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**Eds. Louis P. Cain, Price Fishback, Paul Rhode**

### ***Economic Policy: Antitrust and Regulation***

**Brooks Kaiser**

#### **Abstract**

Over the course of American history and economic development, market activity and the systems underlying and governing this activity have co-evolved to address the changing fundamentals of human interactions within the marketplace and beyond. The growth of the American economy and its regulation are deeply intertwined. This article discusses these co-evolutionary forces in the context of the development of American antitrust laws and the expanding reach of government regulation throughout American economic history. Antitrust and regulation are addressed together here because they complement each other in their ability to address ex-ante incentives, primarily through regulation, and ex-post corrections and adjustments, primarily through anti-trust suits and related legislative action, that may in turn result in new regulation. We focus on government regulation of industry in two arenas: price and entry regulation with market power (antitrust issues), and regulation of other market failures, especially environmental, health, occupational-safety, and product quality regulation.

#### **Keywords**

Antitrust and regulation; Cartels; Monopoly regulation; Sherman Antitrust Act; Standard Oil; Clayton Act; Natural Resource Markets

### **1. Introduction**

The scope of market activity is inexorably entwined in the property rights – those rights which determine the legal ability to own and use all sorts of resources -- and legal systems that govern them and create the environments in which economic activity operates. Over the course of American history and economic development, from the earliest charters that granted monopoly rights to individuals or firms to the current and future battles over climate change and intellectual property rights, market activity and the systems underlying and governing this activity have co-

evolved to address the changing fundamentals of human interactions within the marketplace and beyond. The growth of the American economy and its regulation are deeply intertwined, and relatively well documented (Higgs, 1987; Hughes, 1977, 1991). This article discusses these co-evolutionary forces in the context of the development of American antitrust laws and the expanding reach of government regulation throughout American economic history. Antitrust and regulation are addressed together here because they complement each other in their ability to address ex-ante incentives, primarily through regulation, and ex-post corrections and adjustments, primarily through anti-trust suits and related legislative action, that may in turn result in new regulation.

The iterative and co-evolving interaction between antitrust policy and regulation have created and adjusted the playing field on which American firms and industries have operated over time. This article first addresses the economic forces that determined the economic playing field that developed alongside the young American democratic republic, and then uses economic theory regarding the primary economic forces driving differing needs for legislative and regulatory efforts that have led to sets of policies that have transformed the country as it developed, along with some of the economic outcomes of these efforts.

Government intervention to remedy the societal costs generated by market failures, discussed further below, can take a variety of forms: command and control techniques, where government directly provides or prohibits goods and services and interacts directly in markets; incentive-based techniques, where government influences behavior through regulatory systems including taxes and subsidies; or more indirect interventions, such as assignment of liability, which tends to operate through legal action to identify and sanction violations. Antitrust legislation's effects on economic activity are determined primarily through the courts by defining, interpreting, and re-interpreting the rules of the playing field, while other regulation's effects tend to stem more directly from the up-front costs of being in compliance with the imposed rules.

The difference hints at the ambivalence and controversy surrounding the idea that market power, in itself, is detrimental to the economy. In fact, the evolution of both antitrust legislation and other market regulation has been one of balancing and rebalancing the ideals of socially optimal competition with the incentives confronting individuals within society. As Richard Posner says, "the choice is rarely between a free market and public regulation. It is between two methods of public control – the common law system of privately enforced rights and the administrative system of direct public control." (Posner, 2007, p. 389)

To deepen one's understanding of the evolution of both antitrust legislation and regulation in the federal economy, it is useful to consider that many of the key market failures resulting in the need for government intervention stem from the incompleteness of markets when it comes to including the natural environment. The extent of the connection to regulation is captured by Joskow and Noll (1981), who, in providing an overview of regulation in the US, divide government regulation of industry into three main categories: (1) price and entry regulation in industries with competitive market structures, (2) price and entry regulation with market power (addressed primarily with antitrust actions), and (3) regulation of other market failures, especially environmental, health, occupational-safety, and product quality regulation.

In (1) markets provide a basis for establishing value and examining choices that directly incorporate these values into efficient economic behavior. Intervention in such well-functioning markets can be expected to distort outcomes away from economic efficiency and generally reflect political or social goals rather than economic ones. As such, they are not considered further in this article.

In (2), the concentration of industrial structure separates the market price from marginal cost and therefore distorts the ability of market price to signal net benefits to society; successful antitrust interventions through e.g. the Sherman and Clayton Acts discussed in Section 2, Developing a Playing Field, below, can increase quantity and reduce price. The causes creating concentration in the industry may, and often have, overlapped with other market failures. This highlights the complementarity of antitrust legislation other regulatory action. The overlaps will guide the choice of examples discussed in Section 3, Further Regulation, which otherwise explores regulation stemming from category (3) above.

In (3), if the inputs and outputs are partially or completely outside of the market, then prices cannot signal demand or scarcity; if the resource can be used by multiple individuals (non-rivalrous or congestible) and/or are partially or fully non-excludable (i.e. has public good characteristics), then economic value is not accurately reflected in price; if there are multiple uses for the resource, e.g. water and forests, then market uses, e.g. timber or agricultural water, distort the ability to generate value from uses with potentially greater, but un- or under- priced marginal benefits. In these cases, the roles for regulation become substantial and may involve one or more of the forms mentioned in the introduction: command and control, including direct provision, and incentive and/or liability systems.

We conclude with a summary and a brief assessment of how antitrust and regulation will evolve in the coming years.

## **2. Developing a Playing Field**

The economic history of the United States is primarily a story of markets and growth. Evidence of markets and market integration begins early, with the colonial agricultural economy (Rothenberg, 1988), and continues within and across regions and globally with considerable rapidity (Kim, 1998; Federico & Persson, 2007). Underlying this development are the sometimes overlooked natural capital endowments – that is, the stock of natural resources such as water, fossil fuels, agricultural land and forests available to generate flows of resources for a wide variety of economic uses. The ability to transform this natural capital into wealth and other forms of capital, in combination with the physical and human capital available, is a direct function of the regulatory and antitrust policies governing their use.

