

Why Your Air Will Not Get Better:  
Path Dependence and Capture in Air Quality Regulation

by

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## Abstract

Despite its near universal reputation as an environmentally conscious state, California continues to struggle to meet national air quality standards. With 68% of the counties out of national standard attainment within California's boundaries, the problem transcends geographical divides and suggests a regulatory culprit. California's unique air quality regulatory regime, in which local elected officials serve as regulators of the polluters in their vicinity, is particularly prone to industry capture and conflicts of interest. There has been no attempt in the body of literature on capture to look closely at membership on regulatory boards and the prevalence of conflicts of interest. Accordingly, I employ a mixed method approach to quantitatively and qualitatively establish the degree of industry capture on regulatory boards and their subsequent impact on air quality trends. This study includes air regulators of 49% of all counties out of attainment of air quality standards in the nation.

First, using time-series economic data from the American Community Survey, the prevalence and type of pollution for three distinct air basins is hypothesized under a theory of regulatory capture. By constructing a novel dataset in which every air quality regulatory board member ( $n=157$ ) who has served since 2002 is evaluated for industry influence, the composition of the relative boards can be evaluated in light of their success or failure to mitigate pollution. In the areas investigated, an estimated 14,000 to 24,000 people die prematurely on an annual basis due to air pollution exposure. I find strong evidence of substantial variation in regulatory capture between boards, and that the assemblage of a majority of captured regulators on a given board has a significant association with decreased success in correcting air quality problems. The results suggest the conditions of capture under which a centralized regulatory apparatus provides greater aggregate welfare.

*“Everyone here believes asthma and chronic coughing are normal.”*  
 – Amber Constantino, Community Organizer, Fresno Pre-term Birth Initiative

*“The Air Pollution Control District doesn’t do its job and doesn’t care about the community. They will never step out of their office to engage us.”*

– Veronica Garibay, Founder & Director, Leadership Council for Justice and Accountability

*“I feel horrible for subjecting my son to these conditions. He’s been counting the days until he can breathe again.”*  
 – Nayamín Martínez, Director, Central California Environmental Justice Network

## **1. Introduction**

Despite rapid economic and population growth across the country, air quality has dramatically improved. Since 1990, 8-hour measures of carbon monoxide are down 74%, annual nitrogen dioxide concentrations have decreased 57%, and sulfur dioxide levels dropped 89% (EPA). Meanwhile, more modest but important decreases have occurred in ozone levels (a 21% decrease) and annual concentrations of particulate matter (26% for PM<sub>10</sub> and 39% for PM<sub>2.5</sub>) (EPA). Among 35 major US cities, the number of unhealthy air quality days has gone from a three-year average of 2,105 between 2000 and 2002 to just 741 from 2016 to 2018—all while gross domestic product has grown 262% (EPA). The first section of background information will explain the improvement in air quality, with particular attention paid to an underacknowledged driver of improvement: globalization and offshoring.

Despite these laudable statistics, air quality progress has not been universal nor evenly distributed—while some have seen incredible success, others continue to struggle greatly. As of 2019, 41 areas in the nation have been designated by the US Environmental Protection Agency (EPA) as out of attainment of National Ambient Air Quality Standards (NAAQS), of which 28 are located in California. Similarly, of the 82 areas that were at one point in violation of NAAQS, but have since improved their air, only three came from California. The state often personified by its harsh regulation and environmental protection, is home to 68% of current NAAQS violators, while only accounting for 4% of the successful policy outcomes.

Therefore, California is over-represented in its air pollution problems and underrepresented in its success addressing them. The question then is: What factors are driving these differential outcomes in air quality? What, in essence, makes some communities better or worse at solving their air quality problems? For many in California's Central Valley, like those quoted at the outset of this paper, relief cannot come soon enough. Concerningly, the problem of air quality is exacerbated by socioeconomic inequalities, disproportionately affecting disadvantaged communities. A survey of the Central Valley conducted in 2018 found that 74% of residents pay close attention to the air quality and 62% restrict their behavior when air quality is poor (Cummins and Bryant 10-11). In total, 53% supported while 40% opposed, increased restrictions on residents and businesses to improve air quality (Cummins and Bryant 12). Despite this public support for harsher measures, there have been few and the problem persists.

Closely inspecting the case of Fresno, California in combination with larger statistical analysis and complementary case studies will yield powerful insight into the factors responsible for prolonged exposure to air pollution, amounting to regulatory failure. For the residents of the Central Valley and people across the country living under heavy pollution burdens, such regulatory failure has had life changing consequences. In addition to the pure monetary costs – asthma expenditures alone total 11.3 billion dollars across California—there are the raw impacts on human welfare (California Department of Public Health xi). In California's most polluted areas, lung conditions are more prevalent and severe – in Fresno alone, poor air quality causes *800 annual premature deaths* (Prunicki & Nadeau 296, 298). Recent studies have also shed light on the profound and myriad health effects of air pollution exposure, linking it to increased aggression, stroke, heart disease, and brain tumors. The specific harms of air pollution and their concentration in the Central Valley will be explored at length in following sections.

In total, the severity, prevalence, and stubbornness of air pollution in California should be extremely concerning to everyone, not simply Californians or those in the Central Valley. In many respects, the effort to tackle California's air pollution with notable programs like cap-and-trade and localized air pollution districts, represents the most comprehensive and sustained fight against pollution in the United States—with shockingly little to show for it (American Lung Association, *State of the Air*). If such efforts are successful at decreasing pollution at the state level, yet have little impact in the most disadvantaged localities, the link between monetary inequality and unequal health outcomes becomes more obvious and problematic. Extrapolating outwards, the socioeconomic, political, and environmental conditions culminating in California's health crises likely exist across the globe, with disproportionate concentration in developing economies. If, under the most favorable public policy conditions, the disadvantaged have been left so far behind for such a sustained duration, where is their hope for improvement? As will be demonstrated through extensive case studies of granular, county level data, California's efforts have been stymied at every turn by the decision to fracture the regulatory state, multiplying veto points and incentivizing regulatory capture. Hope, therefore, lies in centralizing regulatory power and reimagining tradeoffs between the environment and economy.

## 2. Background

### a. Explaining air quality improvements

Before discussing the political, environmental, and sociological impediments to air quality improvement, it is important to explain current national air quality trends and an often-omitted explanation. Figure 1 demonstrates air quality progress since the hallmark Clean Air Act was authorized.

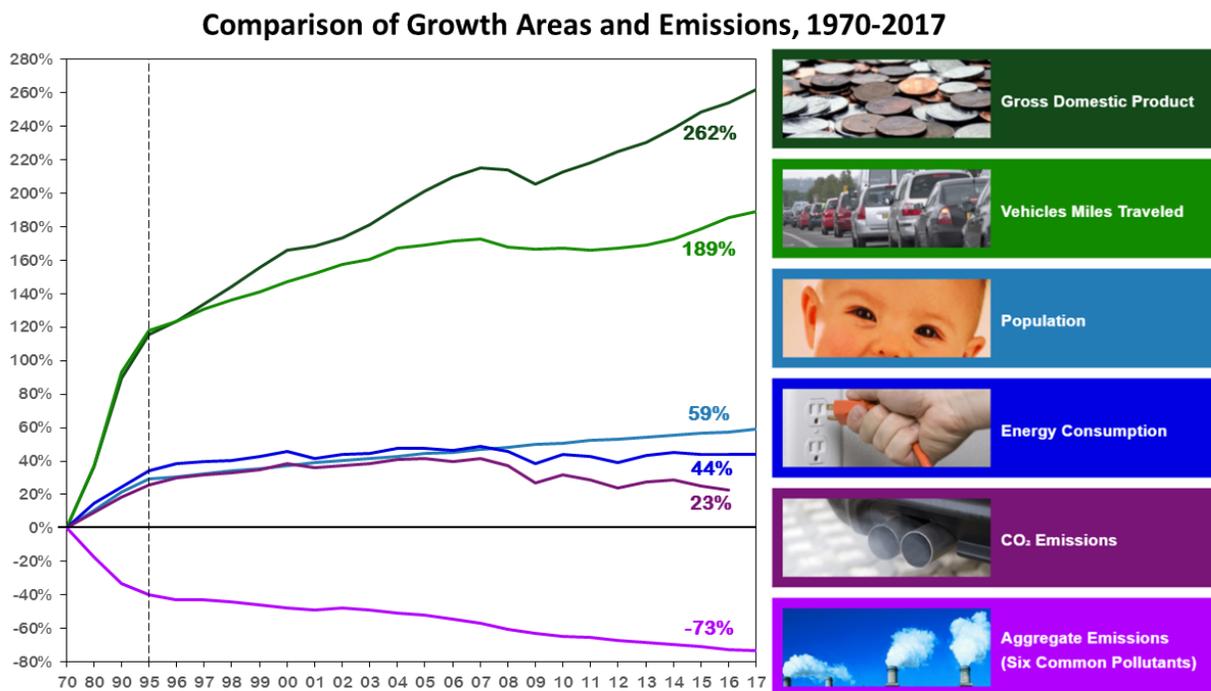


Figure 1: Air pollution declines despite economic growth. Source: US EPA

These reductions are multi-causal but examining the factors of this success are imperative to understanding California's shortcomings. Starting at a fundamental level, advancements in land use and urban planning can reduce air pollution by encouraging infill, decreasing commute times, establishing public transportation, and locating polluting activities away from vulnerable populations (Fensterstock, Kurtzweg & Ozolins 395-397). Since 1997, use of public transportation has increased at a rate faster than population growth—to 10 billion annual trips—

despite 45% of the country still lacking access (American Public Transportation Association). Larger cities have the resources to create mass public transport systems and benefit from economies of scale, meaning they see disproportionate air quality improvements from infrastructure investment relative to smaller cities.

Other nationwide emissions reductions have come from a concerted shift away from fossil fuels. Figure 2 demonstrates that the growing relative share of energy harvested from renewable sources reached a 115 year high in 2017, accounting for 11.3% of total energy consumption.

### U.S. total energy consumption (1950-2018)

quadrillion British thermal units

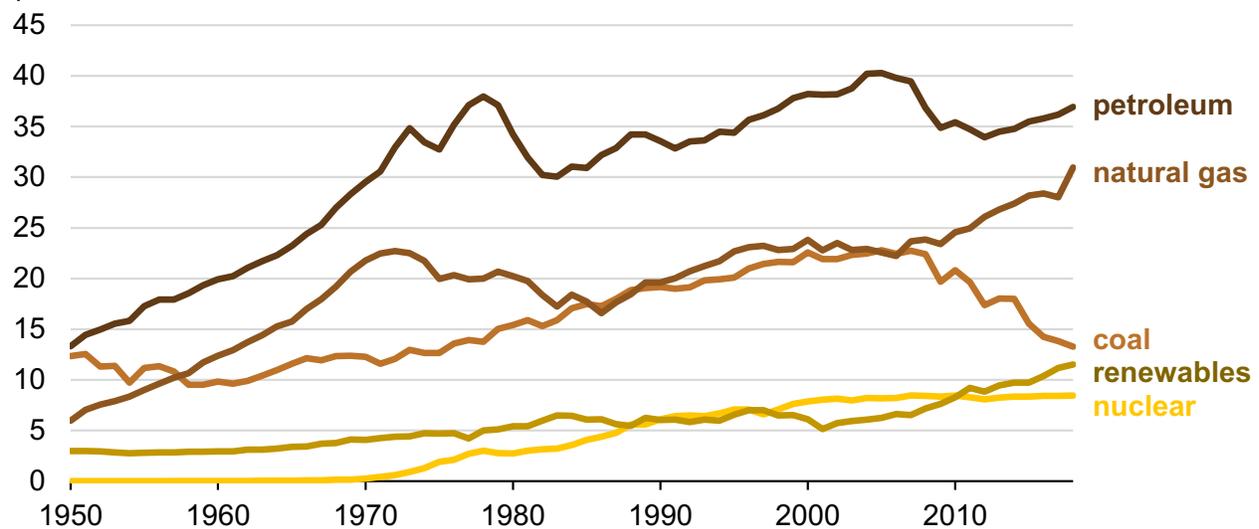


Figure 2 depicts the relative share of energy from renewables continuing to increase. Source: US

While this is certainly an achievement, the growth in renewables has likely had minimal impact on air quality. As Figure 3 clearly represents, the overall growth in energy consumption has outpaced the growth of renewables, meaning that while more energy is coming from renewables than ever before, the total energy from fossil fuels has also increased.



### U.S. total energy consumption (1950-2018)

quadrillion British thermal units

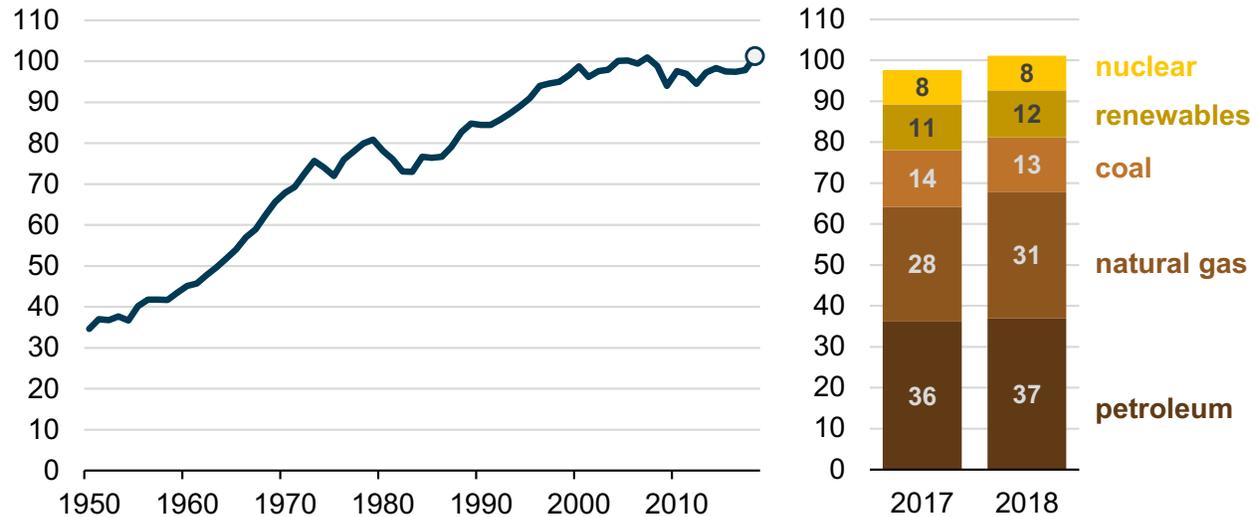


Figure 3 demonstrates the increase in total energy consumption mitigating the air quality gains from renewable investment. Source: US Energy Information Agency

To be sure, the type of fuel used in energy production does have a substantial impact on emissions. For example, coal produces nearly twice as much carbon dioxide per BTU of heat, meaning it is the alterations in the type of fossil fuel being used, rather than the overall shift toward renewables that accounts for any substantial reduction in aggregate emissions (Center for Climate and Energy Solutions).

Technological advancements have made possible many of the shifts to alternative fossil fuel sources and are, broadly speaking, responsible for most of the reductions in total emissions. Included among these advancements are growing renewable technologies, the catalytic converter, which reduces tail pipe emissions by 90%, and perhaps most importantly, industrial emissions control devices (International Platinum Association). These ‘wet-scrubbers’ are the most popular pollution control technology because of their cost-effectiveness and versatility. By forcing the emissions of burning fossil fuels through a chemical solution more than 99% of

particulate matter and substantial levels of other pollutants can be prevented from entering the air (Walker).

