

CHAPTER 2

Economic Freedom as Environmental Regulation by Markets

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1. Introduction

A frequently iterated talking point is that economic growth comes at an environmental cost. Some contend that this trade-off can be mitigated through policies that reconcile growth with conservation. Others argue that the trade-off is unavoidable and that continued economic expansion necessarily generates environmental degradation, making degrowth the only viable path forward. In other words, they contend, there exists a tension between economic growth and the environment. Thus, under either viewpoint, economic growth is typically regarded as environmentally risky because of its presumed tendency to accelerate growth at the expense of nature.¹

Public opinion polls seem to suggest that this is not a fringe opinion. A 2019 poll in America shows that 20 percent of Americans believe “capitalism has an exploitative and corrupt nature, often hurting either people or the environment” (Pew Research Center, 2019). Even polling questions seem to assume an inherent tension between capitalist growth and nature. Take, for example, a Canadian poll from 2026 which asked whether energy policy should be designed with economic growth in mind or with environmental preservation in mind (Canadian Press, 2026).

However, is there really an inherent tension between capitalism (and the growth it seems to generate) and environmental preservation? To answer, we must understand that economic growth *can* deteriorate the environment substantially. However, it is not inevitable.

A large literature has questioned the notion of a permanent trade-off between prosperity and environmental quality, suggesting instead that the relationship may evolve as societies develop. This evolution is captured by the Environmental Kuznets Curve (henceforth the EKC). Named for the Nobel Prize-winning economist Simon Kuznets, it suggests that there is an inverted U-shape to the relationship between economic growth and the environment. In other words, initial economic development increases pollution up to a point, but after

1 There is a well-documented literature showing the connection from economic freedom to economic growth, see Alvarez, Geloso, and Scheck (2024).

that point, more income leads to reductions in pollution and greater efforts at environmental preservation and restoration.² In this chapter, I argue that this relationship is highly conditional on institutions—many of which underlie economic freedom. These institutions create effective ways to deal with pollution, nuisance, and resource overuse. In so doing, they reduce the peak point (so that less pollution is generated before the point is reached) and move it forward (the peak occurs at a lower income level).

In nations with institutions that protect economic freedom, property rights offer ways to experiment with liability and tort to internalize the damages of pollution in ways that are more prone to reconcile development with preservation. They also permit the creation of complementary mechanisms—insurance, easier delineation of commons, and new forms of industrial organization—that facilitate internalization. To top it off, property rights create strong incentives to innovate in ways that replace outdated production techniques with more efficient ones (i.e., those that use fewer resources). At the same time, open markets communicate information via prices about substitutes, scarcity, and damages induced by pollution while also facilitating specialization in ways that increase the efficiency of resource use.

I present this as “regulation by markets.” It contrasts with the more usually discussed “regulation by bureaucracy” whereby government agencies are tasked with specific mandates to control and restructure markets (and individual behavior) in ways to improve environmental outcomes.

In Section 2, I review those mechanisms that make it possible to improve the shape of EKC via open markets and stronger property rights protection—both of which can be proxied by economic freedom indices published in the *Economic Freedom of the World* (EFW) reports. Section 3 reviews the evidence that directly speaks to the connection between economic freedom as the proxy for regulation by markets and environmental quality. Section 4 discusses regulation by government and its effect on the environment. Taken together, sections 3 and 4 are meant to highlight two key conclusions: a) that regulation by markets is far more potent in improving environmental outcomes than commonly realized and; b) that while regulation by bureaucracy can secure environmental improvements, its efficacy is often overstated as many aspects of government actions end up causing more harm than good (notably by undermining regulation by markets). Section 5 discusses and concludes.

2 Kuznets did not originate the curve. Instead, he postulated an inverted U-shaped relationship between economic growth and inequality. The economists Gene Grossman and Alan Krueger adapted this graph to show the relationship between economic development and the environment in 1991 and named it in honor of Kuznets.

2: Kuznets, regulation by markets, and regulation by bureaucracy

Environmental problems boil down to what economists call a “commons problem” or sometimes “open access resource” problem. Referring to the old communal grazing lands (i.e., the village’s commons), it speaks to the idea that there are resources or areas that can be accessed by everyone. No one can be excluded from using it. However, when they access these commons, they still reap private benefits. The problem part emerges because rational self-interest leads to overuse as the cost is spread over everyone which leads to what economists call an externality (i.e., a cost borne by others than parties that contracted) (Boudreaux and Meiners, 2019).

To illustrate, take the example of an open sea fishery (a classic example in economics) (Scott, 1955). The ocean cannot be fenced to exclude some from using it the same way one can fence land to prevent trespassers. The fish that dwell in it are thus an open access resource since the ocean is a common. A fisherman knows that if he is not the one to capture the easiest fish himself, another fisherman will. He must thus pull as many fish out as he can before other fishermen do. If he hesitates, he will face higher costs in trolling the harder-to-find fish. The problem applies the same for all fishermen and they all have the same incentives. The result is that fish catches are well in excess of the fish population’s ability to sustain itself. Fish stocks dwindle and eventually go extinct. That cost is shared by everyone.