Together, these resource endowments and the regulatory systems overseeing their use determine, to a large extent, the potential productivity of the economy. It is not, for example, simply the discovery of significant petroleum supplies in the United States that caused the country to lead the world in petroleum production and exports at the end of the 19<sup>th</sup> Century (Wright, 1990). This abundance was most rapidly exploited due to the applications of the ‘rule of capture’ – originating as English common law – that granted ownership, without liability for external consequences to those who might share access to the resource, to the person who extracted (captured) the resource first being applied by states and other jurisdictions. The oversupply fostered by the rule of capture generated instability in the industry; this in turn promoted mergers and vertical integration of firms like Standard Oil to control the supply chain and stabilize profitability (Hardwicke, 1935). These visible profits captured the attention of consumers and regulators alike, and created the drive to shift more regulation to the federal level and increase overall regulation of the market activities and outcomes that shaped the Sherman Antitrust Act of 1890, discussed further below, and other important regulations.

Such resource endowments, and the related policy decisions, including antitrust and legislative action, that have affected incentives to develop and exploit their use in particular ways, have generated both opportunities for economic development and challenges to social well-being. Though economists tout free market solutions to most problems of scarcity and allocation, markets

are susceptible to inefficiency, or a reduction in welfare for society as a whole, in the presence of market failures. The sometimes complex economic underpinnings of regulation and antitrust are well documented in a variety of excellent texts that range from case-oriented presentations (Kwoka and White, 2013) to theoretical works with numerous applications (Viscusi et al., 2005) to Nobel Prize winning theory (Tirole, 1988). In short, however, the need for antitrust and regulation can be summed up by market failures that invite corrective government intervention.

Market failures occur when there exists market power, so that firms can charge prices higher than marginal costs and sustain long run extra-normal profits; they occur when there are public goods aspects of the goods or services involved; they occur when there are externalities that impose costs or benefits on parties not directly involved in the market transactions; and finally they occur through missing or imperfect information about the benefits and costs of the market goods or services.

Often overlooked in simplified discussions of economic efficiency, there is also an important dynamic element to efficiency that must be considered when the present use of resources changes the availability or value of resources in the future. This dynamic element is most obviously present in the case of exhaustible natural resources, which range from oil and gas to prairie soil, and tend to be widely susceptible to all forms of market failures. Such goods are also often intermediate inputs rather than final market goods. Networked goods such as railroads, pipelines, and electricity and telecommunication transmission lines also exhibit strong dynamic linkages and path dependencies that affect economic efficiency, as well as also being intermediate goods and goods that are often described as natural monopolies,<sup>1</sup> where regulation often favors a single firm provider due to high initial fixed costs and low marginal costs for adding new components to the network. It should not be surprising, then, that the major drivers of regulatory change, including antitrust developments, have been in these types of industries.

### *Early Federal Regulation*

Arguably the single most influential federal legislation affecting the economic playing field in the United States is the *Sherman Antitrust Act of 1890* (26 Stat. 209, 15 U.S.C. §§1-7). The Act prohibits collusive and other anti-competitive behavior amongst firms and provides requirements for the government to identify and eradicate such practices occurring through industrial trusts. The

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<sup>1</sup> Comprehensive discussion of the regulation of natural monopolies can be found in many sources, including Joskow (2007).

legislation provides much of the foundation of formal federal antitrust policy. As firms and industries grew over the 19<sup>th</sup> century and state and local regulations could no longer sufficiently oversee anti-competitive behavior, the Act, and other federal interventions like the creation of the *Bureau of Animal Industry* overseeing animal health in 1884 and the *Interstate Commerce Commission* (ICC) overseeing railroads in 1887, served to bring regulatory oversight up to the federal level and on a par with the growing national (and international) industries like rail, sugar, oil, steel, and finance. By formalizing federal regulation over individual assessments of wrongdoing in local and state courts, the ICC and the Sherman Act also shifted some of the balance of power from the wealthy industrialists back to society as a whole (Glaeser & Shleifer, 2003). Still, early applications of the regulation that did involve antitrust court decisions, such as the *United States v. E.C. Knight Co* (156 U.S. 1 (1895)) case heard by the Supreme Court -- the first case brought under the Sherman Act -- defined “commerce” very narrowly and returned governance to the state and local jurisdictions rather than force the sugar trust to disband its manufacturing monopoly (Friedman, 2005). The Bureau of Animal Industry, on the other hand, had early successes in addressing negative externalities from the spread of disease and was increasingly able to open new markets as intended<sup>2</sup> (Olmstead and Rhode, 2015).

### *Cartelized Industries and Market Failures*

In spite of the failure of the courts to fully support early antitrust actions, the growing influence of these trusts and the formal and informal ties between firms continued to drive regulatory action. These firms were acting as cartels – groups of firms coordinating decisions in order to improve profitability – with the most successful cartels, ones in which the self-imposed constraints included full cooperation of all the firms in the industry – could operate just as a monopoly could. Table 1 shows identified US and global cartels since the Sherman Antitrust act of 1890. We categorize these to ascertain how industries engaged in cartelization are related to potential market failures. The data are compiled from Connor (2014), which includes brief descriptions of the cases and outcomes, as well as a separate table documenting evidence of price increases for cartels from the literature for over 700 published economic studies that catalog over 2000 quantitative estimates of the amount by which cartels have overcharged relative to competitive markets throughout history. While this data

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<sup>2</sup> Olmstead and Rhode (2015) show that early federal actions of the Bureau of Animal Industry are not hampered by subsequent restrictions from the courts as the Sherman Act and ICC are in the first decades after their introduction. This differentiation provides a nuanced contrast and added depth to the co-evolution of early federal regulation and large scale industry that is an avenue for interesting and fruitful further research.

does not include pure monopoly cases, it gives a good indication of the markets in which antitrust legislation is prominent. We see that 62% of cartel investigations were for intermediate goods; 39% were for non-renewable resources. Categories are not mutually exclusive. Only 7% of cases do not fit into at least one of the following categories: network goods, intermediate goods, non-renewable resources, renewable resources, agriculture, medicine, and financial and related transactions intermediaries. In fact, 73% of cases fit into more than one of these categories. For US-only cases, 41% of cases involved renewable resources, while 34% involved non-renewable resources.