However, the success of these pollution control technologies has been a double-sided sword. First, relying on further technological advancements to solve air pollution problems ignores the point of diminishing returns and the severity of localized impacts. Both wet-scrubbers and catalytic converters already function at very high levels of efficiency, leaving little room for improvement. In addition, breakthroughs in scientific research can be few and far between, and even if new mitigation technologies were discovered, the impacts of air pollution still increase with proximity to the source.

So, while technological advancements have been extraordinarily helpful in the fight against air pollution, they're ultimately an approach that seeks to minimize the harms of pollution while leaving the underlying causes of its prolonged existence unexamined. Ultimately, the obsession with technological improvement as a measurable and tangible way to solve the negative externalities of production has led to many overlooking the environmental ramifications of a massive historical and sociological phenomenon; namely, globalization and the offshoring of many production jobs that came with it.

While tracking the environmental effects of global trade may be an impossible task, understanding its broad effects offers profound theoretical and epistemological grounding for addressing public goods problems. John Bellamy Foster, a sociology professor from the University of Oregon, sums up the implications of globalization on the environment nicely:

“[E]merging economies are growing in large part due to the global labor arbitrage [...] whereby the rich capitalist countries are, via multinational corporations, increasingly transferring their production and their environmental costs to poor and emerging economies. A major issue in today's carbon debate thus has to do with embodied carbon in international-trade goods and the locus of global consumption of these goods. One effect of the global shift in production is to transfer the carbon emissions associated with goods consumed in the global North to the global South.” (Foster, *James Hansen and the Climate Exit*)

Importantly, the relationship Foster observes between the global North and South, takes place at every level of societal organization and the idea of embodied emissions is not merely constrained to carbon. Just as the US has exported much of its productive activity to emerging economies, production within the nation, and even within states, has always sought the cheapest source of labor. The case of US food production is particularly demonstrative.

Figures 4, 5, and 6 demonstrate the economic centralization of US agriculture.

## % of American workforce in agriculture, 1840-2000

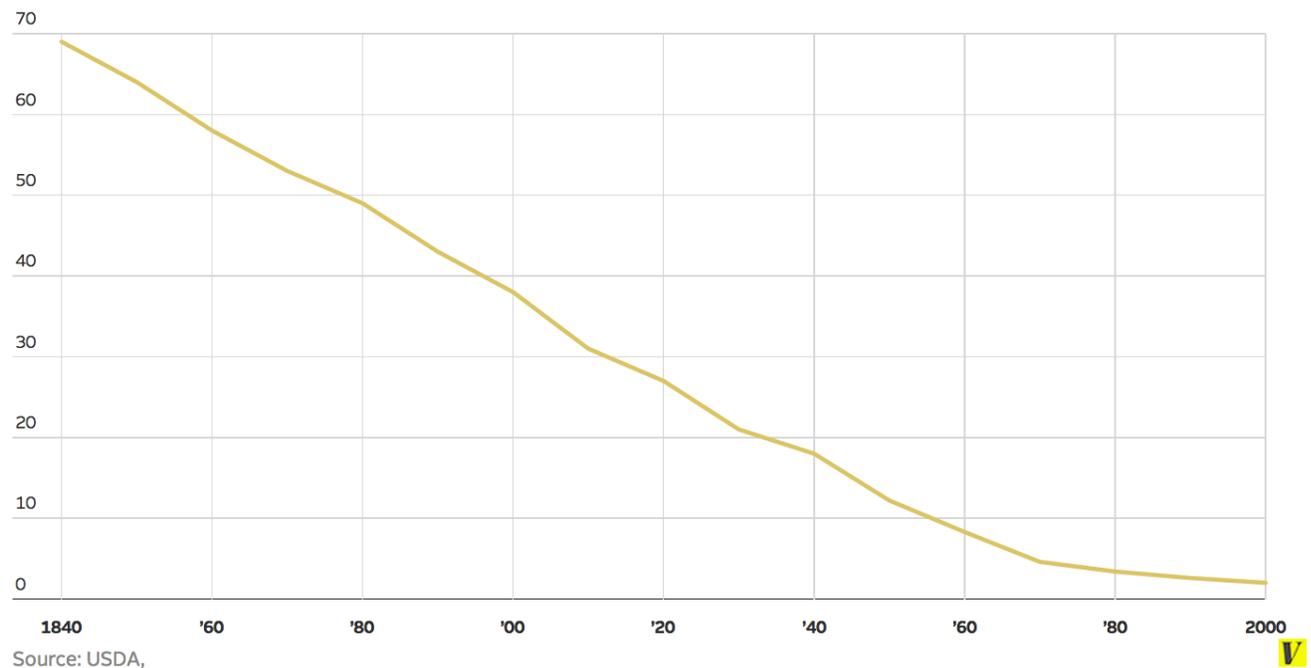


Figure 4 demonstrates the declining percentage of the American workforce in agriculture Source: Vox, USDA

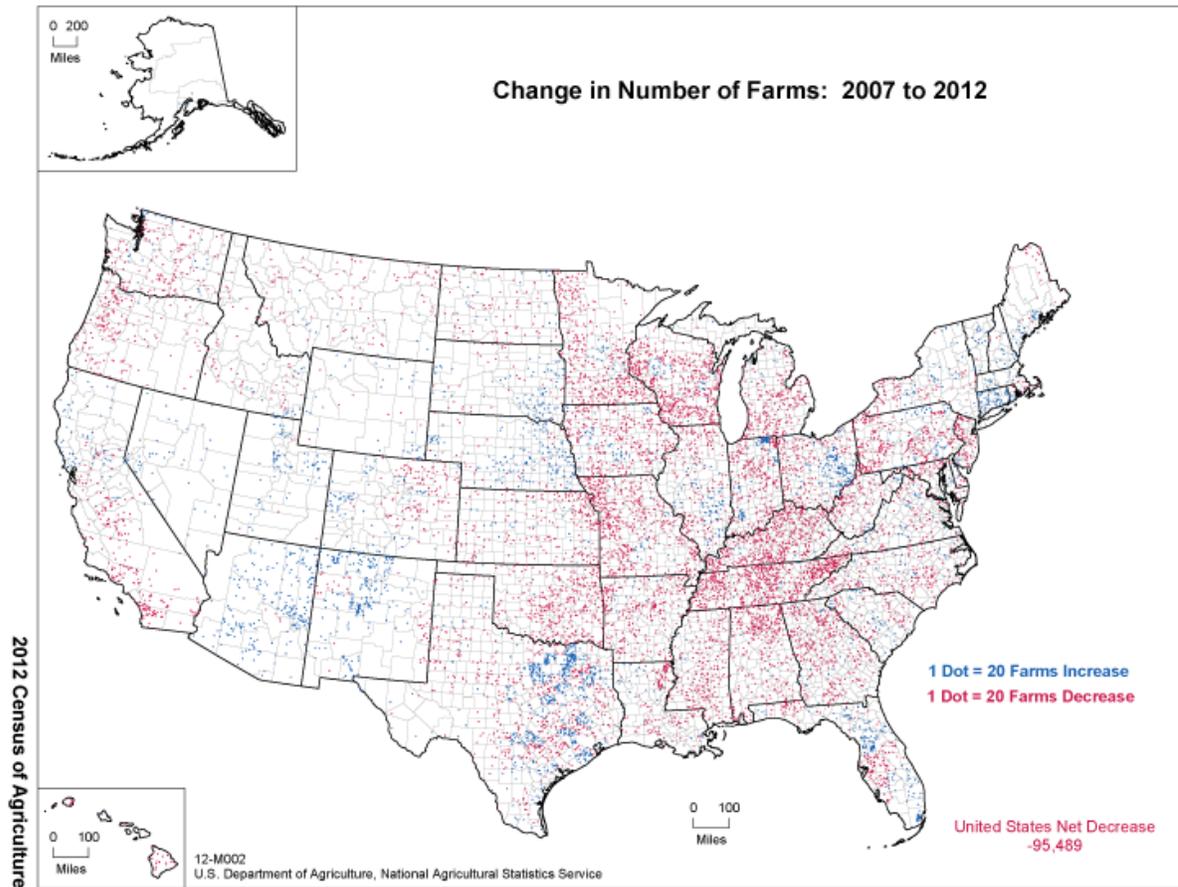


Figure 5 demonstrates the net loss of more than 95,000 farms over 5 years in the US Source: Vox, USDA

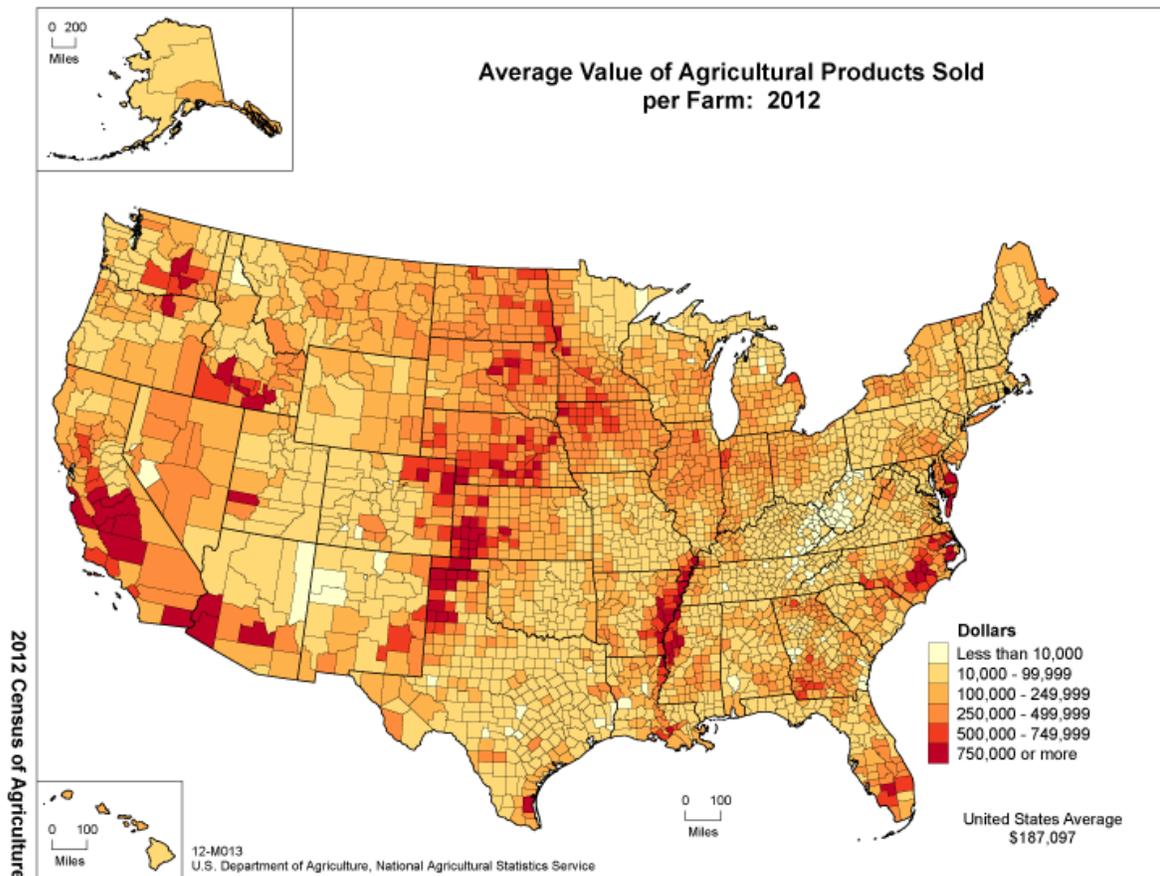


Figure 6 demonstrates the massive concentration of industrial scale agriculture in small localities Source: Vox, USDA

Figure 4 charts the decline in agricultural employment from more than 70% of the US workforce in 1840 to less than 2% in 2000. Figure 5 shows the recent pace at which small farms are being forced out of business, with nearly 100,000 operating farms disappearing in a five-year span, disproportionately in the East Coast and Midwest. Meanwhile, Figure 6 demonstrates the concentration of industrial scale farming. Making the case most clearly, data from a 2012 survey by the US Department of Agriculture found that just 4% of farms produce 66% of farm products by volume, while 55% of farms net less than \$10,000 in sales (Klein & Locke, *Explain Food Production*). The message is clear: while food production is a collective or societal obligation,

most people, and disproportionately those on the East Coast, have abdicated such responsibility by outsourcing their food production. Coupling the monopolization of food production with Foster's conception of embodied pollution demonstrates the problem—if 4% of farms and communities produce 66% of the nation's food, they also bear 66% of the pollution burden of industrial agricultural production.

Importantly, conventional wisdom tends to see such consolidation as a good thing. Consolidation allows for economies of scale to take hold and creates a far more efficient food production system. The growth of Central Valley farms has employed many people over the years and growing efficiency results in lower food prices which benefit everyone. That efficiency is also theoretically beneficial for the environment, as less efficient processes would necessarily involve more waste. My stated goal here is to problematize such notions of efficiency. Foster refers to this style of argument as “trickle-down ecology”—wherein unrestrained consolidation is thought to improve the environment as a sort of secondary effect (Foster & Clark, *Paradox of Wealth*). Put most succinctly by ecological economist Herman Daly:

“Instead of asking, when will we be rich enough to afford the cost of protecting the environment? We might instead ask, does growth in GDP at the current margin and scale in the U.S. really make us richer? Might it not be increasing environmental and social costs faster than it increases production benefits, thereby making us poorer?” (Foster & Clark, *Paradox of Wealth*)

To better understand the costs of this system, it is important to turn to the consequences of long-term pollution exposure.

### **b. Consequences of Concentrated and Prolonged Pollution**

This section will examine the literature around the health consequences of air pollution, describe its concentration in disadvantaged communities with Fresno and the Central Valley as examples, and evaluate some exacerbating factors and second-order consequences of pollution

exposure. Establishing the explicit health consequences of air pollution will make apparent the profound threat it poses, and the appropriate urgency needed to address it.

### **i. Health**

Multiple studies have found pollution to be a contributing factor in impeding lung development in children, increased risk for the development of asthma, and repeatedly established as a major cause of asthma attacks in all ages (Prunicki & Nadeau 299). In addition, chronic obstructive lung disease (COPD) represents a significant threat and can be precipitated by ambient pollution. This threat results in increased doctor's office visits, emergency room calls, and even death (Prunicki & Nadeau 299).

The threats of ambient air pollution go far beyond the respiratory system. Ultrafine particles can enter the blood stream, damaging quite literally the entire body (Prunicki & Nadeau 299). Many studies have tied air pollution to increases in heart attacks, alterations in blood pressure, and micro-vascular function (Prunicki & Nadeau 299). Air pollution has been shown to affect the immune system, exacerbating thyroid conditions, diabetes, lupus and multiple sclerosis (Prunicki & Nadeau 299). There is even evidence that pollution can cause ear infections in children and almost doubles the risk of brain tumors (Prunicki & Nadeau 299; Carrington, *Air Pollution Linked to Brain Cancer*).

