarter of 2003).

30. Indeed, we suspect that OIP would rarely have to invoke its authority to remand a regulation for consideration of its arguments: the risk created by judicial hard-look review, combined with the additional risk created by the prospect of OIP remand, should be more than sufficient to persuade an agency that the costs of compliance are smaller than the costs of noncompliance.

31. Joseph Farrell and Philip J. Weiser, “Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age,” *Harvard Journal on Law and Technology* 17 (2003): 85, 105-119 (discussing the idea of internalizing complementary efficiencies and the exceptions to it).

32. Michael Abramowicz, *Predictocracy: Market Mechanisms for Public and Private Decisionmaking* (New Haven: Yale University Press, January 2008); and James Surowiecki, *The Wisdom of Crowds* (New York: Random House, 2004).

33. Kenneth Culp Davis, *Administrative Law Treatise* § 6.15, at 283 (1st ed. Supp. 1970).

34. David Barron and Elena Kagan, “Chevron’s Nondelegation Doctrine,” *2001 Supreme Court Review* 201, 231–32 (2001).

35. Some have argued that the value of comments in the rulemaking process could be increased via various changes to the process. Proposed changes might allow for collaboration among commenters perhaps like Wikipedia and/or ratings of comments perhaps like Slashdot, in which users rate the quality of others’ submissions, and the raters themselves are rated for the quality of their ratings. One of us focused on these questions in a different article and came to the conclusion that such an increase in the value of comments is unlikely, for several reasons—perhaps most notably that collaboration and ratings systems do not work well in contexts where policy preferences loom large. See Stuart Minor Benjamin, “Evaluating E-Rulemaking: Public Participation and Political Institutions,” *Duke Law Journal* 55 (2006): 893, 924-32. The other of us believes that these “open source”-type approaches to improving notice and comment may have value, but that it would be premature to impose even potentially improved notice and comment procedures on an OIP before their value had been proved in other, more conventional rulemaking contexts.

36. Michele Estrin Gilman, “If at First You Don’t Succeed, Sign an Executive Order: President Bush and the Expansion

of Charitable Choice,” *William & Mary Bill of Rights Journal* 15(4) (2007):1103, 1154 (noting that Reagan’s regulatory-review executive order did not apply to independent agencies, whereas Clinton’s executive order applied the procedural, but not the substantive, review requirements to independent agencies).

37. Harold H. Bruff, *Balance of Forces: Separation of Powers Law in the Administrative State* (Durham, North Carolina: Carolina Academic Press, 2006): 167–97.

38. If our confidence in OIP was lower, we would propose a time limit, with a sunset provision to shut down OIP after a given number of years (unless it was renewed).

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