Table 1: Percentages of US and Global Cartels by Industry Characteristics

| Percentages                     | Network | Intermediate | Non-renewable | Renewable | Agriculture | Medicine | Financial Services/ transactions | Other | Multiple categories (excl. other) |
|---------------------------------|---------|--------------|---------------|-----------|-------------|----------|----------------------------------|-------|-----------------------------------|
| US Cases (120 cases)            | 22      | 63           | 34            | 41        | 29          | 4        | 13                               | 6     | 81                                |
| Global cases (119 cases)        | 15      | 61           | 45            | 16        | 7           | 8        | 9                                | 8     | 65                                |
| US and Global cases (229 cases) | 18      | 62           | 39            | 28        | 18          | 6        | 11                               | 7     | 73                                |

A significant reliance of the industries involved in antitrust and regulation on natural resources is evidenced in the industries facing scrutiny for antitrust regulation. In a mid-20<sup>th</sup> century report on early United States antitrust policy actions, Whitney (1958) addressed twenty US industries that shaped the law as it evolved. 9 of these industries involved primarily non-renewable resources (petroleum, chemical manufactures, steel, bituminous coal, cast iron pipe, anthracite coal, aluminum, tin cans, and cement), with an additional 5 renewable resource industries (meat packing, paper, cotton textiles, tobacco products, corn refining).<sup>3</sup> Most of these are also intermediate goods. Furthermore, of the most influential antitrust cases on the evolution of policy involved non-renewable or renewable resources, and networked or intermediate goods.

<sup>3</sup> The remaining industries are the intermediate goods of shoe machinery, farm machinery, and Pullman cars, the financial services sector (insurance), and motion pictures and automobiles.

## *Evolution of Antitrust Law*

### *Standard Oil Case: the rule of reason*

Good overviews of the evolution of policy through industrial cases can be found in Kovacic and Shapiro (2000) and Hart (2001). In particular, the Standard Oil case (221 U.S. 1 (1911)) established the “rule of reason,” which set conditions for future firm and industry evaluation on a case by case basis to determine if firm and industry behavior was reasonable business practice or criminally anti-competitive. The break-up of Standard Oil into smaller regional firms set a structural precedent for the implementation of policy; this model would be used repeatedly over the years, including in the break-up of the American Telephone and Telegraph Company (AT&T) in 1984. These breakups have frequently generated new valuable companies and spurred technological innovations that would have been less likely under monopoly, but also have created new regulatory challenges based on the artificial geographical constraints. Here, common carrier regulations, discussed further below, become important co-governance tools with the antitrust rulings.

### *Clayton Act of 1914*

The passage of the Clayton Antitrust Act (P.L. 63-212; 38 USC 730) in 1914 expanded the scope of the Sherman Antitrust Act and remedied some of the perceived problems in the original act, including the use of the 1890 law to break up trade unions and the failure of it to address mergers and acquisitions that significantly reduce competition. Section 7 of the Act allowed the government to intervene in potential horizontal mergers – mergers between firms that produced similar outputs – when the prospect of monopolization would be increased by the merger, rather than the more stringent requirements of the Sherman Act that monopoly exist.

In the same year, the Federal Trade Commission (FTC) was created, taking over from the Commerce Department’s Bureau of Corporations with expanded powers to enforce antitrust laws. The role of the FTC evolved greatly with WWI, then with the Depression, and in to WWII – in each case becoming more involved in American industrial policy than simple enforcers of the Sherman and Clayton Acts. (FTC, 2004). This process, and the law, co-evolved with cases that tested the ability of the government to measure and predict competition and industrial concentration.

### *Celler-Kefauver Act of 1950 and beyond: development of merger guidelines*

By the mid-1940s, a body of antitrust rulings had evolved that more broadly defined commerce and anti-competitive behavior. Interest and ability in the quantification of the presence of such behavior and its effects was growing. As cases evolved to require more predictive analysis and quantitative assessment grew more feasible, the gains of the flexibility of the rule of reason became outweighed by its arbitrary components, including that cases were often left ambiguously resolved, and the rule of reason was effectively abandoned in favor of per se rules aimed at reducing the use of price and capacity as competitive weapons.

One aspect of formalizing rules was the development of merger guidelines. These stemmed from the 1950 Celler-Kefauver Act, essentially an expansion of the 1914 Clayton act and broadened the reach of antitrust in overseeing mergers and acquisitions. Early applications favored competition arguments against mergers over arguments of economies of scale and other efficiencies put forward by those hoping to merge. This began to change with the merger guidelines put forward by Assistant Attorney General W. Baxter in 1982. At that point, non-market share factors came to play a bigger role in case determination, and from that time, arguments for mergers generating efficiencies became central to merger defense. (Kolasky & Dick, 2003).

With respect to measurement, Albert Hirschman and Orris Herfindahl independently created similar, straightforward indices of industrial concentration in the late 1940s, which evolved into the Herfindahl-Hirschman Index (HHI) – a primary measure of industry concentration that could be used to determine before- and after- horizontal merger market shares. Through the 1982 Baxter Guidelines discussed above, this Index came to replace the common use of the rather uninformative 4-firm Concentration Ratio (CR) – a sum of the market shares of the 4 largest firms in the industry (Calkins, 1983). The CR had come into common use after the passing of the Celler-Kefauver Act (1950) and was formally recommended in the 1968 Department of Justice Merger Guidelines (ABA, 2007).

