COMMENTS ON DRAFT 2013 REPORT TO CONGRESS ON THE BENEFITS AND COSTS OF FEDERAL REGULATIONS

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My comments on the report are focused on improving the administrative process. I do not believe that OMB has sufficiently recognized the need for agencies to adopt new methods of regulation that are appropriate to our age of technological acceleration. The Office of Information and Regulatory Affairs ("OIRA") should play an important role in encouraging such a transformation though its oversight. The new elements needed for regulation in our age are of two kinds. First, both agencies and OIRA should both deploy modern information technologies, like prediction markets and systematic empirical assessments, to improve regulations. Second, they both should consider technological change more systematically in determining the content of regulations, and promote, where warranted, alternatives to regulations to solve social problems. This second step requires the projection of future technology to better determine the content of current regulations, the recognition of the greater wealth of coming generations to better evaluate the claims of intergenerational equity, and the use of prizes and subsidies to incentivize technological innovation that may substitute for regulation.

The Background of the Modern Administrative State

Modern government is largely administrative government. Congress, by legislation, delegates substantial power to executive agencies. These agencies then promulgate regulations on a wide variety of subjects from pollution to banking, from consumer safety to pharmaceuticals. While Congress oversees and influences the content of these regulations by conducting hearings on agency performance, it rarely overturns them. Courts also defer to the decisions of agencies and overturn only those regulations that are outside the scope of Congress's delegation or are not supported by evidence.

Administrative government though agency regulation was itself a response to technological change. The rise of the administrative state in the late nineteenth and early twentieth century coincided with the faster change brought about by industrialization. Legislators were thought to have inadequate sources of information to use in formulating responses to such change. Indeed, some of architects of the new legal and political order were aware that technological change was a cause of the administrative state's necessity.

The rise of the administrative state can thus be understood in terms of restructuring government to make policy that is more rooted in information about consequences. Under this rationale, Congress sets the basic policy objectives for an administrative agency, such as the Environmental Protection Agency or the Federal Communication Agency. But the agency has the comparative advantage of specialized expertise which allows it to access information and to assess whether a regulation would actually meet those objectives. The administrative state represents a first attempt to separate the distillation of preferences (done by Congress) and the prediction of

consequences (done by agencies). This separation provides a good reason to consider how it can be updated with better information rules.

Over time, the government tried to improve the deliberation of agencies so that they made more accurate evaluations of the consequences of regulation. In 1980, Congress established the Office of Information and Regulatory Affairs (OIRA) within the Office of Management and Budget to review regulations. President Reagan then issued an executive order establishing regulatory review process by which OIRA generally assesses the costs and benefits of regulations, and authorizes the promulgation of regulations only when the benefits outweigh the costs. This executive order on regulatory review creates a careful and reticulated framework for evaluating the consequences of agency action.

Every subsequent President has continued the regulatory review order with only slight modifications. Democratic Presidents have focused a bit more on distributional consequences of regulation than Republicans but the basic cost-benefit framework has remained unchanged. The development of regulatory review is itself an excellent example of the ideal of consequentialist democracy in action.

But in practice the regulatory review process has been heavily criticized. One concern is that special interests with the most at stake in agency decisions are able to capture its regulatory process and distort regulation to ensure that consequences of regulation benefit them rather society as a whole. Thus, banking regulations often come to benefit bankers and regulations issued by the Labor Department help unions.

Another concern is that the experts in the agencies will themselves be biased for particular outcomes and imbued with an insular overconfidence in top-down decisionmaking at the expense of more dispersed sources of wisdom. Thus, while the ideal is that an expert agency will make policy based on whether the consequences of the policy meet the objectives of the Congress and the President--objectives that are themselves supposed to reflect the consensus of the American people--the reality is often otherwise.