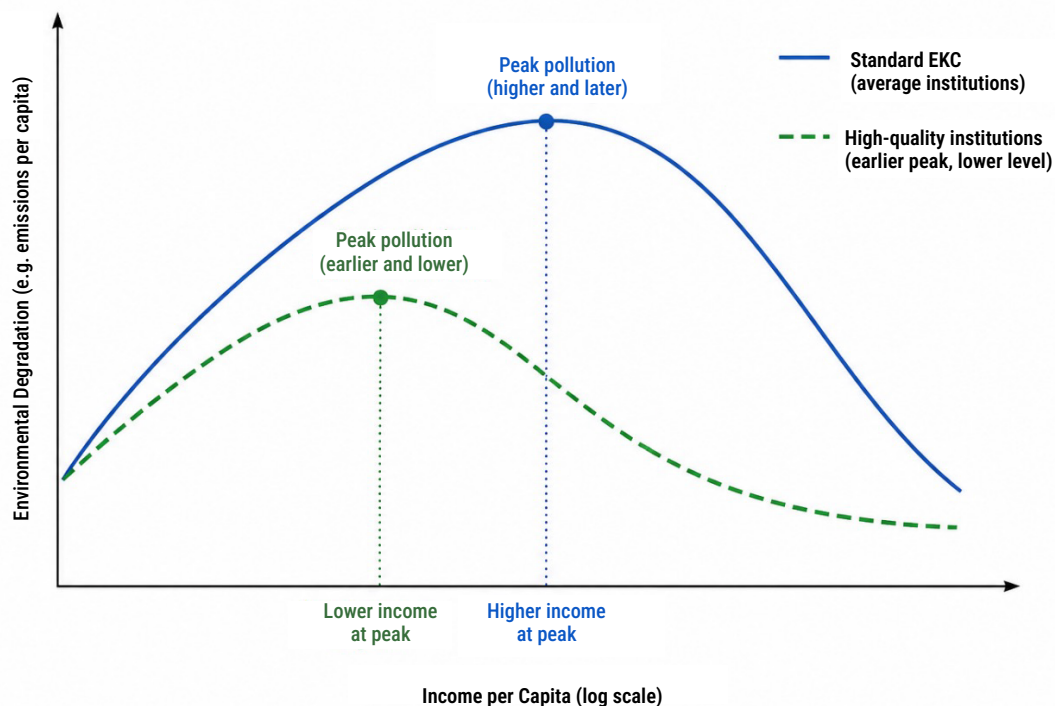
This is the same problem that exists for all environmental problems. Air pollution occurs when firms have private incentives to produce goods and the costs (i.e., the emissions) are shared by everyone. Water pollution is when firms have incentives to produce goods and throw the waste associated with the production process into the water. And so on.

Normally, three answers to environmental problems can be provided. The first is tied to what is known as the Environmental Kuznets Curve (EKC) named after economist Simon Kuznets who won the Nobel Prize in economics in 1971.³ It postulates an inverted U-shape relationship between economic development and environmental degradation. As countries grow richer, they produce more and that leads to environmental degradation, but only up to a point. As they continue to develop, the effects on the environment become smaller and eventually reverse. After that point in income, the environment starts improving. In figure 1 below, the solid blue line depicts this idea. This relationship emerges out of three factors. The first is that richer individuals might marginally value environmental goods more as they grow richer. Thus, after a certain point, one extra percent of income might lead to more than one percent increase of spending on environmental preservation (e.g., forests, water cleanup, energy-efficiency methods, etc.). Moreover, as incomes rise the cost of some environmental

3 Dinda (2004); Raymond (2004); Stern (2017).

goods might fall relative to income. For example, if the cost of reforesting one acre of land is always \$1 per acre, economic growth makes that fixed cost proportionally easier to bear. Second, economic growth does not only happen via the scaling-up of activities. In fact, it happens mostly via innovations that enhance productivity. These productivity-enhancing innovations are adopted by firms, consumers and workers if they use fewer resources such as energy, capital, and material commodities to create value. Third, the process of economic growth also comes with a form of industry rotation. Poor societies tend to be agrarian and produce mostly using land. As they grow richer, the farm sector contracts, land is returned to nature (such that forests recover) and industries emerge (leading to more air pollution from the chimneys of the new factories). Then, as they grow even richer, manufacturing industries contract in size relative to the rest of the economy and service industries rise. These new industries emit fewer air pollutants and thus air pollution declines. The three factors explain why environmental damage eventually peaks and then starts to decline.

Figure 1: Environmental Kuznets Curve



But the EKC is not a sufficient explanation. Indeed, all it does is describe a general shape. It says little about how much income is needed to reach the peak; how much environmental degradation happens before that peak is reached; or even the instances where the EKC might be too weak. Indeed, there are instances where the EKC works well in settings where the harm is localized and when those injured by environmental degradation are people not yet born. However, when both conditions are not met, the EKC has a harder time working.

An example of the problem not being localized is climate change, whereby emissions made by industries in the United States are costly to people in Kenya, South Africa, or Sudan. The growth in America comes at a cost to people elsewhere, which cuts the incentives for Americans to reduce their emissions. Similarly, if environmental problems are intergenerational, whereby pollution now creates irreversible or highly persistent damage (e.g., accumulation of greenhouse gases leading to higher temperatures) to generations not yet born, the incentives to generate the EKC are weakened.⁴

This explains the next two answers, which speak to policy responses to environmental problems. Indeed, as described above, the EKC proposes no policy course whatsoever. It simply states that, in some situations, as incomes increase, forces will materialize to improve environmental outcomes. There is little debate over the existence of the EKC; the predicted pattern shows up in a wide variety of environmental indicators from ground water contamination to air pollution to CO₂ emissions. But it does not show up everywhere (or at least the peak has not been reached in all instances), and scientists continue to debate its exact shape.⁵

However, a more important question is whether there are policies that can affect the EKC's shape and reach. By shape, I refer to the peak in figure 1 and where it occurs. Ideally, we would prefer a flatter curve with a lower peak, such that the point of reversal occurs earlier (i.e., at a lower income level on the horizontal axis) and with less environmental degradation (i.e., at a lower point on the vertical axis). By reach I mean the number of environmental outcomes to which the EKC applies. In figure 1, I presented environmental outcomes as a single aggregate indicator. However, the discussion above suggests that the EKC is likely to apply more readily to some environmental problems than others. For example, it may apply well to urban smog and other localized air-pollution problems whose costs are borne largely by people currently alive and living nearby, but less so to broader environmental problems such as chlorofluorocarbons and ozone depletion. Thus, an EKC with a wider reach would be one that applies to a larger set of environmental problems rather than only a narrow subset of them. The ideal we should strive for is an EKC with a lower peak that occurs at a lower income level and that affects a larger number of dimensions of environmental quality.

To move towards a better curve, policy choices matter. This is where the green dashed-line comes into play in figure 1. This shows the effect of better (not yet defined) policies and institutions in terms of dealing with environmental problems. Notice that the peak occurs earlier and at a lower level of pollution denoting the direction of ideal improvements we should desire.

4 Dasgupta, Laplante, Wang, and Wheeler (2002).

5 Dancer, Miller, and Burgess (2026).

What is better policy? One answer is tied to legislation by government which aims to restrict access to the commons. This means rules, quotas, permits, regulations, and penalties for overuse.⁶ For example, a legislative assembly could impose emissions quotas on factories to limit greenhouse gas emissions that contribute to climate change. I call this approach regulation by bureaucracy as agencies have to be put in charge of defining and enforcing the rules. For many people, this is the more obvious form of policy approach and it requires little elaboration to be understood.

