The Relationship Between Regulation and Productivity

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Chairman Schweikert, Ranking Member Hassan, and Members of the Committee:

Thank you for the opportunity to testify today regarding how regulations impact supply chain modernization and factor productivity enhancement. I am a Research Fellow with Stanford University's Hoover Institution and a Visiting Research Fellow with the Pacific Legal Foundation. I am also an associate editor of the *Journal of Regulatory Economics*. The views expressed here are strictly my own and do not necessarily reflect those of the Hoover Institution, Stanford University, Pacific Legal Foundation, or any other entity with whom I am affiliated. The bulk of my research is on the regulatory process and its economic effects, and it is mostly based on this research that I have four main points to make today:

1. As regulations accumulate, they increasingly distort and deter investments into the activities that are primary drivers of long-run economic growth: research and development, new machinery, new locations and buildings, and new business formation.

2. Emerging technologies—also vital drivers of productivity growth—are sometimes limited by regulations, by accident or by design. To remove the regulatory barriers to new technology, we should actively identify, and then modify or eliminate, those regulations that inhibit the adoption of emerging technologies, especially when those technologies could improve productivity at no cost to safety or other goals of regulation.

3. Regulations cause major infrastructure projects to be delayed by years, and it is unclear whether we gain anything substantial as a result of these delays.

4. In some unique circumstances, such as in network industries that span multiple states, federal regulation is necessary to preempt state-level regulations that would create a patchwork of mismatched obligations that can also limit productivity growth.

Each of these issues is increasingly solvable as AI becomes more and more advanced, but at some point, a long-term solution will require Congressional action. I will discuss some possibilities throughout my testimony.

1. Regulatory Accumulation Hinders Productivity Growth

Regulations, of course, play a vital role in modern society, and with good design and management, regulations can deliver important desired outcomes. Conversely, poorly crafted or conceived regulations can lead to rules that create only costs and little to no benefits. More importantly, the accumulation of regulations over time stifles innovation and productivity growth, and as a result, slows economic growth overall. A unique but, in my opinion, very feasible challenge for policymakers today is to find a way to trim unnecessary regulations while preserving necessary public protections.

Over the past several decades, the stock of federal regulations on the books has more than doubled. The quantity of regulatory restrictions in the *Code of Federal Regulations*, or phrases within regulatory text that create obligations or prohibitions, such as the word, "shall," or the phrase, "may not," has grown from about 400,000 in 1970 to over 1.1 million today.[1]

Regulatory accumulation refers to the steady buildup of regulations over time. Without a systematic approach to reviewing and removing outdated, redundant, or otherwise undesirable regulations, the steady buildup of government rules eventually shows up in economic outcomes ranging from business activities such as investment decisions, startup rates, and productivity growth to household outcomes such as household income and consumer expenditure.

A study that I co-authored with Bentley Coffey and Pietro Peretto, published in the *Review of Economic Dynamics* in 2020, showed that regulatory accumulation slows economic growth by nearly one percentage point annually.[2] Specifically, the study found that the buildup of more and more federal regulations over time distorted business investment decisions. These business investments are broadly defined, including research and development expenditures, new machinery, new locations and buildings, and new business formation itself. In the long run, such business investments are key drivers of innovation and productivity growth. As a consequence of the slower productivity growth that it causes, the buildup of federal regulations creates a considerable drag on overall economic growth, amounting to a 0.8 percentage point average reduction in annual GDP growth. This seemingly small annual reduction has large implications. The slower economic growth caused by regulatory accumulation resulted in an economy that was $4 trillion smaller in 2012 than it could have been without such regulatory accumulation. That amount equaled about a quarter of the US economy in 2012, and if it were a

[1] These figures come from the RegData project, hosted at QuantGov.org. For methodology, see: Al-Ubaydli, Omar and Patrick A. McLaughlin, "RegData: A Numerical Database on Industry-specific Regulations for All US Industries and Federal Regulations, 1997 – 2012," *Regulation & Governance* 11 (2017): 109–123; and McLaughlin, Patrick A. and Oliver Sherouse "RegData 2.2: A Panel Dataset on US Federal Regulations." *Public Choice*. 180 (2019): 43–55.