Thus, today's information technology permits a substantial reformation of the sources of agency information. Theorists in the New Deal may have been correct that Congress was not well structured to update on information to create detailed policy that would achieve legislative objectives. But agencies have not proved all that much better. Only by requiring agencies to rely on the more dispersed sources of information provided by markets and experiments are they likely to improve. By creating more objective measures of results, the use of such information technologies also constrain the influence of special interests. More generally, these new mechanisms empower encompassing interests because they make clearer which policy instruments are likely to achieve the goals established by law, replacing ideological frolics with more fact-based analysis.

Faster technological change will also challenge the administrative state in other ways. Accelerating technology not only expands the number of regulatory issues by creating more technologies with potentially dangerous spillovers, it also creates the need for new kinds of cross cutting analysis. For instance, technological acceleration means that current regulatory policy may be affected

by the dramatically different technology that could be available relatively quickly. The future has become a present presence in the regulatory review.. Thus, the administrative state is also worth considering because it will earlier than the rest of government have to figure out how systemically to project the future in current policy.

Encouraging Empiricism and Prediction Markets

Agencies face great difficulty acquiring the information to determine whether a regulation will achieve the objectives set by Congress, particularly because regulations have secondary effects that may undermine the achievement of the very objectives Congress has established. For instance, assume that Congress has said that the Federal Aviation Administration should impose safety requirements on airplanes where the benefits will exceed the costs. Even assuming further that the agency is able to set a value to lives saved and injuries prevented, it is often unclear what the effect of the regulation will be. For instance, how many accidents will it prevent? Will its costs raise airline fares and encourage people to take less expensive but more dangerous forms of transportation, like cars? Will it discourage innovations that will lead to safer airlines in the long run? Or assume that Federal Communication Commission is told that its licensing decisions should assure that diversity of voices is heard by the American public. Will rules against media concentration advance interests of diversity? Or will they discourage the kind of innovation that big companies can best undertake, thus preventing new kinds of programming that increases the variety available to consumers.

Administrative law attempts to make agencies more informed by requiring that agencies hold a period of notice and comment to permit the public to assess the regulation. But this process has obvious limitations. The public has little incentive to respond and special interests may skew the administrative record with self-serving analysis. It is thus is not surprising that agencies continue to rely principally on the assessments of their own experts. As a result, agencies engage in substantial top-down decisionmaking without systematic access to more dispersed sources of knowledge. But these experts themselves are influenced by interests of those they regulate, because these interests wield substantial control over their future employment prospects and over their reputation in a specialized area of expertise.

The new information technologies from empiricism to prediction markets can substantially improve agency decisions by permitting them to tap into less insular and more dispersed sources of information. The scope for experimentation is potentially as large as the regulatory agenda of an agency. Whenever there is a plausible debate about which regulation will better achieve the goals of the agency, or whether no regulation at all is the best possible outcome, there is room for considering experimentation. For instance, an experiment in which certain regulations would be imposed on some factories and not on others offers the real prospect of determining whether those regulations are useful. As a result, the standing presidential order on regulatory review should be revised to direct agencies to include such experiments to resolve disputed issues of policy. Bureaucratic inertia may resist a more

relentlessly experimental approach, but the creation of a unit devoted to experimentation will create an impetus for change. In a bureaucracy, function follows form.

Government decentralization is also useful to create the conditions for empirical learning. But there has been a growing trend for agencies to preempt state action with uniform federal law. As a result, the standing executive order that promotes federalism should be revised to direct federal regulators to take into account the opportunity for empiricism afforded by federalism before preempting state regulatory regimes. Through both these initiatives, agencies would restructure themselves to be more self-consciously experimental.

Prediction markets offer the other most important technology for improving regulatory decisions. Instead of offering the public the opportunity to simply comment on a proposed rule, a conditional market can be made on a rule or on a few alternatives. The rule can then be assessed to see whether it will meet its purported objectives. For instance, will a safety rule actually save lives? What will be the added cost of the product fashioned under the new rule?