The second answer is tied to what legal scholar John Hasnas calls “common law privatization” or what I prefer to refer to as regulation by markets. Regulation by markets is more complicated and requires longer elaboration than regulation by bureaucracy. Yet it surrounds us in advanced economies. It is ubiquitous and deeply embedded in everyday life, making it so easy to overlook. This is because it all starts with property rights but it ends with strong forces to reduce socially harmful costs, increase socially beneficial outcomes, internalize both costs and benefits, and align incentives with preservation. When combined with open markets, this is a potent way to deal with environmental problems.

Secure property rights mean there are socially recognized and enforceable claims over the use of resources that define who may undertake particular actions and who must bear the costs or receive the benefits that result from those actions. As a result, behavior by parties that destroy or damage those claims can be adjudicated in courts. Under common law regimes, for example, judges developed doctrines such as trespass, nuisance, negligence, and defamation to determine when one person’s actions unlawfully impose costs on another, as well as the remedies available. Central to this is the idea that he who causes harms must bear the consequences of his actions and offer remediation against injured parties who may seek compensation. This occurs through liability rules that force actors to internalize the costs that their behavior imposes on others. Property rights, when enforceable and well-defined, open the door to the use of liability rules. Aware of these potential lawsuits, actors adjust their behavior before harm is done when they are aware they can cause harm.

For example, a company working up a particular river might be aware that they can be sued for throwing waste into the water thereby damaging farms downstream. The threat of costly lawsuits incentivizes them to treat waste or dispose of it in safer ways. The adjustment can also occur by more indirect means since the security of property rights creates complementary effects. For example, insurance companies could be aware of this liability which would—for them—imply that they are taking on a risky client. The higher premiums they charge communicate information about risks and incentivize the adoption of water treatment installations. Insurance companies do more than just charge higher premiums;

6 Hasnas (2009, 2021, 2024).

they also encourage policy holders to change their behavior. For example, they may refuse to insure a factory without inspecting it and they may require it to take certain actions to mitigate the risk of an industrial accident. The security of property rights allows insurance firms to impose that additional—more indirect—mechanism which is why the security of property rights is multiplicative.

Moreover, secure property rights may incentivize the conversion of waste into valuable resources. For example, geographer Pierre Desrochers pointed out that many waste products tied to Britain's industrialization during the 19th century caused concerns of legal actions for negligence, nuisance, and trespass.⁷ The risk of incurring liability costs led factories to experiment with ways to convert waste into valuable products. Coal tar—a thick dark liquid which is a byproduct of coal heated to high temperature—dumped in rivers could dramatically hurt properties downstream. If burned, it produced heavy smoke noxious to the health of nearby inhabitants. Gas companies frequently gave it away for free for fear of nuisance. However, because coal tar is made of hundreds of chemical compounds, chemists realized that these could be separated and refined, creating valuable byproducts. For example, creosote oils can be extracted and used to preserve railroad ties, telegraph poles, and wooden infrastructure. Phenol can also be extracted and used as a disinfectant to clean livestock and for other sanitary products. The nuisance problem disappeared with innovation, whereby waste was converted into valuable products. The key point to remember is that the security of property rights also created this additional indirect mechanism. Security of property rights meant that nuisance doctrine created the risk of lawsuits and thus the incentive to mitigate harm. At the same time, they allowed innovators to retain the gains from discovering more productive uses of waste materials, thereby increasing the benefits of internalization.

Unlike regulation by bureaucracy, these rules evolve incrementally through litigation and judicial decisions. Courts adapt legal doctrines to new circumstances on a case-by-case basis, refining standards of responsibility through experience. In this sense, common-law privatization relies on private rights, liability, and judicial remedies to govern behavior and resolve externalities, including environmental harms such as pollution. This is well-suited to situations where the harm of a particular practice is not yet known to people.⁸ A good example of this is the case of British shellfish in the late 19th and early 20th centuries. The British were historically fond of shellfish. However, shellfish (notably oysters) feed by filtering water, which means that bacteria present in local waters can accumulate in their tissues and subsequently be ingested by humans. Shellfish growing in waters near sewage-water facilities often acted—because of *Salmonella Typhi*—as transmitters of typhoid fever.

7 Desrochers (2007, 2008, 2009a, 2009b, 2023, and 2025).

8 Geloso and Tynan (2025). See summary at Geloso and Tynan (2026).

The link between shellfish, wastewater, and typhoid fever was not well understood until the late 1890s and early 1900s. In 1903, however, a well-publicized case of typhoid fever was linked to oysters, leading London newspapers to speak of “Oysteria” because of the consumer response to the outbreak. The link—which had been discussed between experts for more than a decade—became vividly clear to consumers and the shellfish industry which feared collapse. A rapid experimentation process began. The main fish market in London—Billingsgate Market—initiated court cases against fish merchants who brought tainted products, required proof of site inspections by respected bacteriologists to sell at the market, and expelled merchants from well-known contaminated sites until they proved safety. The risk of liability incentivized experimentation with new rules and new arrangements of property rights. Simultaneously, Billingsgate Market began funding the research of bacteriologists into processes—notably epuration in flowing water tanks to allow the pathogens to exit shellfish—to clean the product. Moreover, aware of the risks and because consumers were turning away from their products, firms also changed their production methods. Shellfish harvesting in deeper water—though far safer, as the risk of typhoid from those sites was far smaller—had been deemed unprofitable before the 1903 crisis. This was largely because deep sea fishing required more capital, and was conducted further away from markets, thus necessitating higher transportation and handling costs. The crisis changed the incentives by shifting the demand from cheaper but riskier sites to deeper but safer sites. The risks incentivized a change in production techniques that minimized the problem.

This example illustrates the experimentation process under regulation by market and the fact that it is quite flexible. Indeed, the solution was a mixture of multiple solutions. Shellfish merchants adjusted their production methods as a result of the fear of losing consumers and being exposed to lawsuits. Retail markets like Billingsgate began restricting the entry of merchants with risky products, initiated lawsuits against them, and began to fund research and development efforts to deal with the problem. Within a decade, the “oyster” crisis was dealt with entirely and faded from the memory of all except a few historians.