[2] Bentley Coffey, Patrick A. McLaughlin, and Pietro Peretto, "The Cumulative Cost of Regulations," *Review of Economic Dynamics* 38 (2020): 1–21.

nation's GDP, it would have been the fourth largest in the world at that time.[3] This translates to a loss in real income of approximately $13,000 in year 2012 dollars (or about $18,000 in current dollars) for every American.[4] Another study estimated the effect to be even larger, finding that regulatory accumulation slowed US economic growth by as much as two percentage points annually.[5]

This line of research is focused on the totality of regulations and their cumulative effect, rather than the direct compliance and paperwork costs that are typically included in regulatory impact analyses produced by regulatory agencies. This is not to dismiss those direct compliance and paperwork costs—they often are large and noteworthy. But when we consider the opportunity cost of regulations—and how they distort business investments and the productivity gains that comes from them—the total cost of regulations is substantially greater than the sum of the projected compliance costs when each regulation is analyzed on its own. Indeed, forgone innovation eventually makes compliance and paperwork costs seem relatively trivial in comparison.

Research also shows that regulatory accumulation disproportionately burdens small businesses—including the startups that are often the sources of innovation—and that this burden grows at an increasing rate as regulation accumulates (i.e., the negative effect of each new regulation grows larger as the stock of regulation grows larger).[6] And where there are fewer new businesses entering an industry, there is less competition, less investment in new technologies, and slower productivity growth.

2. Regulations Can Limit the Adoption of Emerging Technologies

Ideally, regulations would facilitate, or at least not hinder, technological advancements, especially when emerging technologies can enhance safety or other regulatory goals while simultaneously increasing productivity. An excellent but frustrating example comes from the transportation world, where challenges include maintaining safety while keeping costs down and supply chains running smoothly. In the freight rail industry, investments in R&D have led to the development of automated and autonomous track inspection technology. Autonomous Track Geometry Measurement Systems, which these days can be mounted on working locomotives,

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[3] Patrick A. McLaughlin, "What If the US Regulatory Burden Were Its Own Country?" (Mercatus Data Visualization, Mercatus Center at George Mason University, April 26, 2016).
[4] Coffey et al., "The Cumulative Cost of Regulations."
[5] John Dawson and John Seater, "Federal Regulation and Aggregate Economic Growth." *Journal of Economic Growth* 18 (2013): 131–177.
[6] Dustin Chambers, Patrick A. McLaughlin, and Tyler Richards, "Regulation, Entrepreneurship, and Firm Size," *Journal of Regulatory Economics* 61 (2022): 108–134.

continuously collect real-time data on rail conditions. Compared to periodic, visual track inspections performed by humans, these systems can detect problems earlier and pinpoint where preventive maintenance is needed. In other words, these technologies offer significant safety improvements over manual inspections performed by humans. And they increase productivity in multiple dimensions: less down time because real-time and more frequent track quality data permits timely preventive maintenance; less human error; and when these systems are mounted on a locomotive, as opposed to on a repurposed car, there is more capacity on the train for freight.

Despite successful pilot projects by Norfolk Southern and other railroads, under a waiver granted by the Federal Railroad Administration in 2020, regulatory inertia remains a barrier. Norfolk Southern's application for an expanded waiver was denied by the FRA in 2022—in the name of preventing uncertainty and potential risk. The reality is that automated and autonomous inspections of railroad tracks represent an improvement to safety, not a new risk. This regulatory inertia inhibits both productivity gains and safety improvements.

3. Infrastructure Permitting Delays Are Productivity Delays

According to Taiyo.ai—an AI startup with perhaps the largest infrastructure database in the world—the average time to complete an Environmental Impact Statement required under National Environmental Policy Act (NEPA) is about 4.5 years, and the median time is around 3.5 years. A large portion of major infrastructure projects encounter significant NEPA-related legal challenges, typically adding another one to three years to the process.

NEPA-related delays, of course, are not the only delays caused by federal rules and processes related to permits. It should be obvious that delays to new or upgraded infrastructure also delay the increases in productivity they would create. Or, even worse, that the threat of delays can deter the investments altogether. While the details of NEPA and permitting in general are beyond the scope of my testimony today, I would like to leave this committee with a few thoughts on permitting:

1. With as much data as NEPA has created over the decades of its existence, we should be able to establish what, exactly, we are getting in exchange for the delays. There are clear costs in terms of delay and paperwork alone. What are the benefits, and are they worth it?
2. Part of the problem is that there can be dozens of different permits required for a given project, and separate approval processes run across a multitude of agencies. The state of Virginia has shown, with its permitting transparency project, that some transparency and a sense of competition across regulatory agencies can lead to much more rapid permitting. Virginia's Permit Transparency Initiative portal allows permit applicants to track the status of their permits from submission through approval—making easy to see

which agency is reviewing the application, how long it has been there, and where it will go next. Virginia reports that permitting review time by its Department of Environmental Quality was reduced by about 70 percent following the launch of this initiative as a pilot program.[7]

3. Recent executive orders and actions are already attempting to deal with some of these issues.[8] Congress, meanwhile, can begin addressing the set of laws that are at the root of the issue. For example, are there laws in place that inhibit agency usage of software that could speed up the permitting process?