Perhaps most concerning are the effects of pollution exposure on future generations. Researchers have tied air pollution to miscarriage, pre-term birth, birth defects, and low overall birth rate (Prunicki & Nadeau 299). Shockingly, even after moving from highly polluted areas, the effects of exposure can persist as a result of epigenetic changes (Nadeau & Prunicki, *Exposure Linked to DNA Methylation Differences*). The threats air pollution poses are not bound

to a particular geography or generation—it affects people at a genetic level, making its harms transmittable over time and space.

**ii. Disadvantaged Communities**

Of 7,931 surveyed census tracts in California, every one of the 1,986 tracts considered socioeconomically disadvantaged ranked above the 75<sup>th</sup> percentile for pollution burdens (CalEnviroScreen 3.0). Figure 7 is a comparison between the three most socioeconomically disadvantaged tracts and one of the most advantaged.

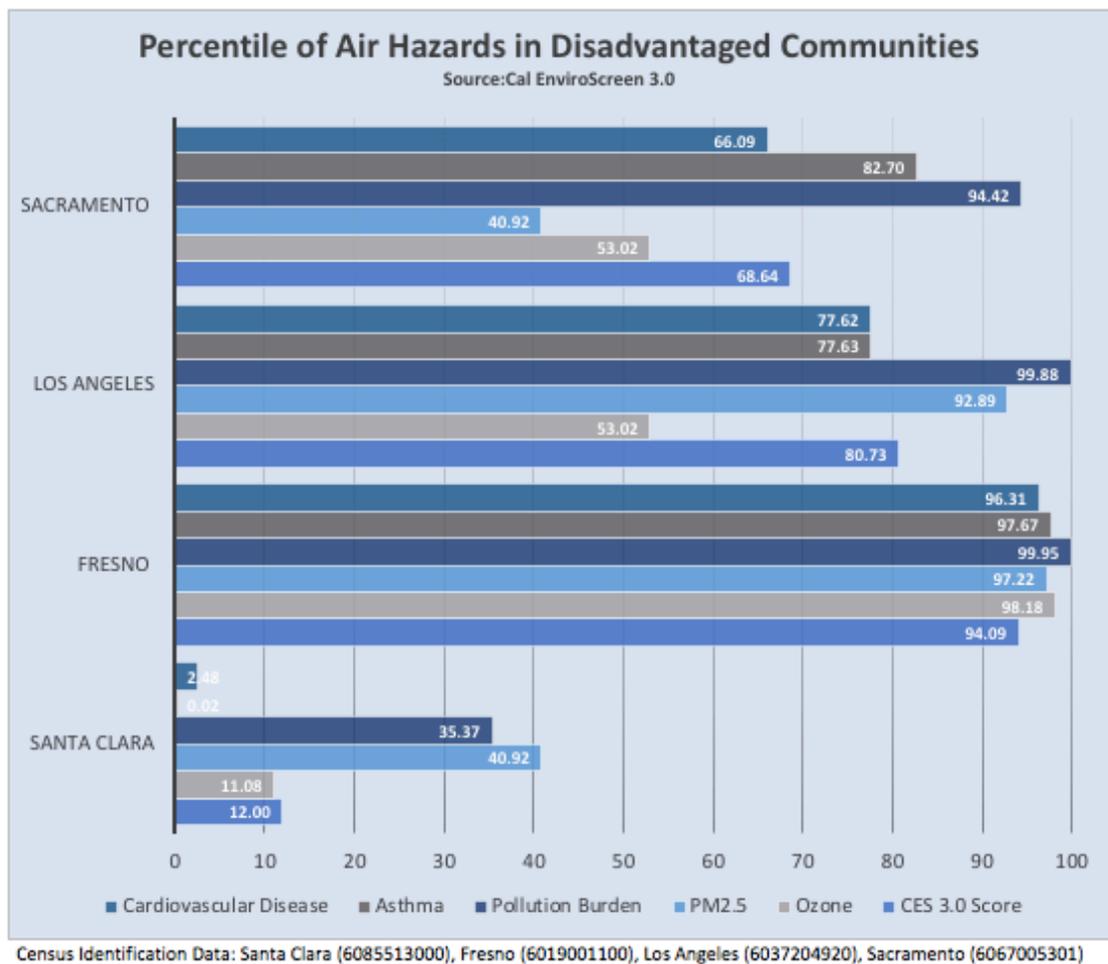


Figure 7 demonstrates the relationship between socioeconomic status and environmental burden—even among the worst-off, Fresno stands out

These concentrated effects are particularly concerning because compounding disadvantages impede the function of political mechanisms and worsen the consequences of

health problems. Layering pollution on top of food insecurity, housing insecurity, crime, poverty, and unemployment makes it far more likely to go unaddressed. In communities facing compounding disadvantages, Maslow's hierarchy is vigilantly at work. The air quality becomes a far less pressing threat to personal health than any of the aforementioned problems, so addressing it falls far down the list of priorities for these families. Additionally, in poor and disadvantaged communities, a lack of access to medical care can worsen the effects of breathing conditions like asthma, increasing the chance of serious adverse outcomes like death.

Fresno ranks worst in the nation for year-round particulate air pollution, resulting in .1% of Fresno's population dying prematurely on an annual basis—about 16x greater than annual homicides in the county (Prunicki & Nadeau 296, 298; American Lung Association, *Most Polluted Cities*). Starkly demonstrating the consequences of pollution and compounding disadvantage, the difference in life expectancy between Fresno's wealthy Northern neighborhoods and its poorer Southern areas is 20 years—a distance of just seven miles (Victoria et al., *Amazon Delivers Dirty Air to Fresno's Poorest*). The disproportionate effects of pollution fall on those with the least political and economic resources to address them. This creates a vicious feedback loop in which polluting activity is located near poor communities, partially to be closer to their cheapest labor sources and partially because citizens with substantial political and economic resources will not allow polluting activity in their vicinity. These areas then become polluted, driving down property values and further attracting poor residents and more polluting activity.

This phenomenon has led some, like ecologist Steve Lerner, to deem these areas “sacrifice zones” – places in which locally unwanted land use results in pollution or chemical exposure, often constituting environmental racism (Bullard, *Sacrifice Zones*). Several studies

empirically demonstrate pollution burdens are correlated with race often as strongly if not more so than with class.

Documenting this disturbing pattern, a 2007 study found that people of color make up 56% of those living in neighborhoods within 2 miles of commercial hazardous waste facilities and comprise 69% of the population in neighborhoods with clustered industrial facilities (Bullard et al., *Toxic Waste and Race at Twenty*). Similarly, a 2008 study found African Americans experience such disproportionate pollution burdens that families with incomes between \$50,000 and \$60,000 live in areas that are, on average, more polluted than white households with incomes less than \$10,000 (Downey & Hawkins 759-762). On the whole, concentrated and compounded disadvantages make health conditions far more costly, impede proper political functioning, and amount to environmental racism, systematically subjecting the poor and colored to a diminished quality of life.

### **iii. Exacerbating Factors**

While the situation is dire at present, there is reason to believe it may only continue to worsen. As the unpredictable effects of climate change continue to disrupt weather patterns, elevated temperatures and risk of wildfires will contribute to and worsen the effects of pollution. There is a preponderance of evidence showing regional warming and drying in the western United States is linked to increased fire frequency and size, as well as to longer fire seasons. The US Forest Service has concluded that fire seasons have grown in length by an average of 78 days since 1970. Similarly, a study from UC Merced found an increase in large fires of 140%, a 390% increase in acreage burned since the 1970s, and a significant relationship between fire numbers and an earlier snowmelt, creating worrying feedback loops (Westerling, *Increasing Wildfire Activity*).

Higher temperatures through spring, summer, and fall coupled with an earlier snowmelt results in vegetation becoming arid sooner and staying dry longer. Research over the past few decades concludes climate change has caused more than half the increase in fuel aridity and is responsible for a doubling in forest area burned. Climate change projections for the middle of this century suggest there will be a 35% increase in the days with high danger of fire across the world, with even higher increases in the western states of the US and southern Africa (McSweeney, *Megafires increase*).

As fires become more prevalent, they will become a bigger source of pollution. Notably, increased temperatures alone are sufficient to increase hazardous pollution in areas exposed to ozone. Geographic conditions combined with calm winds, greater amounts of solar radiation, and high temperatures during summer months increase ozone production while all air pollutants are exacerbated in severe heat waves and long periods of stagnant air (Prunicki & Nadeau 296).

#### **iv. Other Consequences**

In addition to the health consequences and environmental racism of air pollution, two other consequences are particularly concerning. There are the sheer economic consequences, mostly by way of increased emergency room visits and degraded health. Authors of a RAND study sought to quantify the cost of failing to meet air pollution standards in California over two years. From 2005-2007, the study found an additional 30,000 emergency room visits for asthma alone, most of which took place in the San Joaquin Valley (Romley, Hackbarth & Goldman). Reducing air pollution to below levels recommended by the EPA would save nearly 100 million dollars annually in asthma ER visits alone.

Asthma requires diligent and consistent medical care, meaning the uninsured and underserved are at greater risk of uncontrolled asthma; Fresno has three times the national rate of

asthma. Throughout the country, asthma causes 14.2 million office visits and 1.8 million ER visits annually (Prunicki & Nadeau 297). In 2013, there were also 3,630 deaths from asthma, and the national direct and indirect cost estimates could be as high \$40 billion annually (Prunicki & Nadeau 299). Given these estimates do not include the other health myriad consequences of pollution exposure, the real costs are likely far greater.

Beyond the pure health costs, there is a growing body of evidence quantifying the effects of air pollution on agricultural yield. A 2014 study conducted in India found significant deleterious effects of ground-level particulate matter and ozone pollution on crop yields. In addition to the indirect effects of pollution on crops via global climate change, the direct impacts resulted in 36% lower yields of wheat, with some densely populated areas experiencing 50% relative losses (Burney & Ramanathan 2014). The study also found a 20% decline in rice yield and estimated that global crop loss caused by surface ozone in the year 2000 reached 79 million metric tons and totalled \$11 billion (Burney & Ramanathan 2014). Importantly, the yield gains from addressing regional air quality have the potential to offset agricultural production losses produced by a more stringent regulatory state.

### **c. Literature Review**

With much of the literature surrounding air pollution covered in the background section, focus can be turned toward the political conditions that have prevented air quality improvement despite a clear understanding of the sources, strategies, and urgency necessary to address it. There will be three broad literature bases drawn from: those encompassing regulatory capture, common pool and public goods resource management, and the critical arguments around the environment-economy tradeoff.

### **i. Regulatory Capture**

The primary work that motivates my own stems from an influential paper published by George Stigler in 1971. Stigler is responsible for catalyzing much of the work on regulatory capture with his observation that “as a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit” (Stigler 1971).

Traditional capture models assume regulators are complicit in setting suboptimal policy, with special interests winning influence through votes (Grossman and Helpman 1994; Peltzman 1976). Others have emphasized the revolving door of public-private employment (Cohen 1986; Gormley 1979). Most important for this work, however, is an emphasis on what Karthik Ramanna and others have called “thin political markets”. In these thin political markets, “corporate managers are largely unopposed – because of their own expertise and the general public’s low awareness of the issues” (Ramanna 2015). Critical to the theory is the idea that there exists “a co-location of expertise and interest” such that those most qualified to make decisions on regulatory topics also happen to be those with substantial monetary interests at stake (Ramanna 2015). These markets have two primary features: a concentrated commercial interest, with relevant expertise on the issue at hand, and diffuse public interest. Regulations that are rooted in thin political markets, therefore, will be slanted toward the knowledgeable interest group in subtle but self-serving ways, amounting to what many would deem regulatory capture.

Now, some have argued that when regulations impact public health or other areas of particularly high salience, obvious regulatory capture would result in scandal, potentially leading to imprisonment, making regulators less likely to cave to special interests (Wilson 1980). While this changes the risk calculus for regulators, it does not mean capture cannot exist in these arenas. As will be shown in the case of Fresno, the alteration of a single word in a decades-old,

obscure emissions rule has resulted in potentially hundreds of thousands of additional tons of pollutants; there is no thinner market than a single word. Nevertheless, Wilson's argument helps underline the premise from which my argument will be constructed. In line with Perlman (2019) and Olson (1997), the fact that certain outcomes benefit certain actors does not necessarily indicate regulatory capture. Rather, regulators are always fundamentally dependent on the information they are provided by interest groups, and the manipulation of that information can be largely out of their control.

Connected to Ramanna's work and important for a full understanding of capture is Dal Bó's analysis of regulation as a market economy itself (Dal Bó 2006). Dal Bó argues that the demand for regulation is connected to the size of the beneficiary group, and the stakes of regulation (205). Unless the composition of an interest group is undergoing substantial transformations (eg. layoffs, mergers, etc.), one would expect regulatory demand to stay relatively constant. On the supply side, one would have to "pay attention to the machinery that produces regulation: the public sector, which responds to political pressures" (205). The fact that many voters have poor incentives to be well informed about regulation, means politicians have a systematic informational advantage they can leverage to augment their own power. Dal Bó ultimately argues "asymmetric information is the source of regulatory discretion, making capture possible" (210).

Most important is the way this market mechanism functions: "special interests will typically face legislators with varying 'prices', and the purchaser of legislative favours will try to assemble a majority of minimum-cost legislators" (213). As will be demonstrated in the case of California, and Fresno in particular, the statewide decision to fracture regulatory control of pollution sources brought hundreds of new regulators into the market, driving down the 'price'

of regulation—resulting in Fresno’s air pollution control board being controlled by a majority of politicians and interests in direct opposition to regulation, for much of the past twenty years.

The response to interest group capture under this federalist system is ostensibly the centralization of power to state and national authorities. There is good reason to believe interest groups can capture and distort policy at a local level more effectively than a state or national level. For example, a corporation employing 200 people in a town of 2,000 has more political influence over the local officials responsive to those 200 people than state officials whose constituencies number 200,000. In addition, more expensive state campaigns would require more substantial monetary donations to register influence, whereas city council races are typically low-budget affairs.

That being said, the decision to centralize power, does not depend on this argument holding true. Though the devolution of power is thought to permit localities to tailor policy to local conditions, Moore and Giovinazzo (2012) demonstrate centralized policymaking can be justified even if interest groups are equally influential at the local and state level. They argue that centralized policymaking “provides more aggregate welfare when voters widely disagree with moderately prevalent strong interest groups” (189). This argument holds even under the assumption that interest groups can equally capture local and state or national representatives because “the *amount* of policy distortion can vary” a phenomenon they term “the distortion gap”(190). It follows that centralized policymaking can prevent distortion by interest groups when the median voter disagrees with the preferred policy of the dominant faction; distortive interests force the adoption of their policy preference over the will of the median voter (Moore and Giovinazzo 2012).

The broader point is that interest group capture is only undesirable when it thwarts the interests of the median voter. In other words, whether centralized or localized policymaking “produces greater aggregate satisfaction depends on the degree of preference incongruity between voters and groups, and the prevalence of interest groups able to capture legislators” (Moore and Giovinazzo 193). Applying this theory to the case at hand, centralized authority over air quality regulation in the San Joaquin Valley, in which voters prefer stringent regulation by a 13% margin, yet agricultural and oil interests continue to thwart progress, would be justified. The problem lies in proving these industries are attempting to capture legislators; this matter will be taken up forthwith.

## **ii. Common Pool Resources, Public Goods and Critical Environmental Perspectives**

Key to a political understanding of air quality is the long-standing discussion on ‘the commons’ and management strategies for these valuable resources. Common pool resources (CPRs) are often differentiated from what is referred to as ‘pure public goods’. Public goods are goods which are non-rivalrous and non-excludable—any individual’s use of the good does not degrade it or limit the access of others. Public goods include things like governmental statistics, national security, and knowledge.