All of these mechanisms of market-based regulation act to push the EKC downward and to the left by encouraging the internalization of costs and benefits and by creating incentives for firms to innovate, allowing them to capture the gains from developing cleaner and more efficient production techniques. These mechanisms are reinforced by open markets. If an industrial activity creates environmental harm, that harm represents a cost and thus an opportunity for entrepreneurs. The existence of that cost signals potential profits to anyone who can devise a way to reduce, eliminate, or repurpose it. As a result, the ability to challenge incumbent firms through innovation can hasten the disappearance of environmentally harmful practices. Yet this process also depends on secure property rights, for innovators

must be able to appropriate a sufficient share of the gains generated by their innovations if they are to undertake the costly effort of innovating in the first place.

The safer property rights are, and the more people can experiment with them (through class-action lawsuits, the transfer by sale of claims from poor parties to parties able to sue for restitution, and richer contractual and corporate forms⁹), the more efficacious market-based regulation becomes.

Both methods have upsides and downsides. The legislation approach uses coercion and penalties to limit pollution and resource overuse. According to the advocates of this approach, it is well-suited to deal with immediate crises where time is of the essence, as well as to problems with inter-generational costs since governments are long-lived agents. However, it is vulnerable to special interest lobbying (economists call it rent seeking when firms expend scarce resources seeking government-granted privileges) and politicians seeking to push costs on future voters and away from current voters (Buchanan and Wagner, 1977). Interest groups might try to lobby governments to use them as a vehicle to serve self-interested ends. For example, incumbent firms might desire emissions caps in certain industries because they limit entry from potential challengers, giving incumbents a degree of monopoly power. Additionally, the legislative approach suffers from a knowledge problem in that command-and-control policies or even lighter-touch approaches like taxes (e.g., the carbon tax) can lead to policies that are too costly: they reduce incomes more than necessary to solve a given environmental problem. In fact, the two downsides can potentially work in ways that make the environmental problem worse.

Regulation by market, for its part, may be poorly suited to deal with emergencies, as the aforementioned experimentation process takes time. It is also highly dependent on the ability to narrowly identify which polluter caused harm via negligence, nuisance, or trespass, and who the damaged party is. Regulation by market works best when property rights are clearly defined, and harms are localized, observable, and traceable to specific actors. It works less well when injured parties of environmental damages are hard to identify, such as in cases

9 While this is rarely discussed, corporate forms can be an exceptionally effective way to address environmental problems. Consider the case of a vertically integrated firm. Integration can be environmentally beneficial because it expands the boundary within which costs and benefits are internalized. Activities that would otherwise generate externalities across firms become internal transfers within the same organization, meaning that a greater share of the resulting costs is borne by the owner. For example, if a food manufacturer discharges waste into waterways that damage farms it owns downstream, it has a stronger incentive to reduce that pollution than if the manufacturing and farming operations were owned by separate firms. By bringing multiple stages of production under common ownership, vertical integration can transform environmental externalities into ordinary business costs that managers have incentives to minimize. In practice, this means that government intrusions into industrial organization (preventing certain business practices) might have the unintended ill effect of limiting incentives to deal with externalities. See Cheung (1983); Coase (1937).

when the harm is global (e.g., greenhouse gas emissions and climate change) or borne by future generations.

The limitations and strengths of both approaches suggest that the relevant question is not which system is perfect, but which institutional arrangement is better suited to a particular environmental problem. Trade-offs exist and the choice is between the best approach in shifting the EKC down to the left without hurting economic growth.

However, it is worth noting that people tend to underestimate the efficacy of regulation by market. One reason for this is that we fail to see how efficacious it is because it prevents some injurious activities before they even take place. John Hasnas reviews debates in America regarding tort law and concludes that regulation by market might even work *too well*. Advocates of tort reform routinely argue that liability risks have become so large that firms and individuals take excessive precautions to avoid lawsuits. They claim that liability concerns discourage socially beneficial activities. But in doing so, Hasnas argues, they provide support to the idea that regulation by market works well. What is powerful enough to discourage socially beneficial activities cannot simultaneously be dismissed as an ineffective regulatory mechanism!

The other reason for this is that governments are frequently very good at creating the commons problem in the first place. Take the aforementioned example of the pollution of waterways in which shellfish were harvested in Britain. After the linkage between typhoid fever and shellfish in sewage water was made, owners of oyster beds blamed local governments for discharging sewage waters near their estates. The issue arose because of the large expansion of government-owned water infrastructure. This was possible because earlier in the 19th century, legislation had exempted local governments from lawsuits by fishermen against the discharge of harmful substances. In other words, a great deal of the pollution problem was created by government meddling with property rights. Hasnas invokes a similar example: the infamous British Petroleum oil spill in the Gulf of Mexico in 2010, when 11 workers were killed, with some 134 million gallons of oil leaking into the Gulf, causing massive harm to inhabitants and fishermen. Offshore drilling carries substantial risks which expose drillers to liability. However, Hasnas points out that governments limited these liabilities by curtailing regulation by market through legislation that capped liability exposure, thereby insulating firms from some of the consequences of environmental harm and weakening the disciplining force of tort law (Hasnas, 2021). This insulation encouraged more reckless behavior and maybe even the offshore drilling in the first place.

On an even grander scale is the case of the Soviet Union, where, in the context of a centrally planned economy, the environmental record is one of overexploitation of the

commons and pollution coming at high costs to human health and welfare.¹⁰ To quote one historian,

[socialist economies] relied on a merciless exploitation (some would say short-sighted plundering) of the countries' natural resources of land, water, and minerals, and processing these resources in a rather wasteful way to produce poor quality products using methods of production which appeared to be what had been significantly more capital- and labor-intensive than need be. (Gomulka, 1986:103)

This creates the possibility that government remedies may not simply be inefficient but also that other state interventions create problems in the first place or amplify them. In terms of the EKC, this means that government interventions also have the ability to move the curve in the non-ideal direction of a higher peak occurring at a higher level of income, meaning that there is more environmental degradation occurs before improvements take place.

3: Direct empirical evidence

Broadly speaking, the concept of regulation by market is best proxied by the *Economic Freedom of the World* (EFW) report. The property rights component speaks most directly to the ability to internalize externalities through liability rules and tort law. The other components—regulation, open trade, and government spending—speak well to the indirect channels of regulation by market, such as the incentives for innovation, the ability of consumers to punish bad behavior, the ability to import new and better production inputs, and the ability to contest incumbent firms through innovation.