#### *Alcoa Case: Capacity as deterrent and the demise of the Rule of Reason*

The long-running antitrust case against Alcoa – the Aluminum Company of America – resulted in significant changes in interpretation and use of antitrust legislation. In the 1945 ruling (United States vs. the Aluminum Company of America (Alcoa); 148 F.2d 416 (2d Cir. 1945)) the court determined that monopoly control in itself could be sufficient reason for intervention. The ruling further incorporated a temporal aspect to antitrust strategy by ruling that building excess capacity in

anticipation of growth in demand was an anticompetitive deterrent – it created a barrier to entry. Delays in efforts to remedy the monopoly through divestitures changed the dynamics of Alcoa's monopoly through increases in both domestic and international competition. These dynamics reduced the need for federal intervention and highlight the role that shifting market conditions and increasing globalization play in the latter half of 20<sup>th</sup> Century antitrust developments. These rules are again evolving as applied to some of today's more complex industries, including pharmaceuticals (Hovencamp, 2004) and networked goods and services in the digital age.

#### *Microsoft case: Product tying*

Though the computer software industry could not have even been imagined during the development of the original development of the Sherman Antitrust Act at the end of the 19<sup>th</sup> Century, the most influential case of the end of the 20<sup>th</sup> Century, that of the United States vs Microsoft Corporation (253 F.3d 34 (D.C. Cir. 2001)) relied on the 1890 legislation directly. The company was found guilty of linking of its original product, the computer operating system, with a downstream product, the browser. The reasoning was based on the same economic principles as the first railroad cases of predatory pricing and product tying. Predatory pricing occurs when firms charge prices below marginal cost and accept temporary losses to gain long term market share and reduce competition. Product tying is related in that, though vertical integration in production or bundling of output in sales, market power may allow price of the final (bundled) goods to be greater than the sum of all the marginal costs involved or that new entrants may be excluded from the market through cross-subsidization of costs via the tie-ins, thus preserving or extending monopoly power.

### **3. Further Regulation**

#### *Causes for regulatory intervention beyond fostering competition*

The evolution of (ex-ante) antitrust regulation and its application through (ex-post) litigation outlined above has been complemented throughout American economic development by other sorts of regulations more broadly aimed at correcting market failures beyond market power. This section discusses how regulation has evolved to do this. The regulatory code embodied by local, state and federal governments in the United States is extremely vast and will not be fully described in this essay. The current Code of Federal Regulations (CFR) can be found online directly ([www.ecfr.gov](http://www.ecfr.gov)) and while state and local resources vary in their accessibility, many law school libraries and databases help categorize and locate these resources both online and off. Instead of attempting a

comprehensive overview, we highlight the evolution of the regulatory environments that intertwine with issues of market power and pertain to the use and development of natural capital to bring focus to the discussion.

All institutional structures for addressing scarcity, not just market economies, will face challenges of externalities, public goods, and imperfect information, and will require costly governance to resolve. Regulations take form within the institutional structures that affect how such challenges are addressed, but may also influence the institutional structures themselves, as we have seen for example with the development of the FTC and Antitrust Division of the Department of Justice's merger guidelines in the discussion above. While institutional structures, ranging from strict hierarchical control such as monarchy to fully decentralized activities, and applied at different scales ranging from local ordinances to international agreements, will differ in the full costs of providing governance over these potential failures, all are capable of pareto-improving outcomes – i.e. outcomes that can improve at least one person's well-being without lowering anyone else's, over an initially ungoverned state. Furthermore, both intensification of governance and transitions in the regulatory frameworks are expected to be endogenous to developments in the value of the resources being governed generated by the demand for the resource, the evolution of technology and opportunities for trade (Kaiser and Roumasset, 2014). The American experience conforms to these expectations.

#### *Non-market Incentives for Regulation: Natural Capital's Sources and Sinks*

A common feature of regulatory policy governing market failures is that it aims to correct firm and industrial failures to incorporate effects on the natural resource sources (e.g. forests, water, minerals, fossil fuels) or waste sinks (e.g. waterways or airsheds) that accompany the market activities. Some of these source materials are renewable, such as biological and hydrological resources, others are non-renewable and their use today has direct and unavoidable consequences for the productive capacity of the future. Fossil fuels and minerals fall into this latter category. Furthermore, most renewable resources at some point become exhaustible, so that unlimited use in the present generates a tragedy of the commons and an inability to capture the full economic value of the resources over time. These intertemporal concerns generate an interesting conundrum for antitrust legislation and other regulation: open access to resources generated by the limiting of market power through antitrust interventions may create greater economic benefit today by increasing production and reducing prices, but the overall productivity of the resource is best served

by limiting use within each time period to capture intertemporal scarcity rents or internalizing externalities.

Thus while Antitrust legislation that began with the Sherman Antitrust Act of 1890 sought to break up monopolies and cartels that in large part gained their market power by limiting access to non-renewable resources (e.g. Standard Oil, US Steel, Alcoa), economic welfare in a dynamic accounting that includes natural resources might recommend extraction paths closer to the monopolist's profit maximizing choice than a static optimization of net benefits, à la Hotelling (1931). Hotelling's argument that the optimal use of a non-renewable resource – i.e. use that generates the greatest cumulative value from the resource -- must incorporate the intertemporal scarcity rent generated by the fact the resource may eventually be unavailable results in advocating prices that are above current marginal costs of use, counter to the goals of antitrust enforcement. Assessment of the early antitrust cases affecting natural resources suggests that when they created competition, long run gains were higher than when they allowed monopolistic behavior to persist (Comanor and Scherer, 1995). Still, the desire to create a fair static playing field at times conflicts with the desire to generate long-term economic benefits, and this conflict helps explain the sometimes complex, contradictory, and overlapping development of antitrust legislation and other regulation.