CPRs, in notable contradiction, are subtractable. They are natural or artificial resources sufficiently large to make it costly, but not impossible to exclude potential actors benefitting from the resource (Ostrom 30). CPR systems are often understood in terms of a “stock” variable, which, under favorable conditions, is capable of producing a “flow” variable (Ostrom 30). That is to say, the resource produces ‘resource units’ that are extractable without harm to the resource itself (Ostrom 31). When one taps a maple tree, they can collect a small quantity of syrup as long

as the tree continues to live; taking too much, however, destroys the resource and any future extractable resource units.

The massive populations and global economic systems ushered in by modernity have blurred the lines dividing resources considered common and public. The world's supply of clean water may not have been rivalrous or excludable 300 years ago, but certainly is so today. It is no longer sufficient to view these goods on a strict axis of excludability and rivalry. Doing so obfuscates the fact that excludability stems from rivalry and that access to any and all resources fundamentally depends on material wealth.

Similarly, while air used to be considered a quintessential public good, pollution amounts to a negative use of the air and impedes other's ability to use it, meaning it can be considered subtractable, calling into question its status as public. It is also becoming increasingly less clear that air is non-excludable. While no one is being physically prevented from breathing the air, there is little debate that an individual's access to *clean* air will be entirely dependent on their material conditions (eg. possessing the disposable income to move from polluted areas or buy air purification equipment). The twin forces of globalization and industrialization have made non-rivalrous goods rivalrous by tethering all countries together in virtue of their natural resource consumption meaning the number of things properly understood as public goods is decreasing while systems understood as common may be growing.

In Garrett Hardin's hallmark paper coining the term "tragedy of the commons", he takes up the issue of air quality directly. Addressing "noxious and dangerous fumes" Hardin observes that a rational operator will find "the cost of the wastes he discharges into the commons is less than the costs of purifying them before releasing them" (Hardin 1245). The tragedy of the "commons as a cesspool" is only averted by "coercive laws or taxing devices that make it

cheaper for the polluter to treat his pollutants than to discharge them untreated” (Hardin 1245). Importantly, Hardin’s solution to the problem of the commons depends on a regulatory structure acting in good faith to increase the cost of polluting. If Stigler’s theory of regulatory capture is correct, the task of regulating polluting activity would fall to the polluters themselves, locking us into “a system of fouling our own nest” (Hardin 1245).

Somewhat surprisingly, the supposition best capturing modern conditions was derived in 1804 by James Maitland, the 8<sup>th</sup> Earl of Lauderdale. Typically referred to as “Lauderdale’s Paradox”, he observed “an inverse correlation between public wealth and private riches such that an increase in the latter often served to diminish the former” (Foster, *Paradox of Wealth*). This foundational principle points to a peculiarity of capital-intensive production; namely, it feeds on scarcity. It is often assumed that increasing environmental costs and consequences will restrain economic growth, but “the fact is that such costs continue to be externalized [...] on nature and society as a whole” (Foster, *Paradox of Wealth*). The seemingly infinite ability to socialize the costs of production provides a perverse incentive for private profits “through the selective commodification of parts of nature (public wealth)” (Foster, *Paradox of Wealth*). An example can be found in India, where pollution levels can be hazardous year-round and oxygen bars offer patrons a reprieve for a price (Suhasini & Schultz, *India Choking*).<sup>1</sup>

The primary lesson: there is no feedback mechanism from rising ecological costs to economic contractions. The consequences of production cannot and will not fix themselves: “by the perverse logic of the system, whole new industries and markets aimed at profiting on planetary destruction, such as the waste management industry and carbon trading, are being opened up” (Foster, *Paradox of Wealth*).

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<sup>1</sup> The owner’s perspective: “Customers say, ‘Now we have to buy fresh air?’ I tell them, ‘Do you not also pay for a bottle of clean drinking water, something you did not do 20 years ago?’” (Suhasini & Schultz, *India Choking*).

As Figure 6 demonstrates, many in the Central Valley have become extremely wealthy at the expense of the degraded air quality, which is disproportionately borne by the disadvantaged. Fresno, therefore, represents an example of public wealth being systematically undermined by capital-intensive production in order to increase private wealth. All too often, when people make claims of this nature, they come off as far too abstract to be compelling: ‘Capitalism did it!’ tells us very little about how and why these conditions proliferate and offer no empirical tools of evaluation. Through intensive case studies and larger statistical sampling, however, a clear story of regulatory capture and economic path dependence will be constructed. As Central Valley agriculture and oil industries sprouted, centralized, and consolidated, they accumulated substantial amounts of money and, with that, power. This economic power allows polluting interests to capitalize on the massive increase in capture-prone political offices as a result of California’s unique regulatory split.

### 3. Hypotheses and Theory

Given the consequences of environmental degradation have not and will not be evenly distributed among those contributing to it, knowing what makes a particular community vulnerable to prolonged poor air quality and explaining differential regulatory responses can inform future best practices. As Schrecker, Birn, & Aguilera (2018) prove, extractive economies produce substantial environmental harms and, in addition to industrial activities, are the most medically hazardous. Communities experience this structural violence through multiple distinct pathways—both political and environmental (Schrecker, Birn, & Aguilera 2018). Having addressed the latter, a deeper investigation of these political pathways will yield unique understandings about California's regulatory state.

Starting in 1967, California split the governing of air emissions into stationary sources and mobile sources, with the California Air Resources Board in charge of the latter and the individually drawn boundaries of local air pollution control districts responsible for the former (CARB). Interviews with eight environmental justice groups in the San Joaquin Valley identified the local control board as the primary prohibitive force in their advocacy. Under a market-based understanding of regulation, having multiple regulatory agencies in charge of a single resource, while intended to empower localities, has only multiplied the points at which regulation can be intercepted and subverted. If municipalities want to court polluting actors and the jobs they bring, they have no choice but to be the lowest regulatory bidder. As poor communities compromise regulations to attract economic activity, that activity brings pollution, drives down property values, physically harms local residents, and further concentrates regulatory power in the hands of industry.

To that end, a comparison of three California ‘air basins’, their regulatory structures, and relative economic dependencies should shed light on the prevalence of capture and differential air quality outcomes. Outlined here is a preliminary hypothesis relating factors impeding or facilitating responses to common pool and public good management problems.

#### **a. ACS Figures**

Using data from the American Community Survey, a project by the US Census gathering county level economic statistics, the economic reliance of air basins on polluting and anti-polluting industries is revealed. Recalling the chief insight of Moore and Giovinazzo (2012), regulatory capture is only problematic when it thwarts the preferences of the median voter. If regulation is captured in a direction consistent with the preferences of voters, it is hard to argue a problem exists.

One unique aspect of California’s regulatory structure that makes it particularly prone to capture is its dependence on non-partisan elected officials policing the companies in their region. When all politics are local, it becomes increasingly hard to regulate polluters because of adverse effects on the local economy and the potential for these companies to campaign extensively against officials. A substantial degree of economic reliance on polluting industries also increases the chances an individual working in these industries attains political office and uses their position to maximize their personal economic interest. Using Dal Bó (2006) and Stigler’s (1971) understanding of regulation as being subject to market forces, suggests that the most powerful industries, those with the most resources at their disposal, would be able to successfully capture the regulation applying to them, regardless of the preferences of the median voter.

Conceptually, it is helpful to group industries vying for capture of air quality regulation into two opposing groups: those pushing for lax regulations, termed “polluting industries”, and those pushing for stricter controls, termed “anti-polluting industries”. Importantly, both groups seek to capture regulation with the aim of increasing their economic throughput, only differentiated in their relative position to the median voter.

This conceptual bifurcation is formed by historical observations made in the case of pollution in Los Angeles, California (Vogel, *California Greenin'*). Vogel found the involvement of the business sector was key to curtailing air pollution in Los Angeles (159). Vogel cites the threat air pollution posed to the real estate industry, who feared a negative reputation would impact property values, Hollywood producers, who were frequently cancelling plans for outdoor shoots, and tourism, who saw fewer people traveling to the city as a result of the pollution, as being the driving factors behind the Los Angeles Area Chamber of Commerce’s strong backing of government regulation that led to the nation’s first air pollution control district (159).

In the case of Los Angeles, a coalition of industries lobbied for regulation that would benefit them at the direct expense of the extractive sector.<sup>2</sup> At the time, the relative price of capturing these regulators would have been high, with multiple interest groups bidding for regulation offered by few individuals. Now, as 35 air districts cover the entire state, each containing at least five members, the supply of regulation has dramatically increased, with demand from polluting and anti-polluting industries staying relatively constant. As such, the price to acquire or capture regulation has fallen.

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<sup>2</sup> Vogel also mentions small farming interests among this cohort of anti-polluting industries. As partially demonstrated in Figures 4-6, contemporary industrial agriculture is almost entirely different and qualifies as a polluting industry. Only extreme levels of pollution affect crop yield, so their incentive is to pollute right up to that point of inversion. As demonstrated by Almaraz et al. (2018), industrial agriculture now produces some 40% of all NOx emissions in California.

## California Air Districts

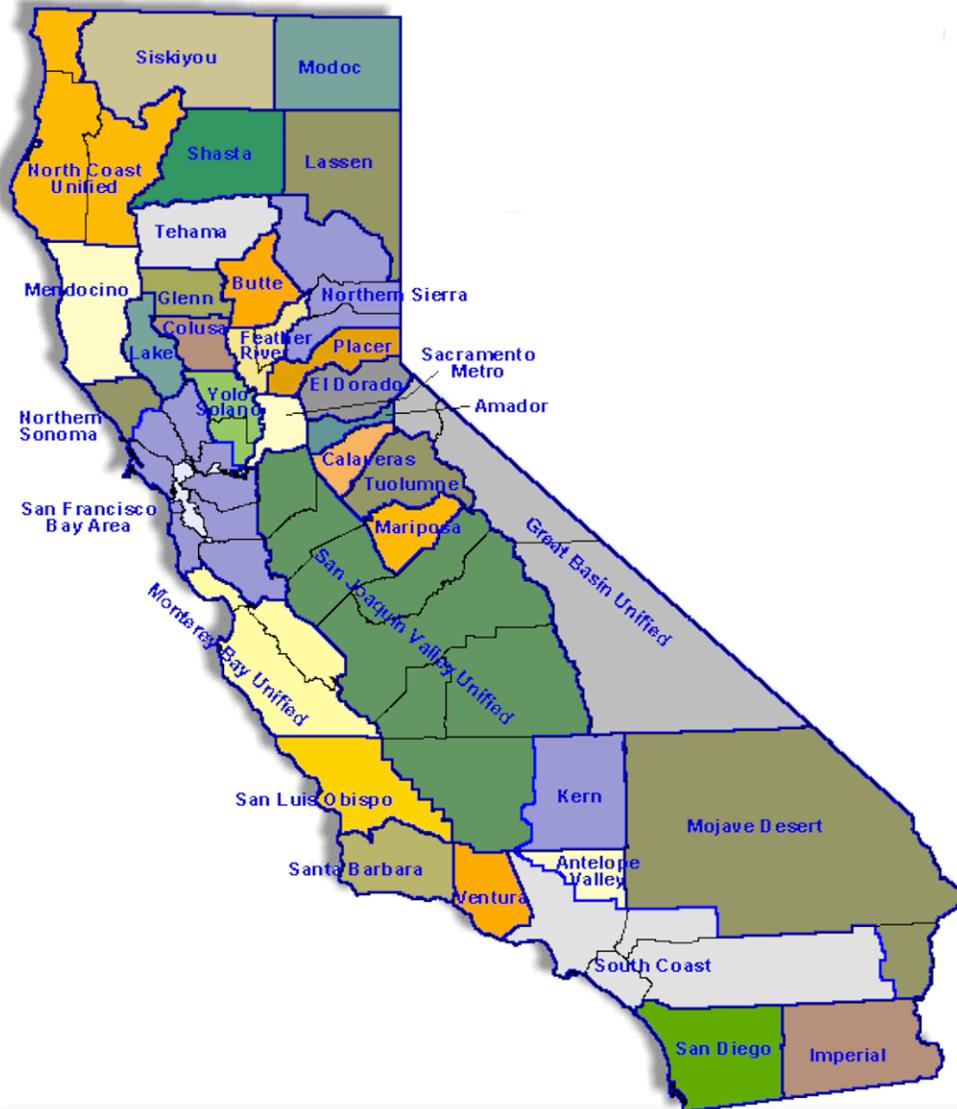
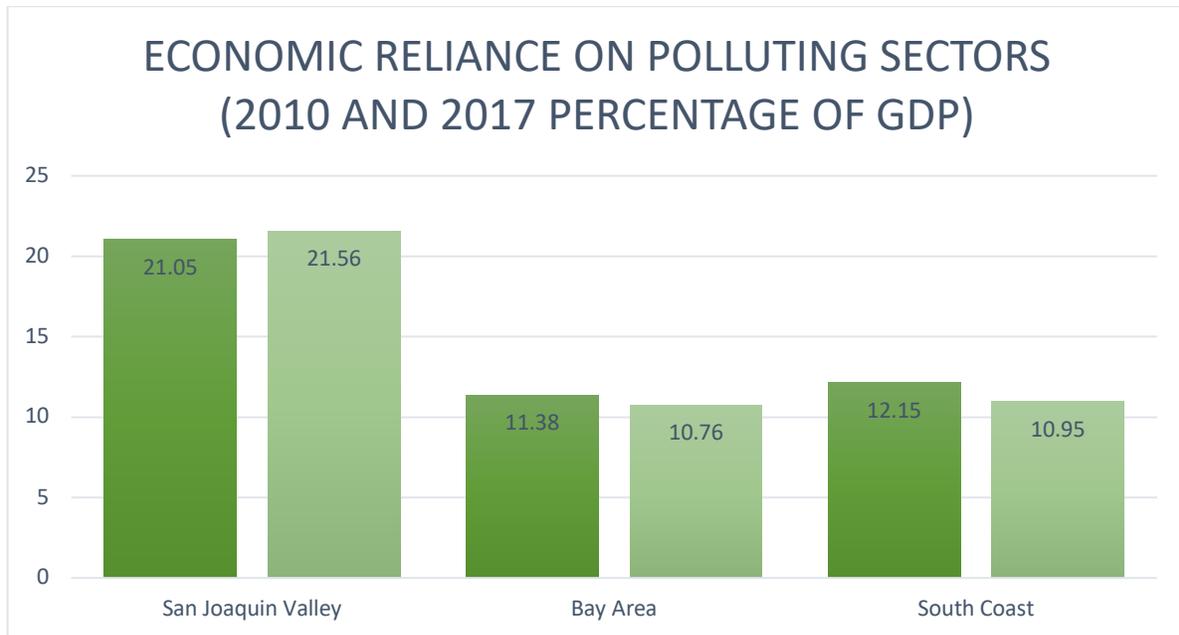