Figure 2 shows that for the broad Yale Environmental Performance Index (EPI), countries with higher economic freedom scores have higher environmental scores. The EPI is a composite measure that ranks 177 countries using 47 indicators across multiple categories of environmental performance (we will return to the categories). It assesses how closely countries approach established targets in environmental health, ecosystem vitality, and climate change mitigation.

Echoing discussions in earlier works and using the same dataset—which also has gross domestic product (GDP) per capita estimates—we can verify if elements of the Kuznets curve are present (Mitchell, 2025: 42–46). Figure 3 is based on an estimated quadratic relationship between EPI and the logarithm of GDP per capita, while controlling for economic freedom.¹¹ Because economic freedom was included only as an additive control and not interacted with GDP, the two curves have exactly the same shape, but the higher the economic freedom,

10 Feshbach and Friendly (1992); see also Martinez and Geloso (2026).

11 The relationship is given as follows: All variables are statistically significant at the five percent level and above.

Figure 2: Yale Environmental Performance Index (EPI) for 2026 by Economic Freedom Score (2023 Values)

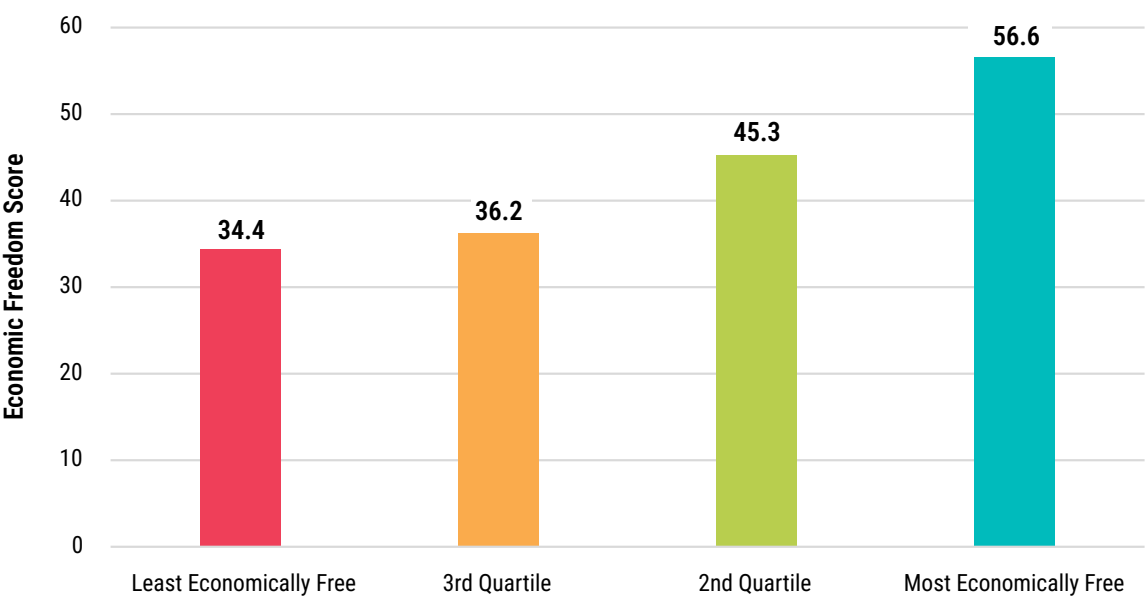
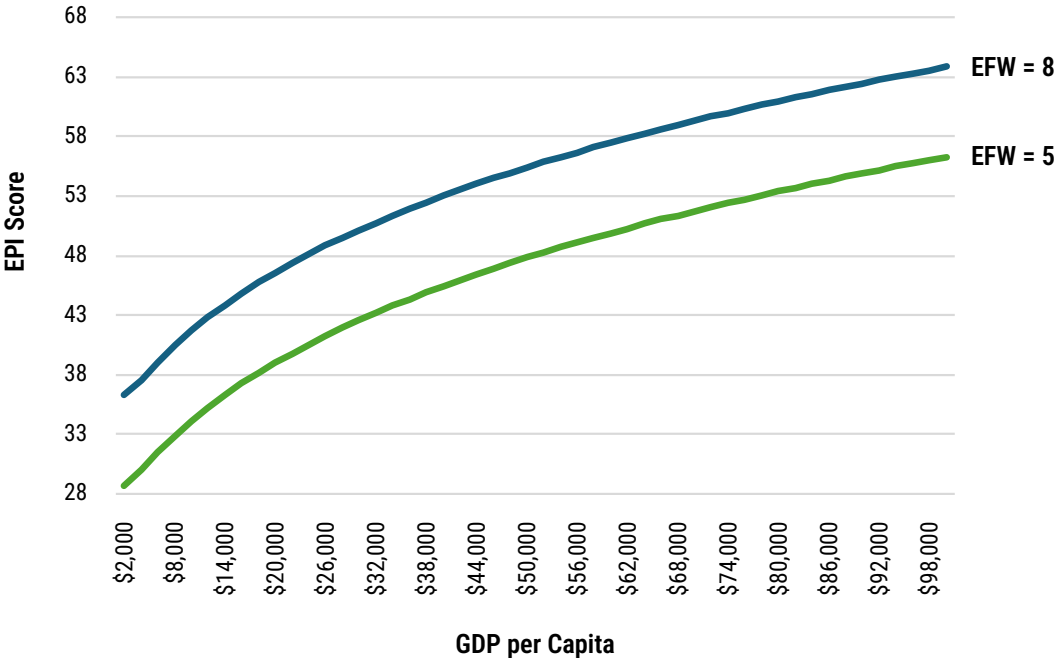


Figure 3: Predicted EPI Score As a Function of GDP per Capita at Different Levels of Economic Freedom