It is true that such prediction markets may raise more difficult questions than prediction markets on more general subjects. They may be subject to manipulation if they do not attract a thick market. The problem of manipulation may be especially acute, given the regulations will dramatically affect the income and opportunities of certain industries. But again we must be careful of the Nirvana fallacy. Agencies are regularly confronted with all sorts of special interests who make claims about the consequences of regulations. The advantage of prediction markets is that they give at least some incentive to foretell accurate consequences. Even in settings rife with special interest such markets have the potential to generate more accurate information about consequences than collaborative mechanisms, like wikis on agencies rules,, because collaboration will often not change incentives.

Nevertheless, regulatory prediction markets may well need to be designed differently than prediction markets on more general policy. For instance, there may be greater need for conflict-of-interest rules that bar parties with a direct interest in the regulation from participating in the market. The subsidies of the market may need to be greater to attract participation. In short, regulatory prediction markets are themselves appropriate subjects of experimentation. Indeed, under certain circumstances, it may be plausible to have competing kinds of prediction markets to discover what kind of market is superior in its predictions. Experimenting with prediction markets underscores the synergies between empiricism and prediction markets. For this reason, it is particularly important that OMB establishes a unit focused on prediction markets that would design prediction markets for evaluating particular regulations to permit design improvements. Such experiments should be undertaken now because accelerating technology will raise the regulatory stakes in the future.

Tapping into the broader sources of information that empiricism and prediction markets permit will also give agencies more legitimacy, because they will help demonstrate in a transparent manner that that the regulation embraced is actually likely to achieve its objectives. Greater legitimacy is important in an era of technological acceleration, because agencies may also have to take quite radical action that will adversely affect members of the public to protect against relatively small probabilities of

catastrophe. The public is more likely to support such initiatives when the agencies are seen to be using the best possible sources of information.

Projecting Technological Change in Current Regulations

Accelerating technology makes future technological change more relevant to current regulation. In a world of technological stasis, there would be no need to consider technological changes within the regulatory process because technology would not change the costs and benefits of regulation. But as technology changes ever faster, the stream of costs and benefits can change radically, making future technology ever more central to current regulatory decisions. Thus, modeling future technological change needs to be made a central and formal part of any cost-benefit analysis. Moreover, any government regulatory regime should consider government elicitation of technological change as a policy option. Thus, subsidies and prizes for technologies should be considered as an integral part of the regulatory review process.

First, the acceleration of technology may affect the timing of regulation or its current content. For instance, if we could predict the development of carbon-eating plants, a possibility considered reasonable by the celebrated physicist Freeman Dyson, it is possible that we would be less interested in controlling current emissions, because some of the effects of these emissions might be reversible. Accordingly, it may be more effective to delay certain kinds of emission standards, because those kinds of emissions can be cleaned up at low cost in the relatively near future.

But the possibility of technological innovation will sometimes favor more current regulation rather than less. Climate change provides again a good example. For instance, technological innovation may ameliorate a central problem of regulating global emissions—the difficulty of having effective regulation without participation of other carbon-emitting nations. If regulating emissions domestically encourages quicker technological innovation, this new technology may be sufficiently inexpensive to be used by nations that did not participate in the regulatory regime. Thus, the sensitivity of innovation to particular regulations may provide an important impetus for domestic regulatory regimes even in the absence of a global consensus.

Thus, the future shape of technology will be ever more central to current regulatory decisions. Some technological change can be predicted with relative certainty. Moore's law predicts continuous and exponential expansion of computer capacities for the next two decades. As a result, scientists have sometimes postponed solving mathematical problems that can be resolved rapidly within a few years. Some have argued that other processes, like the improvement of solar panels, are also now approximating a glide path of predictability.

Other technological change can be predicted through information markets of the kind previously discussed. These markets can take expert claims about technology prospects and put them to a market test. The need to predict the future course of technology for current regulation provides yet another reason establishing a prediction market unit with OMB.

Our views of the shape of future technology may change with time. As a result, regulatory structures should be designed to update regulations without a laborious process. In its original regulation, an agency could specify that regulations should change if certain technological advances arise. Building such revisions into regulations will also make it easier for companies affected by regulations to plan for the future.