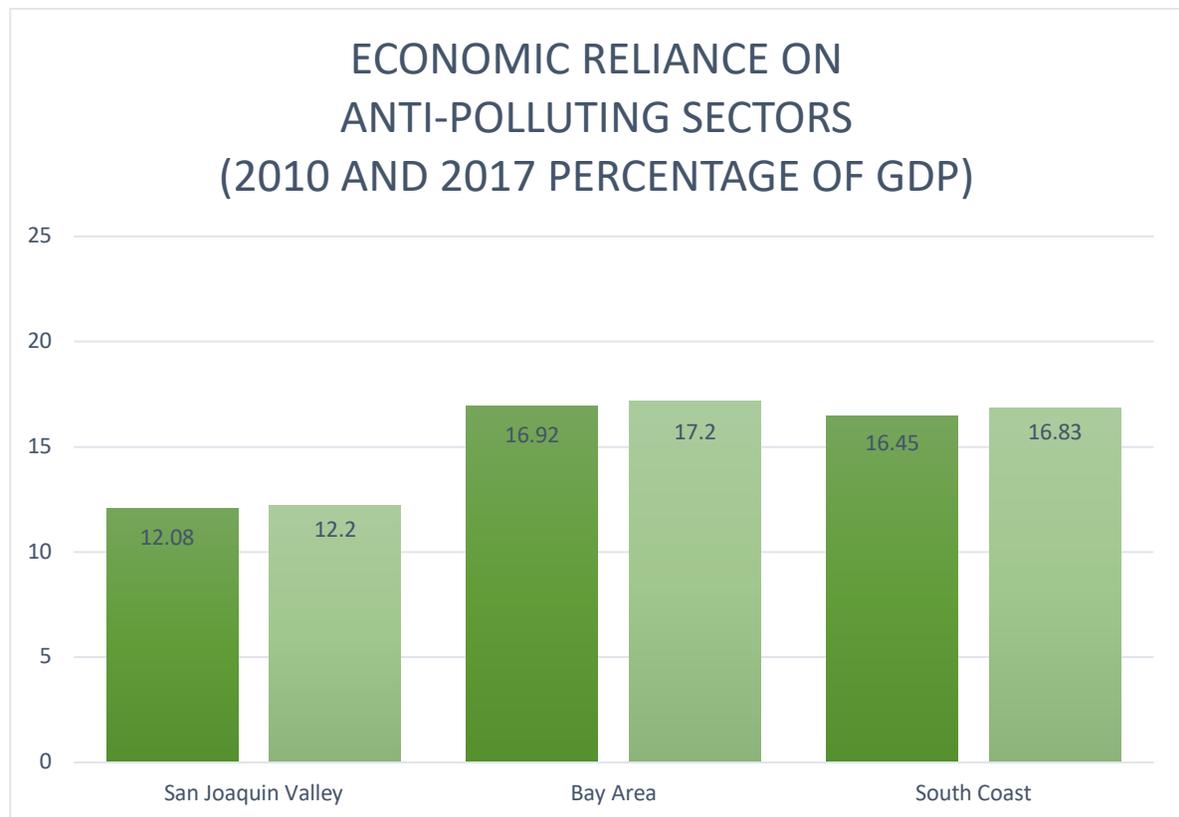
Figure 8 is a map of all 35 California Air District comprised of an estimated 280 local officials at any given time

The figures below demonstrate the relative prevalence of polluting and anti-polluting industries in each region as compiled from the ACS survey. Polluting industries are a combination of the relative county-level GDP contributions of manufacturing, agricultural, and mining sectors, while anti-polluting industries consist of arts, entertainment, accommodations,

real estate, rental, and leasing. It shows the longest possible trend, to illustrate the small changes in relative industries over time.



Figures 9 and 10 demonstrate the economic prevalence of polluting and anti-polluting industries in 3 air basins.



## b. Sources of Pollution

Importantly, the type of pollution an area suffers is directly related to the source of local emissions. For this analysis, two chief pollutants will be measured: ground level ozone and particulate matter with a size of 2.5 micrometers and smaller (PM<sub>2.5</sub>). These two pollutants are chosen specifically because of the unique threat they pose to health and their identifiable sources. Ground level ozone pollution is not emitted directly into the air, but rather is formed by the reaction of nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs) (EPA Ozone). PM<sub>2.5</sub>, conversely, can be directly emitted, called primary PM<sub>2.5</sub>, or formed by reaction in the atmosphere, secondary PM<sub>2.5</sub>. Primary PM<sub>2.5</sub> includes dust from roads or farming operations and elemental carbon from combustion sources, while reactive gases form secondary PM<sub>2.5</sub> (EPA, *Indicator*). Finally, stationary sources, like oil and gas development and agriculture, contribute disproportionately to particulate matter through dust, combustion, and ammonia, meaning local air pollution boards have more power over limiting PM<sub>2.5</sub> than they do ozone (EPA, *Indicator*). In other words, stationary sources, the responsibility of local boards, contribute disproportionate amounts of particulate matter pollution, making it a better direct indicator of the board's impact.

Air Basin (Mobile tons/day)	NO <sub>x</sub>	VOC
Bay Area (2011)	264.6	133.4
South Coast (2008)	666	336
San Joaquin Valley (2008)	287	114.3

Figure 11 is a table of the Mobile Emissions from each air basin, the largest contributor to ground level ozone

## c. Theoretically Informed Hypotheses

An understanding of the degree of economic reliance on polluting and anti-polluting industries and knowledge of relative pollution burdens allows the generation of a hypothesis

consistent with the theory of capture developed by Stigler (1971) and Dal Bó (2006). If air quality boards are subject to capture by industries over which they have jurisdiction, an in-depth biographical analysis of local board members and their campaign finance documents should reveal substantial influence. Additionally, those different degrees of influence should have differential effects on air quality outcomes as measured by the rate at which pollution is decreased or ameliorated. Looking more closely at each individual basin and using the prevalence of polluting and anti-polluting industries, the following hypotheses can be generated for each:

### **South Coast**

The South Coast Air Basin, in comparison to the Bay Area, has slightly more economic reliance on polluting sectors and slightly less reliance on anti-polluting sectors. If regulators are subject to market forces, there would be slightly more representatives with tangible ties to polluting industries than anti-polluting industries. Given the population of the basin is 15,716,000 as of 2017 and mobile emissions, as demonstrated in Figure 11, are substantially greater than the other two basins, ozone would likely be a much more difficult problem to address than primary PM<sub>2.5</sub> emissions. This regulatory capture would result in mixed success in reducing particulate matter as oil and manufacturing interests push for lenient regulations to maintain their margins while real estate and tourism industries push for strict regulations to protect property values and the continued growth of their sectors.

### **Bay Area**

The Bay Area basin is largely in the converse position. With a slightly greater presence of anti-pollution industries and slightly less dependence on polluting interests, the composition of the board should skew towards representatives with ties to real-estate development and tourism,

with fewer representatives with agricultural and manufacturing relationships. With a population of 6,971,000, ozone should also be more difficult to reduce but should be far less of a problem than in the South Coast basin. Regulatory capture should result in more success reducing pollution than the South Coast and significantly more progress than the San Joaquin Valley as real estate interests push for cleaner air to maintain their property values. On the whole, the geography and climate of the Bay Area is substantially different, which also mitigates the pollution problem in the basin. These topographical and environmental differences will be discussed at greater length before the results are examined.

### **San Joaquin Valley**

In the San Joaquin Valley, a market-based understanding of regulation would suggest substantial capture from oil and agricultural interests with little regulatory competition from real estate and tourism. This should be apparent in the composition of the regulatory board with progress on both ozone and particulate matter pollution being substantially stymied as a result, particularly in comparison to the Bay Area basin. There is some reason to believe that, having disproportionate control over particulate matter, the board would be particularly inept at reducing PM<sub>2.5</sub> levels. Having only a population of 3,842,000 and mobile vehicle emissions on par with the Bay Area, mobile emissions reductions implemented by state authorities should have disproportionately beneficial results on ozone. With mobile emissions in the San Joaquin Valley almost identical to the Bay Area, any differences in pollution outcomes ought to be attributable to some mix of geography, climate, and emissions from stationary sources.

In conclusion, the presence of slightly more polluting interests in the South Coast should result in low to moderate success addressing PM pollution when compared to the Bay Area, with more difficulty addressing ozone. The Bay Area should have more success on both fronts due to

capture from anti-pollution industries, while the San Joaquin Valley should see very little success in particulate matter due to overwhelming capture by agricultural and oil interests. Chiefly, if Stigler's theory of capture holds, it should become apparent in an examination of these regulatory boards.

#### **4. Methodology**

An in-depth inventory of local regulatory officials and their links to regulatory outcomes has never been undertaken in the literature on capture. Using three air basins in California, this study will document the background and financial interests of each member with voting rights on regulatory policy and attempt to identify their alignment with either polluting or anti-polluting industries.

The San Joaquin Valley, South Coast, and Bay Area basins were chosen for several reasons. First, all three have been consistently named by the EPA as out of attainment of air quality standards. All said, the three air basins contain 20 of the 41 counties currently in violation of national air standards in the United States (EPA). Second, Los Angeles and the San Joaquin Valley are the closest geographic approximation to one another: both are prone to inversions, hot summers, and surrounded by mountains. The Bay Area serves as a control case in which regulators should be able to operate under favorable conditions. Finally, the sheer scale of the impact of air quality in these regions is a considerable environmental justice concern. It is estimated that between 14,000 and 24,000 people die prematurely on an annual basis in these three basins alone (CARB, *Mortality Workshop*). Those who live in sub-standard housing, work in hazardous industries, or live in proximity to major sources of pollution are uniquely impacted. These tend to overwhelmingly be people of color and the economically disadvantaged.

##### **a. Compilation of Members**

Records of members who have sat on these boards are rarely in any centralized location, so compiling the names of each member who held regulatory positions in the South Coast, Bay Area, and San Joaquin Air Basins was the first step. Only the South Coast kept a centralized list,

so public documents of meeting agendas and federally mandated annual reports were analyzed to compile the membership of each board. The lack of publicly and digitally available agendas and reports were ultimately what constrained the sample size. Nevertheless, a total of 158 local officials were identified as serving on the three boards. They were sub-setted as such:

San Joaquin Valley: 45 Representatives and 4 Governor appointed health specialists

South Coast: 35 Representatives, 2 Governor appointments, 1 Speaker of Assembly appointment, and 3 Senate rules appointments

Bay Area: 67 Representatives and 2 Mayoral appointments

### **b. Determining Conflict of Interest**

After compiling the membership of each board, an extensive biographical analysis was conducted of each member to determine conflicts of interest that would align them with polluting or anti-polluting industries. The biographical analysis included a survey of the top fifty (50) search results on Google for the candidate with the goal of establishing the preceding and succeeding occupations of each member. This information was available for every member, mostly being gleaned from biographies on county websites and public LinkedIn profiles.

In addition to previous and future occupations, an analysis of public financial disclosure documents was conducted to gain further insight into the prevalence of industry influence. Form 700, submitted to the California Fair Political Practices Commission, requires the reporting of personal investments in any business entity that operated or will operate within the representative's jurisdiction (FPPC). It also includes any other personal stakes in business operations that may conflict with the responsibilities of their position. Form 700s were available for the majority of officials, but in cases they were not, Form 460s were used as substitutes. Form 460s are a comprehensive report that disclose all receipts and expenditures of a campaign committee (FPPC, *When and Where*). For each candidate where 460s were examined, 75 pages

of expenditures were investigated, amounting to 375 donation receipts per candidate. If less than 75 pages of receipts were available, all available receipts were analyzed. If a regulatory board member lacked Form 700s and 460s as well as any occupational conflicts of interest, they were noted as “indeterminate”.

### **c. Parsing Party Affiliation**

In addition to conflict of interest data, party affiliation was assigned to each member. With each representative appointed to the board ostensibly in a non-partisan elected position as either a county supervisor, councilmember, or mayor, biographical data had to be collected in order to assign political partisanship. This data included prior or future elections for partisan offices, news articles identifying party status, self-identification of political affiliation in interviews or biographies, and patterns of endorsements of partisan elected officials. To this end, the terms “conservative” and “progressive” in representatives’ self-description were combined with the preceding evidence to yield a proximate party affiliation. In cases where this process proved insufficient, an “indeterminate” was again assigned.

### **d. Relevant Background Analysis**

Finally, throughout the process of investigating party affiliation and conflicts of interest, notes were made of biographical information that would indicate capture not expressly embodied in official channels. Of those 50 search results, a minimum of ten (10) were selected for in-depth review. These often took the form of articles involving policy decisions of officials, political scandals in which they were involved, official biographies or obituaries, and promotion of private interests. Background analysis was only used to assign interest group capture when there

was an extremely clear-cut example of capture. This often took the form of pending or settled criminal or civil litigation involving accepting bribes from industry groups.

## 5. Results

### a. Overview

The results of the extensive biographical analysis conducted on members sitting on the South Coast, Bay Area, and San Joaquin Valley were largely in accordance with the hypotheses outlined, with some important caveats. In the South Coast, a market-based understanding of regulation suggested the relative strength of the pollution generating manufacturing and oil interests would capture slightly more regulators than the real estate and tourism industries. While this was correct, the degree of progress, particularly in regard to particulate matter was unpredicted. In the Bay Area, it was predicted that slightly more economic reliance on real estate and related anti-pollution interests would result in the capture of more board members than manufacturing, oil, and agricultural interests. Though the proportion of each was correctly predicted, it was also anticipated that the pollution problem would be less severe in the Bay to begin with. While both the prevalence of anti-polluting and polluting interests were overestimated, the lower initial pollution levels were correctly hypothesized to be more difficult to reduce. Nevertheless, both ozone and particulate matter were reduced nearly to zero. Finally, in the case of the San Joaquin Valley, the extensive economic reliance on oil and agriculture, was hypothesized to result in significant capture of regulators. The extensive analysis of members showed a majority were prone to polluting industry influence. As a result, progress on PM2.5 reduction was stymied, particularly in comparison to the South Coast. Headway on ozone was made, but it is unclear how much progress was made when the valley's smaller population is taken into account.

Before addressing the results in greater detail, two key qualifications are offered. First, differences in the methods used to assign representatives to the board varied between the three

districts, resulting in disproportionate county-level representation, that was not scaled to population. The Bay Area was the only board that employed proportionate representation and scaled representatives to population with 24 members at any time, the South Coast having 13 members and the San Joaquin Valley having 15. The South Coast assigns one supervisor per county to the board, with three state level appointments and six city councilors from those counties, with Los Angeles county appointing two councilmembers. Both of these systems stand in stark contrast to the board in the San Joaquin Valley, which places significantly more power in rural and sparsely populated counties. Each of the eight counties appoints a member, two others are appointed by the governor, and five councilmembers, two from large cities and three from small, are added on a rotating basis. Both the South Coast and San Joaquin Valley, therefore, employ representation that is not proportional to the population makeup of the region.