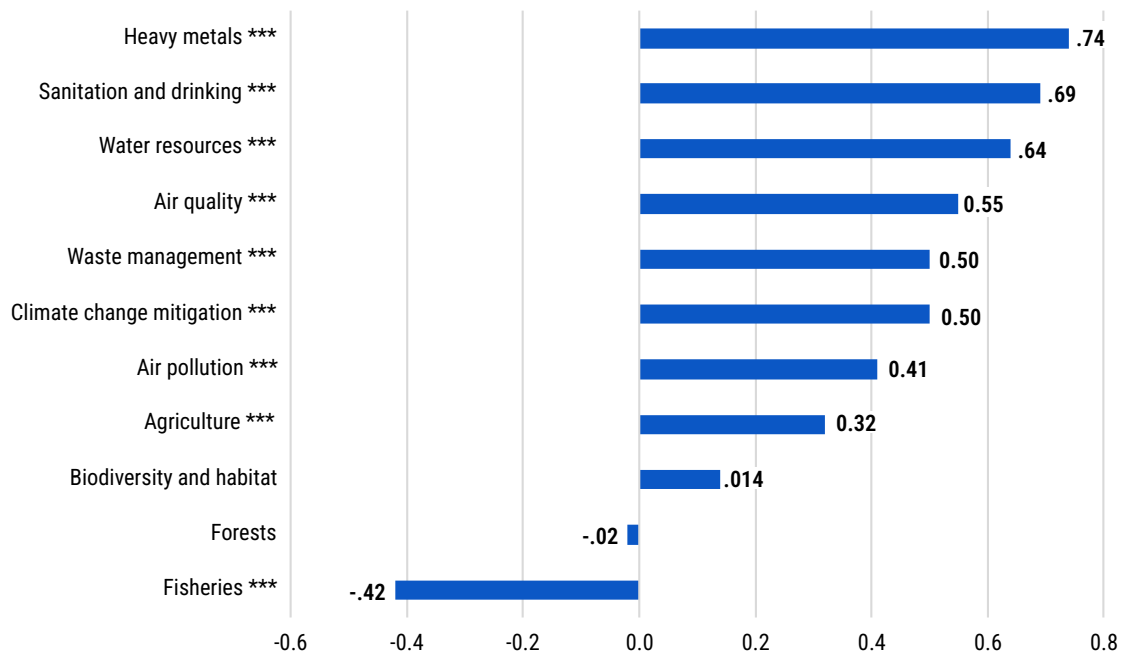


the greater the score. In other words, this specification says that for any level of income, economic freedom improves the EPI score. An alternative specification would consist of interacting economic freedom with both logged GDP per capita and its square, allowing

economic freedom to alter the level, slope, curvature, and turning point of the relationship between GDP and environmental performance. While the results show that at higher levels of economic freedom, GDP per capita is more effective in increasing the EPI score, I do not show this specification. This is because the resulting terms are highly correlated and difficult to identify separately in a relatively small cross-country sample with a single year of cross-section, producing large standard errors and statistically insignificant coefficients despite visually different fitted curves. A proper study would require richer approaches (e.g., panels) and, in any case, as we will see below, the presence of an EKC being augmented with economic freedom are echoed in causal inference works.

The general pattern of the broad EPI holds at the lower categorical level in ways that match what was explained in Section 2. In figure 4 below, I show the correlation between the Fraser Institute's EFW index and the different broad components of the Yale Environmental Performance Index (EPI). The EPI is a composite index developed by researchers at Yale University and collaborators that ranks countries according to a broad set of environmental outcomes and policy indicators, including air quality, water and sanitation, biodiversity, ecosystem vitality, and climate-related measures. This battery of measures is useful because it speaks well to the different limitations and advantages of regulation by market

Figure 4: Correlation between Economic Freedom Index and Components of the Yale Environmental Performance Index (2023)



Stars: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

and regulation by bureaucracy approaches. For example, biodiversity and habitat as well as climate change represent good examples of limitations of regulation by markets since injured parties are hard to identify (who is harmed and to what amount by the extinction of a particular species of snails?) and harms are intergenerational (injured parties are not yet born). However, other dimensions such as waste management, sanitation and drinking water, water resources, and agricultural land quality are all dimensions in which regulation by market should be expected to perform better because harm is more localized, injured parties are easier to identify, and thus remedial actions in court may lead to preemptive harm-reduction measures by firms.

Across all indicators except one, even those where regulation by markets should be at a disadvantage, we see that more economic freedom (i.e., more room for regulation by markets) correlates with better environmental outcomes. The one big exception is fisheries, which is unsurprising given that it is very difficult to fence the oceans, as mentioned earlier. However, even this may be misleading. Oceans are difficult to fence, but *de facto* fencing is not impossible. Some governments—such as Iceland—fix a maximum allowable catch of fish in the high seas. The government then sells rights to that catch to the highest bidder so that the most efficient producers participate in the industry without overexploiting fish stocks (Marvasti, 2024). These rights can be traded between fishermen. This is a form of privatization consistent with regulation by markets, but a form which the EFW cannot measure directly. Wherever this approach is adopted, fish populations tend to show signs of recovery.¹² Moreover, pressures on fish populations seem to be alleviating globally, as rising productivity (and falling costs) in aquaculture (fish farming) allows for a greater share of the fish supply to be increased in the same way chicken, cows, and pigs are increased, without overexploitation of resources.¹³ And there are studies attempting to measure property rights specific to aquaculture and the degree of aquaculture (Anderson, 2002). They find that stronger property rights are associated with greater use of aquaculture and other managed production systems. This suggests that secure property rights can ease pressures on high-seas fisheries and natural fish populations.

This is merely correlation, but it echoes what other studies have found.¹⁴ For example, in 2022, Robert Lawson reviewed 24 studies linking economic freedom to some environmental outcomes. Of those, 41.7 percent showed mixed or null results; 41.7 percent showed good results (i.e., economic freedom improved nature); and 16.7 percent showed bad results—overall showing a relatively decent case for the relative strength of market-based regulation.

12 Chu (2009); Costello and Deacon (2007); Costello, Gaines, and Lynham (2008); Costello, Lynham, Lester, and Gaines (2010); Grainger and Costello (2011).

13 Desrochers, Geloso, and Szurmak (2021a, 2021b).

14 For example, see Hartwell and Coursey (2015).

More recently, Acharya, Geloso, and Psurek (2026) examined claims that capitalist economies create ecological imbalances. They normalized a wide array of environmental indices and measured imbalance using the coefficient of variation across all of them. A higher coefficient indicates more imbalance, and thus that development comes at the cost of unsustainable environmental outcomes. They find little to no evidence that economic freedom increases imbalance. In many specifications, the relationship is statistically insignificant; in others, it runs in the opposite direction, with more economically free countries exhibiting more balance. To top it off, they also note that economically freer countries tend to have much better environmental outcomes scores. Globally, environmental outcomes improved with higher levels of economic freedom (i.e., regulation by markets). Abban, Rajaguru, and Acheampong (2025) looked at the ecological footprint (i.e., a measure of degradation) of 152 countries between 2000 and 2021 and assessed the relationship with economic freedom. They also accounted for spatial spillovers between nations such that improvements in one country can affect a neighboring country. They found that a one-point increase in the EFW index is associated with a 16.4 percent reduction in the ecological footprint. However, neighboring nations also gained from such an increase, as their own footprints fall by 4.4 percent.¹⁵ In other words, economic institutions moderate the relationship between GDP per capita and the environment in a way that significantly reduces ecological footprints, shifting the EKC downward and to the left. Finally, de Soysa (2022) used the World Bank's adjusted net savings measure (which deducts resource depletion and pollution damage while adding investment in human capital) and found that economic freedom is associated with higher sustainability since economically freer societies seem to generate wealth with less depletion of natural, human, and physical capital and lower carbon damage per unit of output. His results seem to speak to the ability of economic freedom to push down the EKC.