Similar issues arise when we consider policy aimed at correcting for industrial failure to incorporate the costs of using natural sinks into decisions over pollution and waste disposal. The environment has assimilative capacity to absorb wastes up to a certain point. As the assimilative capacity limit is reached, the pollution and waste become directly costly to well-being, and it is further likely that they will decrease the productive capacity of the existing natural capital. Regulation may again be necessary to protect or restore sinks so that productive capacity of the economy, in addition to quality of life, does not fall.

Early American legislation and regulation at local, state and national levels, evolving out of English common law, tended to evolve from the desire to conserve sources, while by the 1970s, legislation aimed at reducing pressures on sinks become more prominent (Cain and Kaiser, 2015). Source protection was behind the many state and local regulations over game and fish, forest use, and related statutes. Regulation of these resources also requires consideration of externalities and information problems ranging from tragedy of the commons concerns over ownership of the

resource to information over population interactions and dynamics that affect overall availability in the present and the future (Lueck, 1998).

As these problems began to cross state lines, it prompted early federal activities like the creation of the Forest Reserves (for timber and water) under the Organic Act of 1897 and the Lacey Act of 1900 (for game species), as well as the ongoing establishment of National Parks and other public land management agencies, and such legislation continued throughout the century with several versions of Endangered Species Acts, Forest Management and Public Land Use legislation, and the like. The Rivers and Harbors Act (1899) should be considered the first federal sink protection, though its intent was primarily to maintain use values of the waterways as sources for productivity (Baker, 1976).

### *Long Run Incentives: Economic Development and Growth*

The effects of antitrust legislation and other regulation have impacts both on direct social welfare and the regulatory environment affecting growth. Static considerations tend to focus on distributional matters that also rely on the economic ideal that well-functioning markets produce the socially optimal levels of goods and services.

Dynamic considerations also affect distribution and equity, but have an additional impact on the intertemporal tradeoffs between the certainty of outcomes and the potential for growth. In other words, regulations that protect the status quo provide for relative certainty in economic outcomes, while regulations that allow for innovation, market expansion, and development trade the economic certainty for the possibility of higher economic growth. In particular, a potential downside of this higher growth includes negative consequences from externalities and other unforeseen or underappreciated failings of dynamic markets. Often these failings harm the productive capacity of the natural resource base of the economy in the long run – indeed, the most relevant case of this today is with respect to climate change. The United States has been the primary historical contributor to the rise in greenhouse gasses globally. Policies that have given polluters and extractors rights to unpriced goods and services like air and water quality have enabled the country to achieve over 200 years of continued economic growth through the consumption of fossil fuels. This is, however, in exchange for an estimated 0.15 degree C contribution to the overall increase of approximately 0.7 degrees C from 1800 to 2005 – or 21% of the global total and more than twice the next highest total emitter, China (Matthews et al, 2014). The consequences of this tradeoff are

just beginning to be realized, but most indications are that the productive and absorptive capacities of the planet are not just changing but are shrinking.

These complications require further scaling up of regulation to a global level. In spite of the severe planetary-level consequences, uncertainties and uneven distribution of winners and losers both amongst and within nation-states and across generations has meant that curbing of the damaging behaviors that release greenhouse gasses into the atmosphere through regulatory means has met mainly with failure to date. This is in direct contrast with regulations in cases where incentives are more broadly aligned, such as the landmark international agreement on reducing chlorofluorocarbons (CFCs) and other ozone-depleting gases known as the Montreal Protocol (1989). The key differences in these two similar cases are telling: in the case of the Montreal Protocol, substitutes were quickly found for the economic activities supported by CFCs, and enforcement is fairly straightforward due to significant concentration in the production of such gasses (DuPont and Dow effectively controlled production), so the costs of regulation were low compared to the advantages. With greenhouse gas emitting activities, however, substitutes remain expensive and the production of the gasses is widely dispersed, so regulation is both broadly expensive and difficult to enforce. The evolution of regulation is not much different than other innovation – we expect to see changes in regulation when the benefits outweigh the costs, but this assessment of the net benefits of change must include the transactions costs involved in achieving the regulatory outcomes, including any changes in institutional structures (Kaiser and Roumasset, 2007; 2014).

Again, the flexibility of the American regulatory environment is one of the reasons that regulations with long term, dramatic consequences for well-being have been able to come into existence smoothly. At the same time, the vast natural resources of the United States, especially relative to its population for most of its history, provide a natural capital base from which dynamic services flow that can be used to develop the economy. Thus regulation encompasses not only human behavior but also the natural biological and physical processes underlying it. (Fishback, 2008).

### *Regulatory trends to improve efficiency*

As discussed, renewable and non-renewable resource industries account for the lion's share of the antitrust and regulatory actions in American economic history. Here, we categorize some of the significant historical cases into six potentially overlapping groups to highlight the co-evolution of

the American regulatory environment with economic activity and its underlying natural capital. These groups are: common carriers, monopolies and legal cartels under the market failure of market power, and property rights, externalities, and imperfect information under other market failures.

Though we focus on national regulation, regulatory interventions at the state and local levels on these same matters generally preceded national interventions and guided federal choices. These categories conform to both static and dynamic market failures and are cases addressing market power; public goods and common property resources; externalities; information, including both missing information and information asymmetries; and dynamic considerations, including patents and biological processes from forestry to species extinctions.

### ***Market Power***

#### *Common Carriers*

In 1877, *Munn v Illinois* (94 U.S. 113, 146 (1877)) defined grain elevators as ‘clothed in the public interest’ and initiated the legal precedent that underlies common carrier regulations today. While this is clearly a network good issue, the fact that the initial case revolved around an agricultural natural resource reinforces the intertwining of nature, the environment and regulation. At some point in their production process, natural resources must pass from the natural environment – soil, underground, air, water – into the economic stream (See Kaiser et al, 1999, Fig 1.1 for an illustration). *En route*, bottlenecks that allow for industrial concentration will vary as a function of the type of natural resource extraction. Farming, hunting and fishing, and timber extraction in the 19<sup>th</sup> Century, for example, were most easily cartelized or monopolized at access points like grain elevators, train depots, and river mills, whereas mining or oil and gas drilling may have also been captured at the source, especially if that source were unique or rare.