Second, the scope of the board is limited to the governance of stationary sources of emissions. Primary PM<sub>2.5</sub> emissions, consisting primarily of dust and elemental carbon from combustion sources can be more easily pegged to stationary sources of emission, particularly in the San Joaquin Valley whose mobile source emissions are on par with those of the Bay Area. Progress on PM 2.5, therefore, may represent a better overall indicator of the impact of the regulatory boards than ozone. Before discussing the results in greater detail, a few limitations of this study will be explored. Figure 12 is a graphic representation of all the results from the biographical analysis.<sup>3</sup>

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<sup>3</sup> Members for which partisan affiliation or affiliation with industry marked indeterminate as distinct from non-aligned which were decidedly affiliated with neither, were omitted from graphical analysis for simplicity, but detailed thoroughly in Conclusion and where relevant in the results

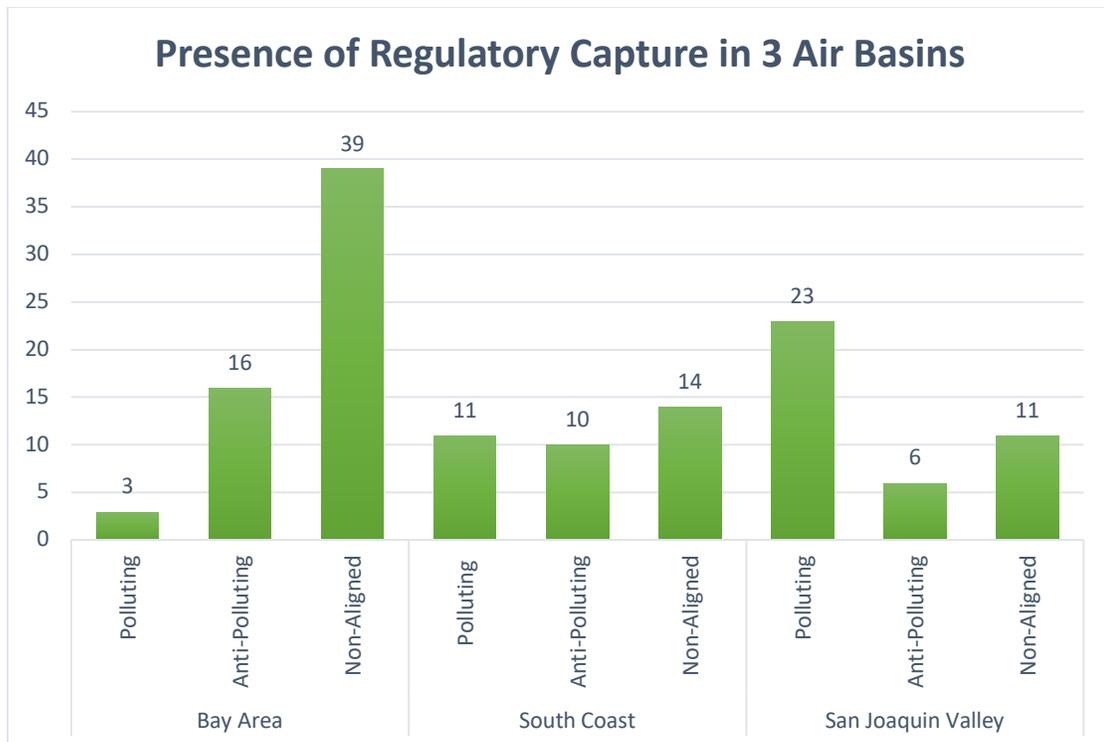


Figure 12 summarizes the prevalence of capture findings across the three case studies

## b. Limitations

### i. Topography, Inversions, and Temperature

One primary limiting factor of this analysis is the inability to control for geographical and climactic differences between the cases in question. In particular, the severity of the pollution problem in the San Joaquin Valley is at least partially due to the topography of the region. The 250-mile-long air basin is surrounded by mountains on three sides, making it difficult for pollution to escape. This topography gives rise to temperature inversions wherein cooler air settles in the valley with warmer air acting as a lid, preventing pollution from escaping, exacerbating pollution problems. Additionally, high temperatures speed the transformation of reactive gases into ozone, amounting to a perfect storm of pollution in the region. That said, Los Angeles is the best comparison case available because of its similar mountainous topography,

warmer summer temperatures, and proclivity for inversions. To be sure, none of these conditions precisely match the severity of those in the San Joaquin Valley, but no better natural comparison exists.

Importantly, the myriad of natural phenomena diminishing the threshold for emissions in the valley ought to offer an incentive for more extreme regulations in the area, rather than less. If air in the valley can be degraded less than elsewhere, more regulation would be required to control it, meaning the prevalence of industry capture carries greater importance. If the carrying capacity of pollution in a region is diminished, the demand by polluting industries for the capture of regulation must increase as control over that resource becomes more valuable.

## **ii. Drift**

An argument often advanced by San Joaquin Valley board members is, in addition to the topography, that pollution drifting from the Bay Area is responsible for a good portion of the valley's ozone problem. A lawsuit filed in 2002 argued that high elevation smog from the Bay Area accounted for between 7 and 11 percent of the ozone problem (San Joaquin Valley, *Board to Sue*). That argument seems to have fallen out of favor recently with a lack of scientific support to back it. Assessing the degree of pollution drift is a very difficult technological task, requiring numerous assumptions within mathematical models. Second, even if drift statistics are accepted at face value, it would mean that 7-11 percent of the progress the valley has made on smog since 2002 is due to the progress on smog by the bay area—the San Joaquin Valley cannot simultaneously divert blame for the problem and take responsibility for the success.

### **iii. Diminishing returns**

Finally, another variable which may be impossible to control for, is the rate of diminishing returns in reductions of pollution. As demonstrated in the background analysis, both catalytic converters and wet scrubbers are already very efficient at removing pollution at the point of emission. Statewide regulations require the installation of the best available pollution abatement technologies meaning that more substantial levels of pollution in previous years were far easier to reduce than future emissions. There exists a point at which new technologies will only be able to make very marginal reductions in emissions, leaving only the reduction of emissions creating activities as a viable source of further reductions (ie. Limiting urban sprawl, increasing mass transportation, or switching to non-emitive energy sources).

### **c. Control Case: Bay Area Air Quality Management District**

#### **i. Executive Summary**

The composition of the Bay Area Air Quality Management Board registered slight capture by anti-polluting interests, with 16 of 68 members exhibiting demonstrable ties to industries directly hurt by air pollution. Surprisingly, the degree of capture by polluting interest was far lower than the economic dependence of the region would suggest. In addition to the overwhelming presence of non-aligned figures on the board, those without connections to polluting or anti-polluting, there was also an overwhelming partisan tilt to the board. This was unsurprising given the Bay Area's reputation as a democratic stronghold. The presence of this capture on the board, was associated with nominal improvements in both ozone and PM2.5. Taking into account declining marginal improvements, the trend reduction of .5 days in exceedance of the 2008 ozone standard per year culminating in 2 days of exceedance in 2018

should be viewed as a significant accomplishment. Similarly, the reductions from a high of 31 days of exceedance in 2000, to 0 in 2016 is demonstrative of a successful regulatory regime. Data on particulate matter in 2017 and 2018 were unreliable and omitted because of abnormally large wildfire events that even the averaging effects of daily exceedance data further averaged across all monitors in the region could not mitigate. Below are graphical representations of findings and a deeper discussion of Bay Area board membership.

## ii. Figures

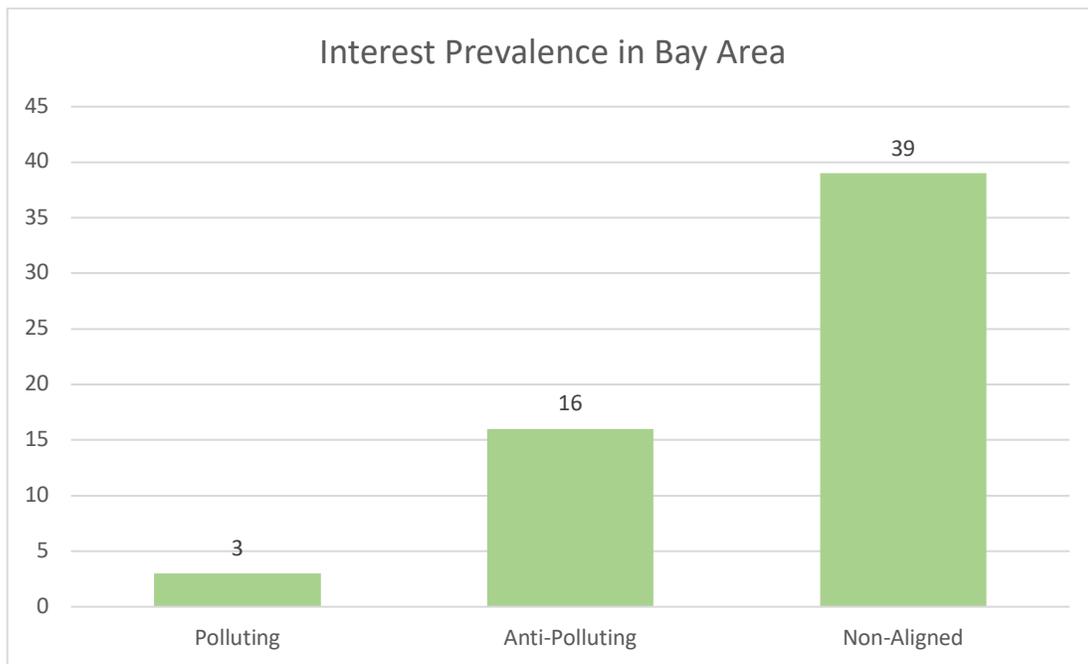


Figure 13 demonstrates an overwhelming prevalence of non-aligned members on the Bay Area Air Quality Management district

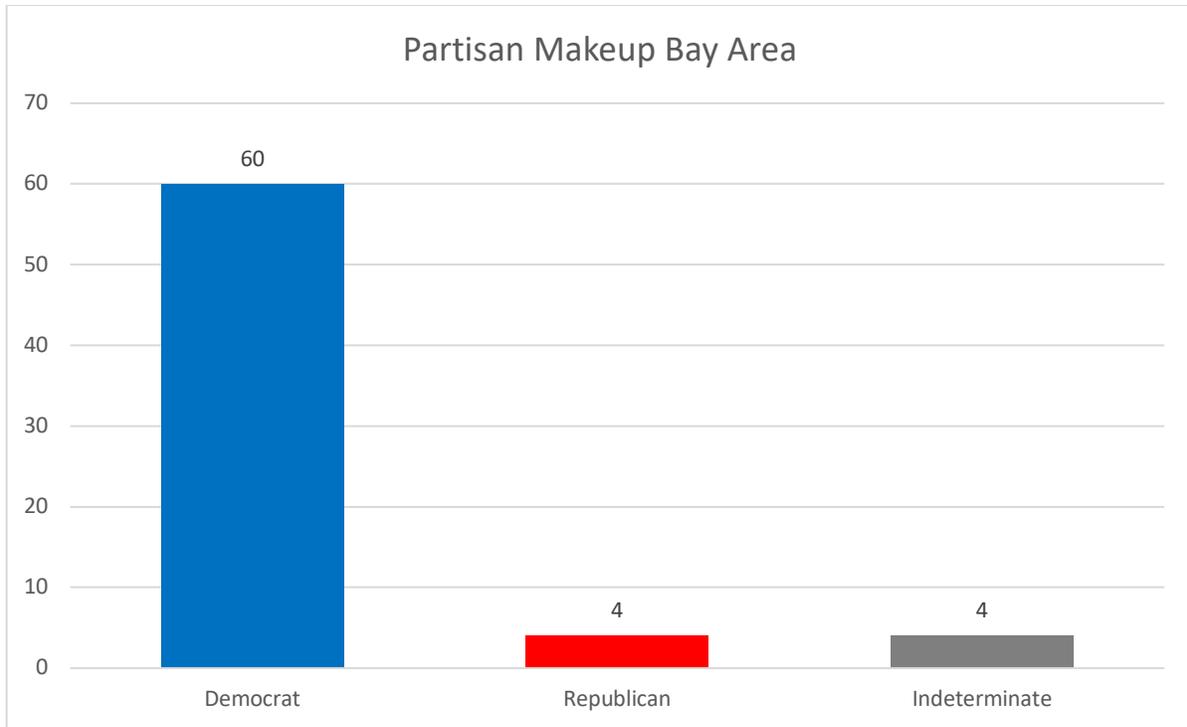


Figure 14 demonstrates an overwhelming presence of Democratic representatives in the Bay Area Air Quality Management District

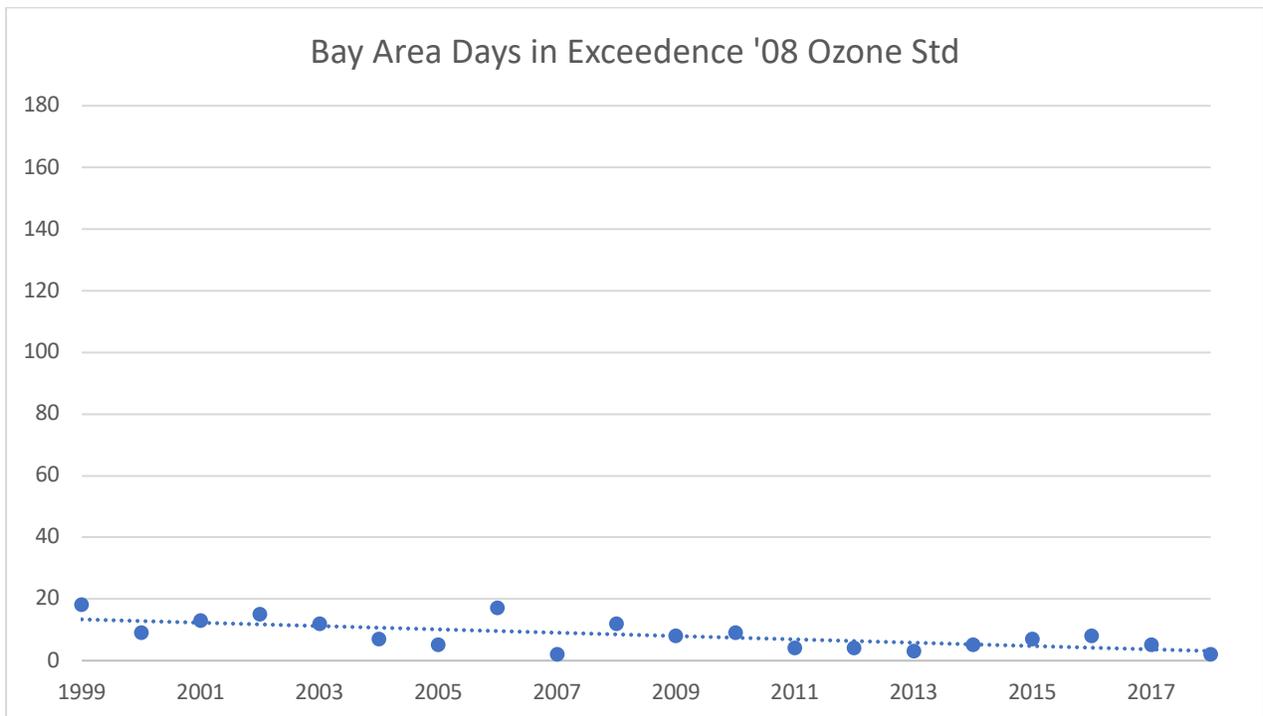


Figure 15 demonstrates the success of the Bay Area in addressing ozone pollution; the slope of the trendline is -0.541