In fact, other studies confirm similar linkages on dimensions that should be unfavorable to market-based regulation. For example, Callais, Geloso, and Plemmons (2026) studied 49 cases of major liberalizations, defined as countries that had a one-point jump on the EFW index over any five-year window and which was sustained in the longer run. They then compared liberalizers with non-liberalizers. While they found that liberalizations increased GDP per capita by 16 percent over 10 years relative to non-liberalizers, they found no signs of increased greenhouse gas emissions (total, per capita, per dollar of GDP). They also found signs that liberalizations reduced mortality rates from outdoor air pollution. In this case, the absence of negative effects of liberalization on greenhouse-gas emissions—the environmental outcome least likely to show improvement because of the limitations of regulation by markets in addressing intergenerational and global environmental problems—makes

15 Abban, Rajaguru, and Acheampong (2025).

a particularly strong case for regulation by markets. It is able to generate growth without harming the environment.

Bjørnskov (2024) found stronger results than Callais, Geloso, and Plemmons in their study of liberalizations. Using data from 155 countries between 1975 and 2015, he found that economic freedom reduces greenhouse gas emissions and probably creates the Environmental Kuznets Curve for emissions (Bjørnskov, 2024).¹⁶ Economically freer societies reach the point at which total emissions begin to decline at substantially lower income levels (roughly \$25,000 in GDP per capita), suggesting that economic freedom accelerates the transition to cleaner technologies and production method. Hence, Bjørnskov concludes that “the EKC is typically situated to the left in economically free societies, indicating earlier adoption of clean technology and faster transition towards a low-emissions society” (p. 12).

Other environmental outcomes less likely to be favorable to regulation by markets proxied in EFW also show that market-based approaches can do considerable good. Asafu-Adjaye (2003) found that economic growth did impose pressures on biodiversity but that this was strongly mediated by indices of economic freedom, as more secure property rights helped internalize biodiversity losses. Pandit and Laband (2009) reach a similar finding, showing that greater economic freedom is associated with lower species imperilment for mammals and vascular plants.

On all other environmental outcomes, where market-based regulation has a stronger theoretical foundation, the evidence is even stronger that it secures environmental improvements. Most notable is the case of forest cover, for which there is a well-documented process of forest transition in many countries, so much so that global forest cover has increased by seven percent since 1982, with additional signs of gains in the vitality of forests since 2000.¹⁷ As incomes initially rise, forest cover tends to decline as land is converted to agricultural and industrial uses. However, beyond a certain point, further increases in income are associated with net gains in forest cover. As such, the forest transition can be understood as a special case of the Environmental Kuznets Curve applied to forests.¹⁸ The point at which the transition begins appears to be affected positively by economic freedom (i.e., the proxy for regulation by markets): stronger property rights and greater economic freedom raise the cost of deforestation, which accelerates forest recovery in tropical nations (Barbier, 2019). Mamkhezri, Muhamad, and Khezri (2022), in their study concerned with Asia-Pacific nations, examined the forest-products footprint (an indicator closely tied to forest cover)

16 Note that, using a smaller sample of countries, Joshi and Beck (2018) found a more modest result but economic freedom did shown signs of mitigating effects.

17 Ma, Li, Wu, and Liu (2023); Song, Hansen, Stehman, Potapov, Tyukavina, Vermote, et al. (2018).

18 Caravaggio (2020); Crespo Cuaresma, Danylo, Fritz, McCallum, Obersteiner, See, et al. (2017, 1–8); Rodríguez García, Caravaggio, Gaspart, and Meyfroidt (2021).

and found that multiple types of economic freedom reduced pressures on forests while also confirming the presence of an EKC. Lin and Ge (2021), for their part, study the carbon sinks provided by forests. Because larger carbon sinks mean that forests absorb more carbon dioxide from the atmosphere, they can be interpreted as a measure of forest quality. At low levels of income, they find that greater institutional freedom reduces forest carbon sinks, which they argue reflects the fact that greater freedom at that stage allows the exploitation of resources in pursuit of economic development. What they call “institutional freedom” is an indicator of a liberal democracy and is highly correlated with economic freedom. However, beyond a certain income threshold (\$2,400 in GDP per capita), institutional freedom is associated with a faster expansion of forest carbon sinks. As countries grow richer, that beneficial effect becomes substantially larger, such that beyond the turning point, economies with greater economic freedom experience larger improvements in forest carbon sinks at any given level of income. This is also consistent with the literature on privatization of forests. In areas with stronger property rights protections, forest owners have greater incentives to think long-term because they can expect to capture a larger share of the future gains from conservation and stewardship. The recently constructed Property Rights Index in Forestry (PRIF) shows a set of results consistent with an EKC, whereby higher PRIF creates incentives for investment and active management; once countries become sufficiently wealthy, those incentives increasingly favor reforestation and forest expansion.¹⁹

Such results suggest that regulation by markets has the ability to push the EKC downward and to the left, such that freer markets and strong property rights protection allow societies to reach the forest transition earlier and at lower levels of environmental degradation. But forests are not the only example of such positive associations between economic freedom (again, our proxy for regulation by markets) and environmental improvements. Prenovitz, Hazlett, and Reilly (2023) found that economic freedom is associated with higher rates of recycling. This result is echoed by Nguyen and Nguyen (2022), who studied the 28 EU countries between 2001 and 2021 but also looked at income from recycling, repair, and reuse sectors.

There are also indirect effects of regulation by markets. For example, greater economic freedom is tied with a lesser dependency on natural resources (Muhamad, 2023: 15–53). Qamruzzaman (2026) showed that greater trade openness is associated with a higher rate of green technological innovations.²⁰ One reason for this is that green technologies frequently have higher fixed costs to be initially deployed. To render such high-cost initial investments profitable, there must be a possibility to scale up production such that average costs fall.