The chain of production from local natural resource to market commodity might develop within the boundaries of a single state, but became more likely to cross state lines as economic integration and transportation networks evolved. Under the United States constitution, interstate trade and related interstate matters are regulated at the federal level – state statutes have precedence unless they violate free exchange with other states. Thus through the interstate commerce clause, regulation focused on interstate matters, with potential disparities in government intervention at the state and federal levels. For example, in the same time period that federal law was addressing interstate grain trade bottlenecks, Frederick Weyerhaeuser was using the legal services of R. Marshall at the state

level to help formally cartelize timber extraction (and resolve a tragedy of the commons problem) on the Chippewa river in Wisconsin. Yet state level decisions tended to filter up to the federal level. Weyerhaeuser's lawyer became a state Supreme Court Justice, and in this position, persuaded the court to rule the Wisconsin state conservationist "Forestry Law" developments of the early 1900s, which were well in line with federal developments initiating forest reserves and the US National Forest system but perhaps counter to the Weyerhaeuser philosophy at the time, unconstitutional (Ranney, 1997). In addition to the discrepancies highlighted between state and federal goals, here we witness a clear example of the common endogeneity of the evolution of industrial market power and its regulatory environment. In this case, the state's regulatory environment set the stage for Weyerhaeuser's organization to become a major forestry firm that over a century later would face an antitrust suit for predatory pricing (bidding) (*Weyerhaeuser v. Ross-Simmons Hardwood Lumber Company*, 549 U.S. 312 (2007)).

Federal law progressed from *Munn v. Illinois* to embrace regulation of other 'goods clothed in the public interest' (*Munn v. Illinois* (1877): 94 U.S. 113). It moved to create, for example, the first national regulatory agency, the Interstate Commerce Commission, in 1887 to regulate the nation's most recognizable interstate industry – railroads. It began to nationalize wildlife legislation and conservation through, for example, the Lacey Act (1900) and Migratory Bird Act (1911).

The effects of the interstate commerce clause on regulatory development in American economic history have been numerous and widespread, including, as shown above, many cases involving natural resources. Their critical role in the development of the regulatory environment stems from the fact that the presence and abundance of natural resources are not inherently defined along political state lines, so that early cases such as interstate species movements helped open up the regulatory landscape in new ways. Though states had regulated game even in colonial times (Bean, 1988; Lueck, 1998), the conservation of resources as population pressures increased required broader action. The clause has become more important over time not just because industry faces a more integrated output market that crosses state lines, but also because the natural resource base upon which it depends do not always conform to geo-political organization. The Lacey Act, as amended, (18 U.S.C. 42; 16 U.S.C. 3371-3378) remains one of the most potent environmental laws in the United States. Having been extended and amended to include much more than just direct conservation of commercial game species, it now encompasses regulation of potential invasive

species and international endangered species trade (CITES), among other aspects of domestic and international wildlife regulation.

The common carrier argument of the grain elevators of the 1870s has persisted through antitrust legislation from railroads to telecommunications and into the digital age, also spawning the Federal Communications Commission as its own regulatory agency (Speta, 2001).

### *Monopolies*

As discussed above, many prominent antitrust cases stemmed from industrial control of a natural resource. These cases include the sugar industry (US vs. E.C. Knight Co. (156 U.S. 1 (1895)) and the Standard Oil of New Jersey (221 U.S. 1 (1911)), both of which primarily involved coercion and related infractions of the law at the bottleneck of refining rather than at the base source, and US Steel (United States v. U. S. Steel Corp., 1920, 251 U.S. 417) and the Aluminum Company of America (U. S. v. Aluminum Co. of America, 2 Cir., 1945, 148 F.2d 416, 431.; (U. S. v. Aluminum Co. of America et al., 91 F. Supp. 333 (1950))), which focused predominantly on the size of the firm in relation to the overall industry, particularly with respect to the capacity to turn raw materials into refined products. The need for intervention can be seen to stem from the process of transferring the products of nature and earth into market outputs.

### *Legal cartelization*

While the established playing field argues that cartelization is bad for economic efficiency and social welfare, some collective action is sanctioned in the United States. While Major League Baseball may be the most well-known case, the remaining legal cartels tend to be agricultural and resource based. This includes legal cooperative behavior amongst milk producers and citrus producers. These products do not have characteristics that generally enable significant price manipulations in the market due to cooperation, particularly due to their perishability (Hoffman and Libecap, 1991). Much of the sanctioned cooperation is also for export activities, highlighting that regulations' national goals can outweigh global economic efficiency. Fruits, vegetables, meat and dairy all have commodity export boards which are specific to their products. These groups not only act independently, but in conjunction with the US Department of Agriculture, through ongoing legislation to directly and indirectly fund international activities and jointly act in international markets (USDA, 2014).

## ***Public Goods, Externalities, and Information Problems***

### *Property rights*

Underlying most public goods, externalities and tragedy of the commons problems are incomplete property rights. The importance of these rights in determining the economic playing field and subsequent economic performance cannot be underestimated. Attempts to use legislation designed to improve property rights to resolve market failures, as well as failures to do so and the reasons behind them, are well documented throughout the work of Gary Libecap (see e.g. Libecap, 1986, 2007; Libecap and Smith, 2002). Incomplete rights can in some cases simply be resolved by assigning them, as suggested by Coase (1960), to anyone at all, so that the playing field is defined and voluntary trades can achieve efficiency. This is the logic behind such federal regulatory actions as the United States Clean Air Act Amendments of 1990 (CAA 42 U.S.C. 7401 et seq.) that created tradable permits in Sulfur Dioxide gas emissions. After 35 years of federal command and control regulation of air pollution stemming from the first Clean Air Act (1955), these amendments directly incorporated economic lessons and incentives.