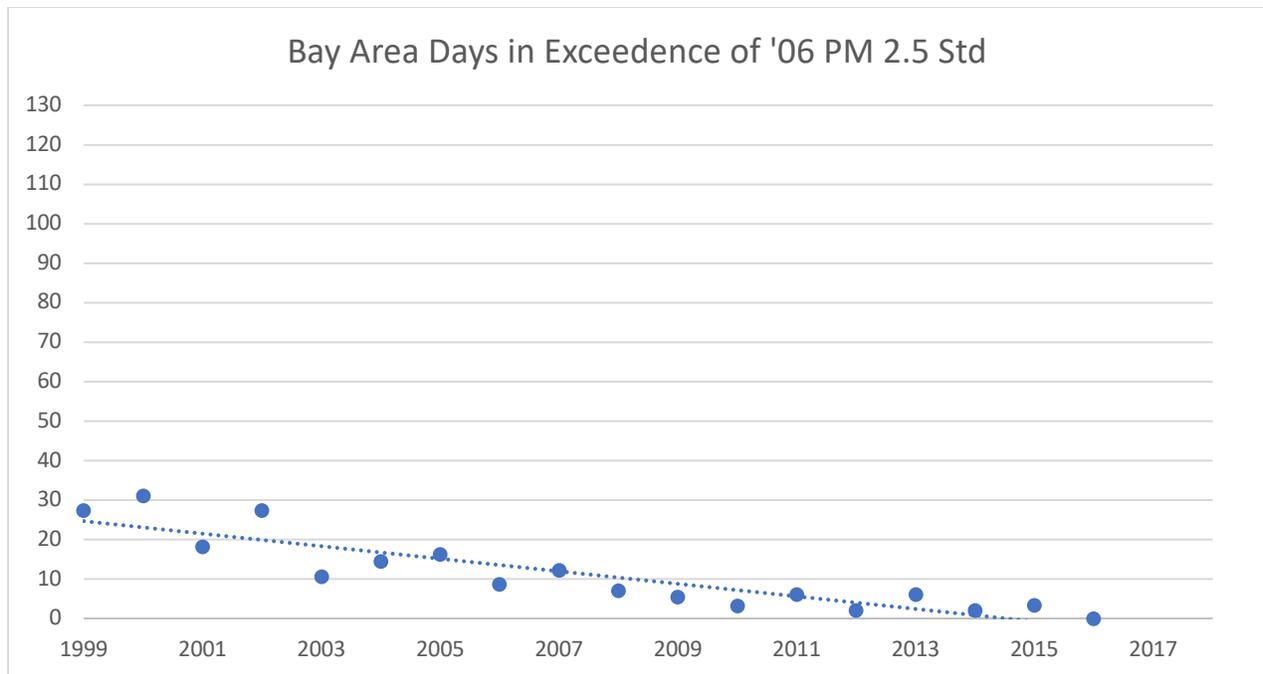


Figure 16 demonstrates the success of the Bay Area in addressing PM2.5 pollution; the slope of the trendline is -1.589

### iii. Discussion

There were several important revelations arising from the in-depth analysis of the membership of the Bay Area Air Quality Management District. First was the Bay Area's overall success in addressing air quality problems with both particulate matter and ozone reduced to near zero daily exceedances. Additionally, as the only control board in the sample to appoint representatives proportionally to population, they served as the best example of curtailing the corrupting influence of industry capture.

Though proportional and high-profile appointment seemed largely successful in staving off capture by any specific industry group, it was not eliminated entirely, but rather diluted in its prevalence and power. The specific instances of industry capture in the case of the Bay Area are particularly representative of the overall theory of capture put forward in Stigler (1971). Namely, that political affiliation, while helpful as a proxy for corrupting influence, is not a perfect indicator. For example, Supervisor Catherine Rice, a Democrat from Marin's 2<sup>nd</sup> District, who

touts environmental restoration and climate change as among her top priorities in office held between 10 and 100 thousand dollars in Exxon Mobile stock for at least three years while a member of the Bay Area Air Quality Management District. While it is impossible to prove these investments ever affected her voting decisions or policy prescriptions, it is undeniably in her personal financial interest to pass lenient policy in regard to regulating the oil and gas sector.

In the same vein, Marland Townsend a Mayor and Council member from Foster City who spent at least four years on the board and served as its Chair in 2005, had significant ties to the Saudi Arabian Oil company, Aramco. Townsend visited the country during his tenure as the board's Chair, receiving four days of tours of facilities in the Eastern Province, attending receptions and having meals with Aramco CEO, Abdallah S. Jum'ah. According to the article, which names Marland and his wife as "retired employees", Marland's wife had arranged three receptions for royal visits to Saudi Aramco. Again, it is impossible to prove definitively that this relationship with a large oil producer affected any of his decision-making as the Chairman of the Air Quality Management District, but loose regulations would certainly redound to his personal benefit.

Demonstrating the opposite party to interest group relationship, Erin Garner, a Mayor and Council member from Monte Soreno, is a Republican and Environmental consultant who currently serves as the Senior Geologist on the State Water Resources Board. As a politician he was committed to making Monte Soreno the most environmentally friendly town yet worked in the private sector for British Petroleum throughout his tenure. This made Garner's capture status the most interesting in the data set to discern. In the end, his position on a visible state level control board and roles within BP and other companies were decisive in coding his commitments as anti-pollution. The reasoning was two-fold: First, at BP, his official job title was

Environmental Business Manager, and his listed responsibilities included managing superfund cleanup operations, including the first successfully completed site clean-up in Oregon. Second, his appointment to the statewide mining and geology board, and his time as chairman there, were relatively high-profile positions, making it more personally costly to be aligned with polluting interests.

Returning to Vogel (2018) offers significant insight into the prevalence of real estate capture on the board as well as the high level of non-aligned membership. Recalling the historical example of the business coalition that inspired the creation of the air pollution control district in Los Angeles, wherein “the threat to the city’s growth posed by poor air quality was of particular concern to its economically important real estate industry”, demonstrates the expected value of regulatory capture in the direction of stricter regulations (Vogel 159). Importantly, Vogel emphasizes a “broad coalition of business interests” who had a pecuniary stake in air quality management, combining to thwart the large oil and manufacturing industries in the region (Vogel 160). In doing so, Vogel demonstrates a key constraint of the pollution/anti-pollution bifurcation employed so far. Namely, that the definition employed for the classification of anti-polluting interests is likely slightly too narrow to capture the full picture of regulatory influences. For the purposes of this study, that was done intentionally, to include only the businesses clearly and directly impacted by the consequences of pollution. More realistically speaking, a wide array of businesses benefit from clean air—pollution makes it hard to attract highly skilled labor and some evidence suggests it hurts worker productivity—meaning any highly skilled industry (like technology or finance) has an incentive to capture pollution regulation (Neidell, 2017).

The case of Erin Garner’s state-level appointed office led to a deeper observation about board composition that is particularly relevant in the Bay Area and South Coast. Broadly

speaking, appointment to more centralized boards, in essence being responsible to a greater number of constituents, raises the personal risks associated with violating the preference of the median voter. This potential relationship was alluded to in the literature, specifically by Wilson (1980) who argued that capture of high-salience areas raised the relative price of capture through increasing the personal risks for the captured representative. Being prone to distorting influence while in a position of high public visibility increases the likelihood of scandal, personal embarrassment and even imprisonment if the activity is particularly negligent. This is the mechanism that makes the disproportionate allocation of representation on boards to counties with low populations, as seen in the San Joaquin Valley and South Coast, particularly problematic.

#### **d. Comparison Case #1: South Coast Air Quality Management District**

##### **i. Executive Summary**

The composition of the South Coast Air Quality Management District registered significant capture by both polluting and anti-polluting industries, with a slight advantage in polluting industry representation. In total, there were 11 members with demonstrable ties to polluting sectors, 10 members with ties to anti-polluting sectors, and 14 members without alignment. Along with the mixed prevalence of industry influence, there was also a partisan balance to the board, with 21 identifiable Republican members and 16 Democratic members. Despite this mixed prevalence of polluting industry capture, moderate success on air quality was attained in the 18-year span, especially in comparison to the San Joaquin Valley. In regard to ozone, the South Coast made slightly less progress than the Valley, with an average yearly reduction of 1.67 days of exceedance. The difficulty addressing ozone pollution likely stems

from substantially greater mobile emissions and population, as documented in Figure 11. On the PM2.5 front, despite moderate capture, significant progress was made, with an average yearly reduction of 5.4 days of exceedance. The decline from 120 days in violation of the 2006 particulate matter standard to 9 in 2018 should be lauded, especially considering the disproportionate control the board has over particulate matter. Below are graphical representations of findings and a deeper discussion of the South Coast board membership.

## ii. Figures

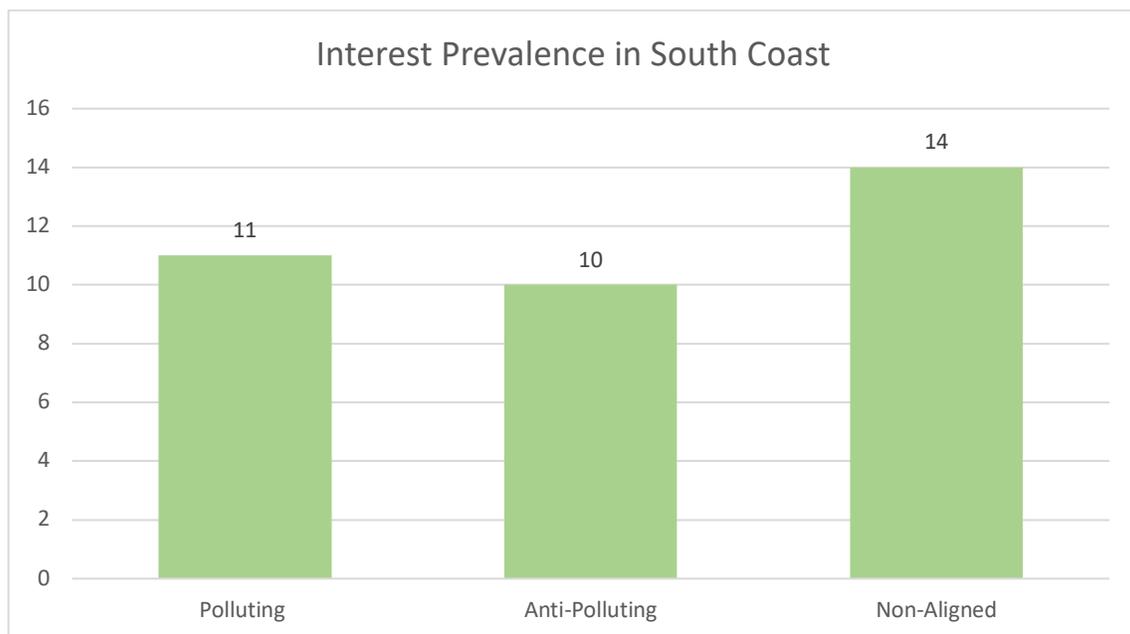


Figure 17 demonstrates a polluting industry advantage in board capture; both industry groups are represented in large number

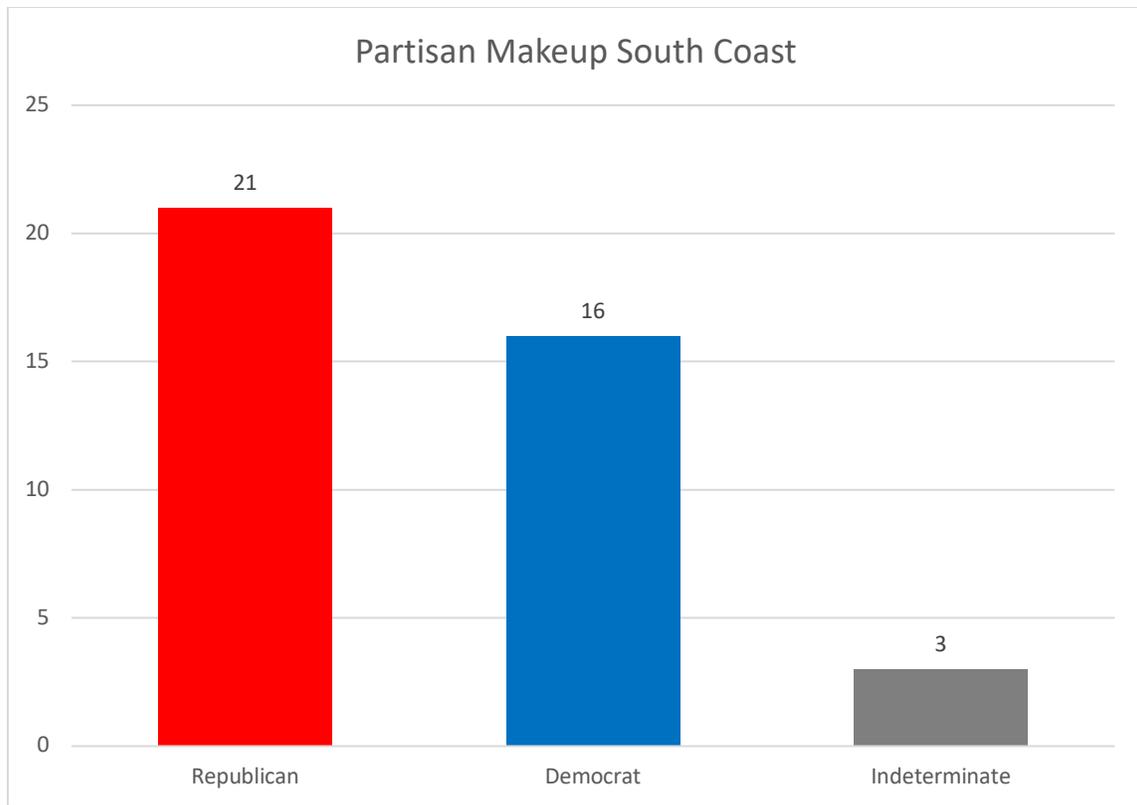


Figure 18 demonstrates a republican advantage in board representation, relatively bipartisan in comparison to the South Coast and Bay Area

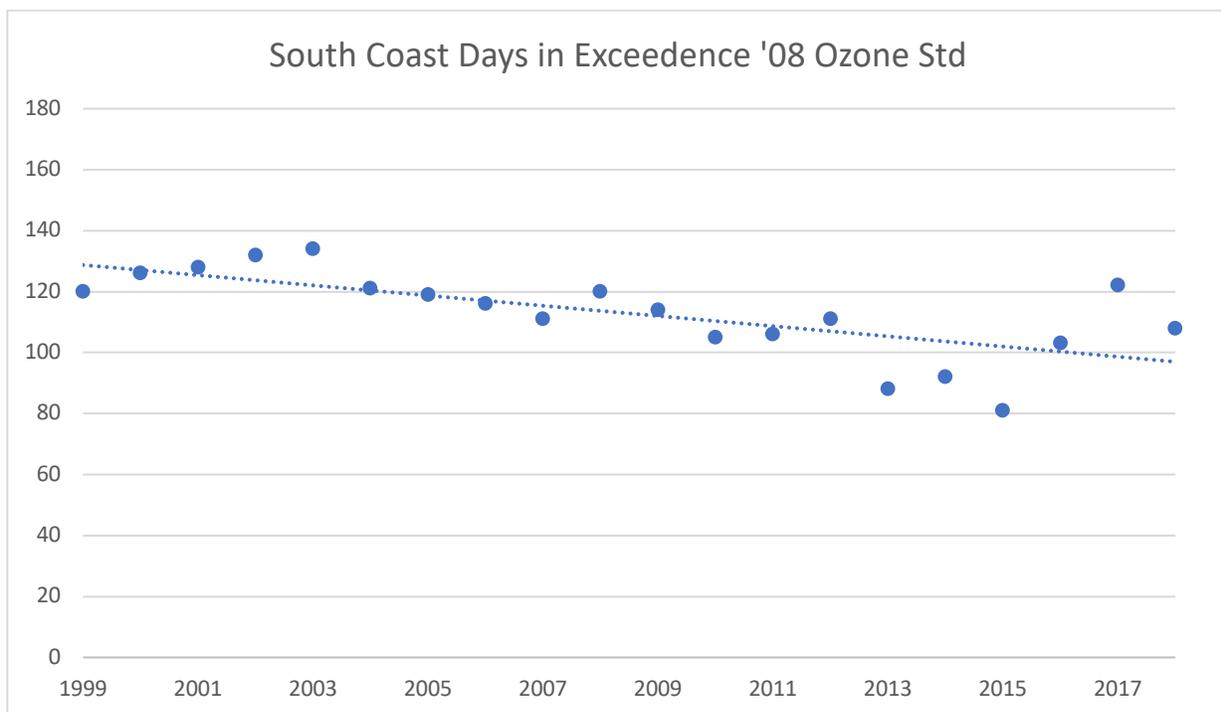


Figure 19 demonstrates a moderate downward trend in ozone pollution; the slope of the trendline is -1.671