19 Rimoli, Bontemps, Bouriaud, Acharya, Nollet, Snoussi, et al. (2025).

20 Qamruzzaman (2026).

Open trade means large markets and thus lower average costs. Bétila (2023) used data from 138 countries between 1995 and 2018 to see if economic freedom encouraged renewable energy innovations and consumption. He found that freer economic institutions did facilitate the transition toward cleaner energy systems which, in turn, improved environmental quality by pushing down carbon emissions (Bétila, 2023).

4: Regulation by bureaucracy

The results from Section 3 above should be interpreted neither as a case against *any* state action in the form of regulation by bureaucracy, nor should they be interpreted as a case for the view that regulation by markets is bulletproof. There are settings, as indicated earlier, where regulation by markets may fail to operate, leading to cases where economic growth definitely can hurt the environment.²¹ In those instances, regulation by bureaucracy has the upper hand.

For example, some of the aforementioned sources that showed that economic freedom improved environmental outcomes also contained results showing contests between variables that can be deemed to represent regulation by markets and variables that spoke to regulation by bureaucracy. For example, while trade liberalization is associated with more green innovations and technologies, environmental taxes are associated with the same outcome.²² This dual effect can be thought of as saying that environmental taxes make pollution more costly and encourage firms to develop cleaner technologies, while trade freedom facilitates the diffusion of technologies, knowledge, and best practices across borders. Hence, there are ways that both approaches can work together.

Such a complementary approach helps explain why the conventional economics literature on carbon taxation tends to recommend pairing carbon pricing with reductions in command-and-control regulation and other distortionary taxes. The objective is both to ease firms' adjustment to the new price signals and to encourage the development of innovations that become profitable once the social cost of carbon is reflected in market prices (McKittrick, 2011; Tol, 2023).

However, while one can find evidence that regulation by bureaucracy improves outcomes,

21 Another example is provided by Cai, Murtazashvili, Murtazashvili, and Salahodjaev (2020) who find a strong Environmental Kuznets Curve in forest cover after controlling for the individualist values of the population. However, measures of economic freedom (using the Heritage Foundation index) exert no independent effect. This may reflect substantial overlap between individualism and economic freedom, making it difficult to separately identify their effects. Indeed, Cai, Murtazashvili, Murtazashvili, and Salahodjaev argue that “individualist cultures contribute to conservation by encouraging property rights entrepreneurship,” (2020: 175)—a mechanism that closely resemble those associated with economic freedom.

22 Qamruzzaman (2026).

its efficacy is probably overstated. One reason for this is epistemic in that governments have a hard time finding the best solution—the one that secures the most improvements at the lowest social cost (i.e., without harming economic growth). For example, Maxwell Tabarrok recently studied the impact of the *Endangered Species Act* (ESA) in the United States on housing construction. Exploiting the time and location of listings of endangered species (which do protect endangered species), he found that each additional listing reduced housing construction by 2.3 permits per thousand residents per year.²³ In fact, sometimes, regulation by bureaucracy is tied to unforeseen harm on other environmental dimensions. For example, ethanol mandates to promote the use of biofuels reduced feed costs and thus induced increases in livestock (which produce greenhouse gases through digestion and manure) and conversion of forest and grassland (which capture carbon) into cropland that, on net, increased carbon emissions rather than reduce them.²⁴

Another reason is that governments often engage in inconsistent policy-making. For example, Luke Petach (2026) found that while governments in the United States promoted policies that ought to reduce greenhouse gas emissions, they also pushed for nuclear reactor closures—which emit far fewer greenhouse gases than alternative energy sources. The independent effect of the closures was to increase carbon emissions per capita by between six and eight percent—thereby offsetting some of the gains of other policies (Petach, 2026).

Globally, we should not underestimate the degree to which commons problems are created via government interventions. Take the example of climate change—which is probably the strongest case for regulation by bureaucracy. Climate change is not simply anthropogenic (human-caused); it is also partly statogenic (state-caused) (Geloso, 2022). Governments around the world subsidize fossil-fuel consumption through direct transfers, tax exemptions, and below-market pricing, encouraging greater use of carbon-intensive energy sources. These distortions of markets amount in value to roughly 6.5 percent of global GDP and affect countries responsible for more than 40 percent of world oil consumption.²⁵ The evidence suggests that eliminating these subsidies could reduce greenhouse gas emissions by anywhere from seven to 21 percent, while simultaneously increasing economic output.²⁶ In other words, a substantial share of global emissions is not merely the result of human activity, but of government policies that artificially widen the gap between private and social costs.

23 Tabarrok (2025).

24 Searchinger, Heimlich, Houghton, Dong, Elobeid, Fabiosa, et al. (2008).

25 Coady, Parry, Sears, and Shang (2017).

26 Larsen and Shah (1992); Burniaux and Chateau (2014); Arzaghi and Squalli (2023).

5: Discussion and conclusion

The literature above does not say that there is no case for regulation by bureaucracy, nor that the case for regulation by markets is complete. What it does show is that the case for regulation by markets is understated in conventional wisdom. And the case for regulation by bureaucracy is often overstated.

More importantly, the results above suggest an approach to the balancing act required to secure rapid economic growth and environmental improvement simultaneously. The key is to rely on regulation by bureaucracy where regulation by markets is insufficient, while recognizing that the reach of market-based regulation depends on the security of property rights, the openness of markets, and the burden imposed by regulation itself. Economies with more open trade, more secure property rights, and less burdensome regulations will require smaller bureaucracies because these conditions allow greater room for liability rules, tort law, nuisance doctrines, market competition, innovation, and insurance mechanisms to interact and evolve in ways that secure environmental improvements at the lowest possible cost. In doing so, they can improve the shape, peak, and reach of the EKC. This, in turn, reduces the need to rely on regulation by bureaucracy—which can itself improve environmental outcomes—without eliminating its necessity.

The economic freedom literature highlighted above illustrates the scope for navigating the trade-offs between these two approaches for when they are substitutes. This is where the point regarding contradictory policy made in Section 5 becomes relevant. However, this point does not mean market-based regulation and bureaucratic regulation are always substitutes. They can occasionally complement, with stronger market institutions expanding the range of environmental problems that can be addressed without resorting to more centralized forms of regulation.

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