Accelerating technology also requires better integration of regulatory decisions with government decisions about encouraging technology. Even if technology does not solve a regulatory problem today, it may offer a full or partial solution in the future. As a result, encouraging new technology may the most cost-efficient way of solving a social problem, either as a substitute for regulation or in conjunction with regulation.

It might be thought the government should promote general policies for encouraging innovation rather than encourage any particular technology. According this argument, if it chooses the appropriate regulations, companies will have incentives to invent technology to enable other companies to comply with those regulations most cheaply. Regulation in this sense would become the invisible hand of technological progress.

But this analysis does not necessarily work in the world of domestic and international politics. First, a principal difficulty is that special interests may inhibit the creation of purely regulatory solutions. Programs with concentrated costs and diffuse benefits are hard to enact. For instance, concentrated groups like energy companies may successfully oppose regulations to stop global warming, because they are well organized.

In contrast, government can use general revenues to subsidize technology or to establish a technology prize to solve the problem that regulation addresses. For instance, instead of a tax on emissions, it could provide a prize for technology that dissipates emissions from the air in specified amounts. Programs with such diffuse benefits (many corporations may think they have a shot at the prize) and costs (all taxpayers pay for it) are easier to enact. In a world of technological stasis, often the regulatory solution may be the only alternative for solving a problem, like pollution. But in a world of technological acceleration, technological solutions may be not only feasible technologically but the most feasible solution politically.

A second reason to believe that even efficient regulation will not stimulate the optimal amount of innovation in technology is the international nature of many regulatory problems in the environmental and health areas. Again, climate change provides a salient example. If other nations, particularly developing nations, do not regulate emissions, companies operating in those nations will not have the right incentives to buy technology that reduce emissions and technologists will not have the right incentives to produce it. Moreover, because of the imperfect enforcement of intellectual property rights in much of the world, companies may fear that other companies in foreign nations will steal their inventions. Thus, regulation within our own jurisdiction may not effectively curb pollution, because it will neither provide sufficient incentives for innovation nor curb emissions abroad. Accordingly, prizes or subsides for a particular technology may be a better alternative than regulation.

It is important to note that the design of appropriate package of incentives for technological innovation may itself be a difficult policy decision that depends on the likely consequences of different approaches. When the government cannot easily observe the quality of the research, prizes may be superior to direct subsidies. Technological acceleration may increase the utility of prizes, because it makes possible diverse approaches to create innovations, which may make it more difficult to observe research quality. Offering prizes has analogies to the advantages that federalism or random experimentation has for policy. All these mechanisms recognize that the government is likely to possess limited knowledge.

As with random experimentation, private organizations are showing government the rich possibilities of embracing a less top-down approach. For instance, the X prize foundation is offering prizes on such diverse subjects as providing faster ways to sequence the human genome and creating an affordable car that gets a hundred miles to the gallon of gasoline.

It would be wise for Congress to appropriate money for a prize fund and permit OMB to determine how it should be spent. Technology funding for regulatory purposes, like regulations themselves, require the time and expertise that Congress lacks. Although agencies may be more expert than Congress it does not follow that they should make decisions on how to incentivize technological innovation on a top-down basis. Even as to the decisions about where and how to offer support and incentives for technological innovation, prediction markets are likely to prove quite helpful.

Taking Account of Intergenerational Equity

The present future of accelerating technology raises the problem of intergenerational equity in a more acute form than ever before. If it becomes recognized at some point that accelerating technology likely makes the next generations far wealthier than those in this generation, we may need to take more account of intergenerational redistribution in our policies. Any substantial economic growth over time creates a problem of intergenerational equity. But accelerating technology makes the issue far more pressing, because it increases the gap in well-being between proximate generations, making redistribution thinkable.