### *Externalities*

The Coase Theorem – which states that if property rights can be fully assigned, regardless of to whom they are initially assigned, the efficient allocations can result through mutually beneficial trade, without further regulatory interference – is an elegant proposition supporting arguments against excessive regulation (Coase, 1960). Its significant limitations are also known, including its lack of applicability in the presence of high transactions costs, missing information, and dynamic considerations (see, e.g. Farrell, 1987; Bowles, 2009). These limitations demonstrate the scope for regulation when property rights alone are insufficient. While some cases of public goods and externalities in American economic history have been addressed by assigning property rights, this has not been the norm. Command and control regulations, where government agencies act to limit the behavior of firms and individuals directly, have been much more common. These include fully prohibitory regulations, where products or activities are banned, such as takings of endangered species under the Endangered Species Act of 1973, as are considerations of costs and benefits in determining the listing of species (16 U.S.C. 1531-1544), and more common legislation requiring certain technologies, such as the Clean Act Act of 1970, or non-transferable permits in order to pollute, such as under some of the earliest federal environmental legislation, the Rivers and Harbors

Act of 1899 (33 U.S.C. 407), or both, such as the Clean Water Act (CWA) of 1977 (P.L. 95-217). The Rivers and Harbors Act, attempting to improve network services by keeping rivers navigable, required permits for dumping into waterways, a requirement which has continued through subsequent acts to the current clean water act.

While these legislative acts have worked to improve environmental quality, they have not done so in an economically efficient manner. A thorough accounting of the outcomes of US environmental legislation is provided in Davies and Mazurek (2014). Among other findings, they conclude that monitoring of environmental quality, and the data this provides, is insufficient. This is partly a function of the lack of funding for such endeavors as the legislative landscape continues to change in response to lawmakers' incentives to 'enact new legislation' rather than simply oversee implementation of existing legislation. Other burdens due to the legislative process include gaps and conflicts amongst regulatory agencies that are difficult to resolve due to path dependencies and bureaucratic incentives. For example the Department of the Interior houses the Fish and Wildlife Service, which is charged with holding up the Endangered Species Act (ESA). At the same time, much of the land needed to achieve this is public land in the United States Forest Service, which is housed in the Department of Agriculture, so that action requires significant interagency cooperation, across potentially competing mandates. These issues stem in part from the overlapping roles nature plays in the production process for the desired goods and services and highlight further the complexity of the natural resource base's role in the economy and its historical development.

Overall, despite the promise of advantage promoted by the Coase Theorem, Hotelling, and other economic theory, environmental legislation in the United States has failed to fully prescribe rights. This is at least in part due to the multiple use and intertemporal nature of the environmental amenities that complicate the assignment of full property rights due to quality differentials in the resource and intensity of the resource use. For example both waterways and forests may have recreational values that are largely non-consumptive, congestible public goods as well as extractive private good uses. Command and control regulations cannot allocate these goods and services at the margin to their highest value uses. Furthermore, achieving the goals of the legislation is often incompatible with human economic behavior. As a case in point, all discharges of pollutants into US waters were to be eliminated by 1985 under the CWA of 1977. We are still not in compliance today. As with the requirement of the ESA of 1973 that costs and benefits not enter the decisions made under the regulations and legislation, these economic factors come into play at earlier or later

stages of the process. In the case of the ESA, everything from scientific research into species that might become listed to the behavior of landowners who might have potential threatened or endangered species on their land works against the spirit of the law. (Ando, 1999; Brown and Shogren, 1998; Lueck and Michael, 2003).

### *Information Problems*

When decisions are pushed outside of the regulatory environment due to lack of incentive compatibility, the role of information becomes more likely to take on asymmetries that further increase the costs of achieving efficiency. Missing information is costly because we may make legislative blunders over which goods and services are most valuable, or the cheapest ways to improve well-being. It is more costly when information is systematically hidden from some individuals but not others. These sorts of asymmetric information challenges – moral hazard (when insurance against risk makes behavior more risky because it does not incur costs commensurate with the risks) and adverse selection (when asymmetric uncertainty limits trading to exclude more risky trades in favor of trades beneficial to the party with the better information) problems, underlie much of the legislative environment not yet discussed in this article. Elegantly examined by Akerlof (1970), one-sided information about product quality can significantly reduce market options, curtail economic behavior, and result in sub-optimal quality offerings relative to willingness to pay. Legislation aimed at alleviating these difficulties is as old as governments – product safety legislation, licensing legislation for practitioners of certain professions, and other quality concerns find their roots in earliest civilization (Kaiser, 2003).

In American economic history, much of the earliest such legislation focused on agriculture and commodities. As market integration increased, and transportation networks brought perishable commodities to urban markets across state lines, quality concerns could no longer be easily addressed at the transaction level, and the commerce clause was again used to support federal intervention. Once more, the process of moving natural resources into the output market drove legislation. In 1912, for example, as buyers and sellers of apples tried to find a framework for improving information and quality of products, an Apple Grading Law (Sulzer Bill) was passed that defined standard barrel dimensions and grades for apples sold in barrels, with hefty federal fine for violations (almost 50% of value), with 1914 regulations adding boxed apples. But, as seen elsewhere in regulatory failure, neither legislation took monitoring and enforcement into account, so they were ineffective (Dimitri, 2002). These acts were followed in 1917 by grading for potatoes and

the establishment of terminal-market inspections service – partly as response to WWI for “national security and defense by stimulating the distribution of agricultural products,” but in this case over 6000 inspections were made in the first 10 months (USDA, 1946). Starting in 1917 under the Food Products Inspection Law, part of the year’s Agricultural Appropriation Act., the USDA set standards for fresh fruits and vegetables and provided quality inspections at central receiving markets. Inspections for fruit grew rapidly, from approximately 11,000 carloads for 1919/20 to 18,828 carloads in 1929/30; and the percentage of federal inspections from all fruit and vegetables rose from 8% in 1923 to 23% in 1930. In 1930, the Perishable Agricultural Commodities Act provided a set of rules allowing the USDA to become the legal authority in resolving disputes over quality, lowering the transactions costs associated with the imperfect information inherent in the industry (Dimitri, 2002). The importance of information was broader than individual transactions. In 1913 the USDA opened its Office of Markets, providing information on commodities prices, a responsibility that picked up when, in 1915, the telegraphic news service providing USDA price quotes needed accompanying information on quality. (USDA, 1946)