4. Federal Preemption is Sometimes Necessary

If there is going to be some form of regulation, then uniform regulatory standards can be crucial for network industries. This is particularly true in transportation networks that require physical connections of roads or railways across multiple state lines to properly function. While in some industries, businesses could avoid a state-level regulation by simply ceasing to operate in the state, the same option is often not possible in transportation. For example, a train traveling from the state of Maine to the state of Massachusetts has no realistic option but to cross the state of New Hampshire.[9]

In cases such as this, there is sometimes little choice but to create a federal regulation that preempts state-level regulations. I have previously written about proposed rulemakings from the Federal Railroad Administration (FRA) related to the minimum size of train crews, arguing that 1. The FRA has not presented evidence that one-person crews have a worse safety record than larger crews, and 2. Establishing a minimum crew size of even one person would deter investments in safety-enhancing technologies and innovations that could potentially lead to even safer operations. I maintain those positions and would be happy to submit my previous writings on those related rulemakings for the record.

However, as the FRA pointed out in its 2024 Final Rule, which mandated a minimum crew size of two, "if the issue of crew size safety is left to be governed by a patchwork of State laws, logistically it may become impossible for a railroad to even consider operations with fewer than two crewmembers." At the time, at least eleven states required most freight trains to operate with at least two-person crews. The FRA's Final Rule, flawed though it is, at least attempts to offer a path for a railroad to demonstrate that a one-person crew can meet the same safety requirements as a two-person crew and to seek approval of one-person operations.

The FRA's crew size rule remains imperfect, as its requirement for a risk assessment that must identify and assess all possible hazards in a proposed operation is unnecessarily fraught with

[7] https://www.governor.virginia.gov/newsroom/news-releases/2024/october/name-1035453-en.html
[8] See, for example, "Updating Permitting Technology for the 21st Century." https://www.whitehouse.gov/presidential-actions/2025/04/updating-permitting-technology-for-the-21st-century/
[9] Circumventing New Hampshire by way of Canada is not a realistic option.

uncertainty and egregiously burdensome.[10] But the concept is a good one: regulations should have a pathway for technological improvement built into them. In the railroad industry, human error is the greatest source of risk in train operations. If the goal is safety, the FRA should hope that railroads continue to invest in technologies that minimize the opportunities for human error to create safety hazards, including more automation. Regulations, in turn, should accommodate such innovation.

5. Conclusion

The thicket of regulations built up over the decades challenges traditional approaches to optimizing them, such as benefit-cost analysis. Prioritizing flexible, innovation-friendly regulatory frameworks will enhance economic potential, improve safety, and strengthen national competitiveness. I leave you with the following modest recommendations:

1. Use AI to build a comprehensive database on permitting frictions and delays created by federal regulations and regulatory guidance.
    a. Follow Virginia's lead and use transparency to establish a culture of competition across agencies for speedier permitting.
    b. Use the database to analyze the total costs and benefits of permitting delays—NEPA in particular, but all permitting should be fair game.
2. Regulators across the board ought to make regulations more accommodating to innovation and advances in technology. Regulations should outline a process that allows a business to demonstrate that a different approach than the one designated by a regulation can achieve the same or better outcomes. If agencies do not know where to start, use AI to help identify rules that contain engineering or design standards, or that limit how far automation can go. Develop alternative performance standards as an option for these rules.[11]

Thank you. I welcome any questions.

[10] Instead, FRA should consider a straightforward and clear process by which a railroad can seek to operate a one-person, or eventually, a zero-person operation.
[11] For a deeper dive on performance vs. design standards, see: Laura Montgomery et al., "Performance Standards vs. Design Standards: Facilitating a Shift toward Best Practices," *SSRN Electronic Journal*, 2019, https://doi.org/10.2139/ssrn.3420320.