A consequentialist view of democracy takes no position on the appropriate degree of redistribution. That is determined by the preferences of individuals. But accelerating technology may change our view of the direction of the redistribution as a matter of fact and thus change our assessment of appropriate policy, given our distributional preferences. Social Security has been criticized as a transfer from the young who, as a class, have relatively few assets to the old who, as a class, have relatively many assets. Considered without regard to technological acceleration, Social Security thus may appear to fail the objective of creating greater economic equality. But to the degree that accelerating technology will substantially increase the well-being of those starting out in the work force today, the factual premise of this argument is undermined. More generally, technological acceleration raises new questions about who is better able to bear the costs of regulation—the current generation or generations to come.

Indeed, it is possible that in a world of accelerating technology intertemporal issues of equity among the generations may come to be thought more pressing than issues of equity within a nation at a particular time, within a nation technological innovation in contemporary society filters more and more rapidly down to the poor. For instance, the almost universal adoption of cell phones has happened much faster than the adoption of televisions.

It is true that accelerating technology may make incomes more unequal by allowing the most able to amplify their earning power. But the intellectual property at the root of today's technology can be used simultaneously by everyone. For instance, discoveries in medicine may rapidly increase everyone's longevity. In contrast, the fruits of the real or personal property that was the basis of most wealth in the past cannot be as easily consumed jointly. A civilization with almost universal access to such technology innovation might have a greater measure of effective equality, even within large income differentials.

To evaluate issues of intergenerational equity, we need to predict the income and the well-being of future generations. Because of the difficulty of measuring changes in well-being in an era of technological acceleration, benchmarks marking income, life expectancy and technological improvement in future generations are all relevant. Prediction markets provide once again the mechanism that can help provide such information, because they can provide a distribution of the likelihood of various results. This distribution can be used as a basis for assessing the most likely level of well-being of future generations.

But the growth rates and innovation that will increase the well-being of future generations depend on current regulatory and other governmental decisions. One political danger of considering intergenerational equity issues at all is that politicians will have incentives to engage in more redistribution to the current generation than is justified in order to please voters. One constraint on this tendency may be the conditional prediction markets described above. Prediction markets can be made in rates of economic growth and longevity on important regulatory and/or tax schemes. They can provide information about the degree to which such redistribution would destroy wealth.

Thus, accelerating technology may not only create new innovations but create new kinds of social questions—questions that are likely to be faced at first in the administrative context given its already reticulated framework for assessing consequences, including distributional consequences.

Accounting for Possible Catastrophes and Elysian Benefits

Another issue raised by accelerating technology is how to consider small probabilities of extreme consequences, both beneficial and catastrophic. Because technology is proceeding so quickly across so many fronts it creates more of these possibilities than ever before. Unlikely events do not have to be considered in a regulatory cost benefit analysis if their effects are not very great, because the effect of an event must be discounted by its probability. In contrast, an event that will have a

potentially huge effect must be considered even if its probability is relatively small, because the effect even when discounted by its probability can be large.

Richard Posner has considered how to integrate evaluating the problem of catastrophes into regulation. He usefully notes that although there may be a great amount of uncertainty in assessing the likelihood of various catastrophes, regulation can address uncertainty. For instance, even if regulators cannot pinpoint the probability of a catastrophe, they can suggest a possible range of probabilities for the likelihood of the catastrophe. It then becomes possible to provide a possible range of spending which it is reasonable to undertake to avoid the catastrophe. That range provides a metric to critique inadequate or excessive spending.

The extraordinary benefits of accelerating technology represent the flip side of potential catastrophes. Accelerating technology increases the possibilities of both kinds of outcomes. Indeed, the same technological advances may raise the prospect of both. Nanotechnology may provide mechanisms for improving health, but may also create new kinds of very dangerous pollution. Thus, a question for regulatory review is how to compare the small probabilities of catastrophe and almost infinite beneficence that might arise from an accelerating series of technological breakthroughs. Elysian benefits may sometimes be as relevant to regulatory calculation as doomsday scenarios.