The standards set in these early legislative interventions in commodities markets continue to exist and proliferate today. The proliferation has intertwined with other legislation involving natural resources and other government agencies, such as the 1910 Federal Insecticide Act and its subsequent amendments to include fungicides and rodenticides (102 USC 2654) that are now under the purview of the Environmental Protection Agency.

At the same time that the Department of Agriculture was becoming involved in standardization, quality certification, and the related enabling of cooperative boards, attention in other industries was aimed at reducing similar anticompetitive behavior.

The harnessing of natural resources for economic productivity has challenged society to address bottlenecks that invite anticompetitive behavior and to develop networks for the resource transportation and resolve economic incentive problems related to natural monopoly characteristics of network goods. It has further required government solutions to public goods and commons problems stemming from resources to which it is difficult to assign complete property rights, due to multiple, potentially competing uses that vary in the level of consumptiveness, biological interactions, or other difficulties in assigning marginal values and quantifiable units. Information asymmetries and incomplete information on product quality when the freshness of nature has been packaged and transported and commodified have spurred government legislation, and even

exemptions from other legislation aimed at reducing anti-competitive cooperation amongst producers. In short, placing nature at the center of the economy helps clearly elucidate the ways in which market failures are likely to appear throughout economic development and enables a coherent picture of the path dependent evolution of antitrust and regulation policy in the American economy.

#### **4. Conclusions**

As is well known, antitrust and regulation policy, its application, and institutions in the United States have co-evolved with business and industry over the history of the country. The market failures these policies and institutions are designed to remedy are primarily: concentration in industry, negative externalities from production of goods and services, and imperfect information that may reduce consumer well-being. These have generally been treated as having inconsequential impacts until first shown otherwise. However once a problem is identified, corrective action tends to be sweeping and transformative.

A primary consequence of this co-evolution is the ‘ratchet effect,’ where government intervention increases in response to the expansion of business enterprises, remains elevated until a new case where social welfare is pitted against private economic interest, and then again ratchets up the governance interventions (Higgs, 1985, 1987; Hughes, 1991). The rapid networking and industrialization of the US, the continuing integration of markets, and the deepening of capital at the end of the 19<sup>th</sup> Century that followed in large part from the newly available and widely exploited forms of energy and other raw materials broadly enabled by rail transport (Wright, 1990) left policy to catch up. This game of catch-up focused on case-driven interventions targeting industries perceived to be engaged in the most harmful behaviors either to industrial competitors and direct consumers (primarily antitrust) or to society at large (primarily regulation).

While the ‘ratcheting up’ of government intervention in response to American economic growth and industrial success has been a subject of long conversation about appropriate levels of government intervention (Hughes, 1989; Fishback, 2008), it should be acknowledged that the flexibility and responsiveness of the US legal and regulatory framework and institutions enabled relatively rapid and transparent solutions that have accommodated sustained economic growth as well as societal protections and well-being over the past centuries in spite of an increasingly rapid pace of change.

Equally important, however, has been the steadily evolving condition of property rights, particularly for complex multiple-use natural resources. In fact, the roles of natural resources in all stages of American development of antitrust and regulation policy have been many and vastly influential – and vice versa. This is due in large part to the myriad ways in which natural resources become incorporated into output markets and the formal economy. The need to transform natural resources, initially subject to physical and biological laws more so than those of man, into finished goods and services, and to protect their dynamic productivity across time when the stream of resources from the environment and their wastes back into the environment is affected by past economic decisions as well as future needs, creates situations that simple markets cannot capture.

## **5. Future considerations**

In today's global environment, geographic dismantling of firms is no longer likely to provide the same impetus to spur competition, and dimensions along which competition can be increased through policy will need to evolve.

Though there are commonalities across industries and centuries, the call for industry-specific policies remains (Lemley, 2011), along with reforms that would change the playing field by abolishing patents (Boldrin and Levine, 2013). The continuing discussion highlights the difficulties in assessing the tradeoffs between innovation spurred by competition and innovation generated by access to capital derived from super-normal profits obtained through monopolistic behavior (Crandall and Jackson, 2011; Brennan 2011). In the broader context, it captures the importance of understanding market failures as the basis for intervention and the costs of misconstruing government regulation and goals of perfect competition as optimal solutions to these market failures, both in terms of the misallocation of resources and in its influence on the definition and evolution of the institutional playing field (Meese 2005).

As population grows, our ability to maintain natural resources and waste sinks will become more difficult. Policy solutions will be as necessary as technological solutions. These solutions will necessarily become more and more embedded in the goal of achieving sustainable development – development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland et al, 1987). As globalization renders previous policy solutions, such as regionalization of large monopolies like Standard Oil or AT&T,

increasingly moot, focus must turn to quality of life defined beyond achieving the lowest market price.

At the same time, there is growing appreciation for the ability of markets to improve economic outcomes. We should expect to see considerable development in regulatory efforts aimed at establishing property rights that better match the needs of 21<sup>st</sup> century goods and services, and accompanying antitrust regulation and litigation. Both antitrust and regulation will, in many cases, need scaling up to international levels.

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