To be sure, individuals are risk averse. One thus might argue that we should weight catastrophic loss more heavily than an equal probability of an extremely beneficial outcome because the total catastrophe could preclude the possibility of any future life and the potential progress life brings with it. But this argument seems too facile in the case of technologies that will help us avoid a range of catastrophes.

Strong forms of artificial intelligence could have beneficial externalities in helping predict and avoid catastrophic events. It can also help evaluate the hidden benefits and costs of other accelerating technologies. Thus, even a relatively small probability of creating strong AI might justify a substantial government program of subsidization or prizes designed to stimulate its creation because of the huge benefits it would bring, even given the risks that strong AI may pose to humanity.

Radical life extension is also an Elysian benefit which may depend on risky choices. Radical life extension is premised on the idea that innovations in medical technology may permit people to live longer until the next wave of medical innovations allows them to live for yet another round of medical innovation. For instance, if very long or even indefinite life spans are thought to be a future possibility, individuals could choose to seek treatments which may permit many more years of life even at the risk of sudden death so that they can reap the benefits of the next round of innovations.

This choice presents a kind of secular version of Pascal's wager. Just as it may be rational to believe in God even if there is a only tiny probability of his existence given the infinite benefits of such belief, it may be rational to take risks to live to certain time in the future if by doing so one can enjoy what one regards as the almost infinite benefits of an indefinite life.

Such an analysis would be relevant to the FDA's regulation of drugs. For instance, even if a drug is largely ineffective or even on balance harmful, the possibility of its extending life for a substantial period becomes a far more substantial benefit when accelerating technology may extend lives even further. In short, by catching a wave of accelerating technological changes, an individual may be able to surf to a very long, even indefinite, life.

Once again prediction markets will likely help regulators consider how much they should count possibilities of catastrophes and Elysian benefits in their calculations. One advantage of prediction markets is that they not only provide evidence of whether an event is unlikely, but also evidence of the probability an event will happen even if it is unlikely. Regulatory choices about the structure of our health care system bear on the pace of medical innovation and thus on the possibility of radical life extension. Thus, prediction markets about the likelihood of increases in longevity depending on the structure of the health care system will yield useful information even if the probability of radical life extension is substantially less than fifty percent.

Richard Posner has objected to utility of prediction markets about events that depend on scientific analysis on the grounds that these issues are the domain of scientists and that the man on the street can add little to predictions. But even if it were true that only experts could contribute, in complex social and technological problems the bounds of expertise are unclear. As the famous example of the economist Julian Simon betting against biologist Paul Ehrlich about the future price of commodities shows, many problems can be addressed by different disciplines with resulting wide differences of perspective.

A market helps mediate which set of experts is more likely to be right. Moreover, the layman may not be exactly sure which expert is right, but he may have enough information about the relatively insularity and biases of experts to perform a useful function. For instance, he may think that economists face a more competitive market and more scrutiny from colleagues than scientists on issues of public concern and so tend to favor their predictions about resource depletion over those climate scientists or geologists.

Prediction markets may also help regulators indirectly by increasing public awareness of the relevance of important events with relative small probabilities of occurrence. These markets address a problem that people face in taking account of small probabilities. When the probability of an event is sufficiently small, individuals seem to dismiss the event from their calculations and they may not give enough weight to events that are less likely than not to happen. But prediction markets dramatize the probabilities of various events by giving them a firm number and making individuals more aware of the comparisons of various important events that may happen even if they are not likely to happen. This comparison helps society apply its resources to the catastrophes that would cause most damage as discounted by the probability of their occurrence.

Conclusion

Like other structures of government the administrative state must become a better mechanism for social learning from dispersed sources of information. This kind of improvement is all the more

important because the tasks regulatory review must consider are broader in scope and may be more urgent because of the high stakes of catastrophic risk and Elysian benefits. Using the information tools created by accelerating technology itself offers regulatory review the best prospect of reducing the errors inherent in the insular, centralized planning and of making our accelerating future more relevant to our present regulations.