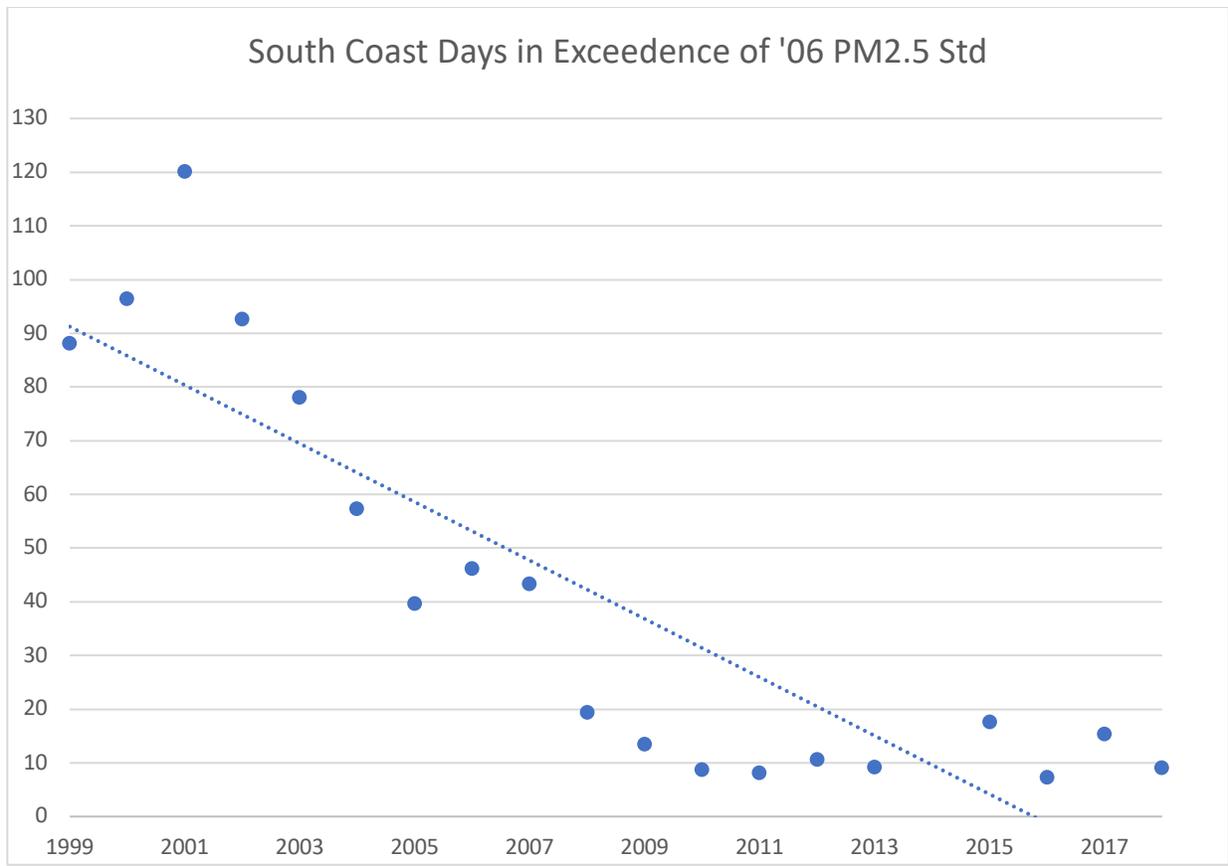


Figure 20 demonstrates a significant downward trend in PM2.5 pollution; the slope of the trendline is -5.443

### iii. Discussion

The insights yielded in the case of the Bay Area held true in the South Coast Air Quality Management District. The rather remarkable success in addressing PM2.5 pollution despite substantial representation of polluting interests on the board speaks to the inability of industries to form a winning coalition. Though not proportional to population, representation on the board was much closer to proportional than in the San Joaquin Valley. The mixed success in addressing ozone pollution was due to the board's limited ability to address mobile sources of pollution, which Figure 11 demonstrates, was nearly three times as high as the Bay Area or San Joaquin Valley. The population of the South Coast was nearly double that of the Bay and five times that

of the valley, which, coupled with the area's substantial sprawl, muted the board's previously constrained impacts on ozone formation.

Importantly, in the South Coast as well, party affiliation was not perfectly predictive of polluting or anti-polluting capture. For example, Joe Buscaino, a city councilor representing Los Angeles' 15<sup>th</sup> district, is a Democrat who has served on the board since 2013 while aligned with polluting interests. The presence of the Los Angeles port within his district's jurisdiction makes any impediments to the profitability of the industries there a non-starter. As a result, many attempts to place regulations on the port have failed. Despite the support of most other Democrats on the board, Buscaino pushed against attempts to regulate the port as an indirect source of emissions, which would have brought it under the regulatory authority of the Board. As with all other cases, it is impossible to prove that affiliations with emittive industries were the motivating force behind his decisions, but it is not a stretch to believe that Buscaino would not be in elected office without at least the tacit approval of these industries.

Personifying Vogel's historical observations of real-estate interests as anti-pollution advocates, the investigation of the South Coast produced members who were Republicans yet were affiliated with industries strongly opposed to pollution. Robert "Shawn" Nelson was a Republican Mayor and Council member of Fullerton who served nine years on the board after he was elected as the 4<sup>th</sup> District Supervisor of Orange County. While serving on the board, Nelson owned more than \$100,000 in real estate stocks, was the director of a real estate investment fund, and served as the real estate officer of SoCal Investors. If the contention that widespread pollution and industrial or extractive industries drive down property values holds true, then Nelson would have significant personal financial motivation in preventing pollution.

A far more insidious capture by real estate development interests occurred in the case of Bill Postmus, a 1<sup>st</sup> District Republican San Bernardino County Supervisor who spent two years on the South Coast governing board. Postmus is currently serving a three-year sentence at North Kern State Prison for accepting a \$100,000 bribe from a real estate company in exchange for voting to give them millions of dollars in a county lawsuit settlement. After pleading guilty to 15 charges, 10 related to bribery and others to narcotics charges, his extensive ties to the real estate industry in the region were revealed. While it is impossible to peg any specific regulatory decisions to these connections (aside from his conviction), it is conceivable that having a financial dependence on industries adversely affected by pollution would rationally influence votes to that end.

The South Coast board also yielded the most difficult member in the dataset to code. Jane Carney was identified as a Democrat from a 1992 run for assembly in the Riverside area. After significant research, she was assigned an alignment with polluting industries in the region. If there were any more ambiguity in her case, she would have been listed as indeterminate, but several articles pegged her as particularly friendly with industry. As an appointed member of the board, she was not responsive to any constituency, making her largely immune from political pressures. Without any record as a community activist, environmentalist, or any scientific or technological background, her motivations in pursuing board membership were very questionable. Upon more extensive research, the law firm she founded specializes in mergers and acquisitions and has experience with polluting industries. Her founding partner at the firm is State Senator Richard Roth who serves as the head legal advisor to the Airlift/Tanker Association. Cementing her relationship to industry, while holding a position as the Chair of the

refineries subcommittee, she advocated against enforcing the use of the best available emissions control technologies despite EPA mandates.

This led to the unique insight that appointed officials are not immune from industry capture and may be especially prone as a result of having no constituency to be responsive to. This pattern repeated itself among appointed members of the South Coast board, most egregiously in the case of Clark E. Parker whose partisanship status could not be determined. After more than seven years of service on the board, Parker was forced to resign when a Los Angeles Times exposé documented millions of dollars he had defrauded from the California education system through a vast charter school network scam. He is currently the subject of a 19-million-dollar lawsuit by the California Education Department for failing to provide the educational services he had promised. Additionally, both the masters and doctoral degrees he claimed, which were highlighted in South Coast Board official literature and communications, were proven to be from universities stripped of their accreditation for being “diploma mills”. Despite not being covered in any official news source, through extensive research it was uncovered that Parker and the longest tenured Chairman of the South Coast board, William Burke, own the racehorse Autumn Isabella together. When Parker officially resigned, he did so to pursue development opportunities and was in a directorship role with multiple corporate real estate development groups, cementing his alignment with anti-polluting industries.

#### **e. Comparison Case #2: San Joaquin Valley Air Pollution Control District**

##### **i. Executive Summary**

The composition of the San Joaquin Valley Air Pollution Control District revealed substantial capture by polluting industry influence. Of the 40 members with identifiable

backgrounds, 23 had conflicts of interest related to the polluting industries they were ostensibly charged with regulating. Only six members had biographies suggesting influence from anti-polluting backgrounds, and of those six, half were health specialists appointed by the California governor specifically for their bias against pollution. The partisan tilt of the board was also very substantial, with 34 Republican identified members and only 9 Democratic members.

This substantial and, for many years, majority presence of polluting industry influence on the board resulted in significantly stymied progress on particulate matter reduction. Over the period, the average daily exceedances of 2006 PM<sub>2.5</sub> standards decreased at a rate of 1.95 days per year. From a high of 84.9 daily exceedances in 2002, to a low of 25.5 in 2016, progress was 2.5x slower than the South Coast, despite nearly identical levels of initial pollution. In the context of ozone, more substantial progress was made than the South Coast, going from a high of 162 daily exceedances in 2001, to 76 in 2018 for an average annual deduction of 4.43 days per year. Due to the board's limited sway over ozone reduction and mobile emissions substantially lower than the South Coast's, it is difficult to say they outperformed the South Coast in this metric. Below are graphical representations of findings and a deeper discussion of the San Joaquin Valley membership findings.

**ii. Figures**

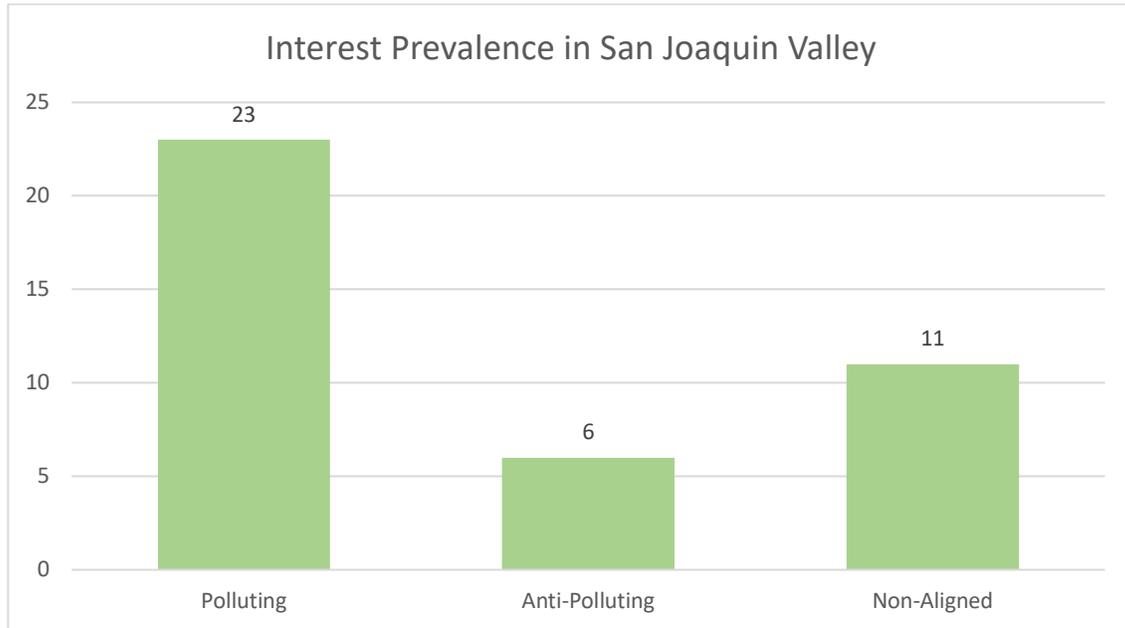


Figure 21 demonstrates the overwhelming capture of the San Joaquin board by polluting industry, the majority of identifiable interests

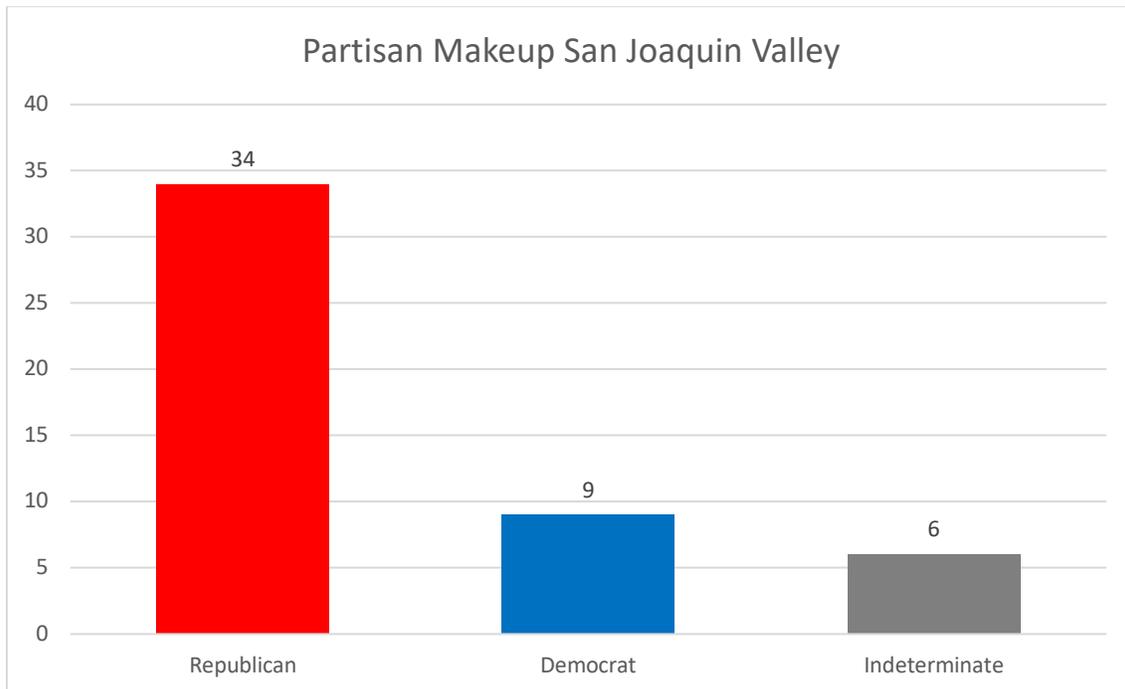


Figure 22 demonstrates an overwhelming presence of Republican interests throughout the board's history

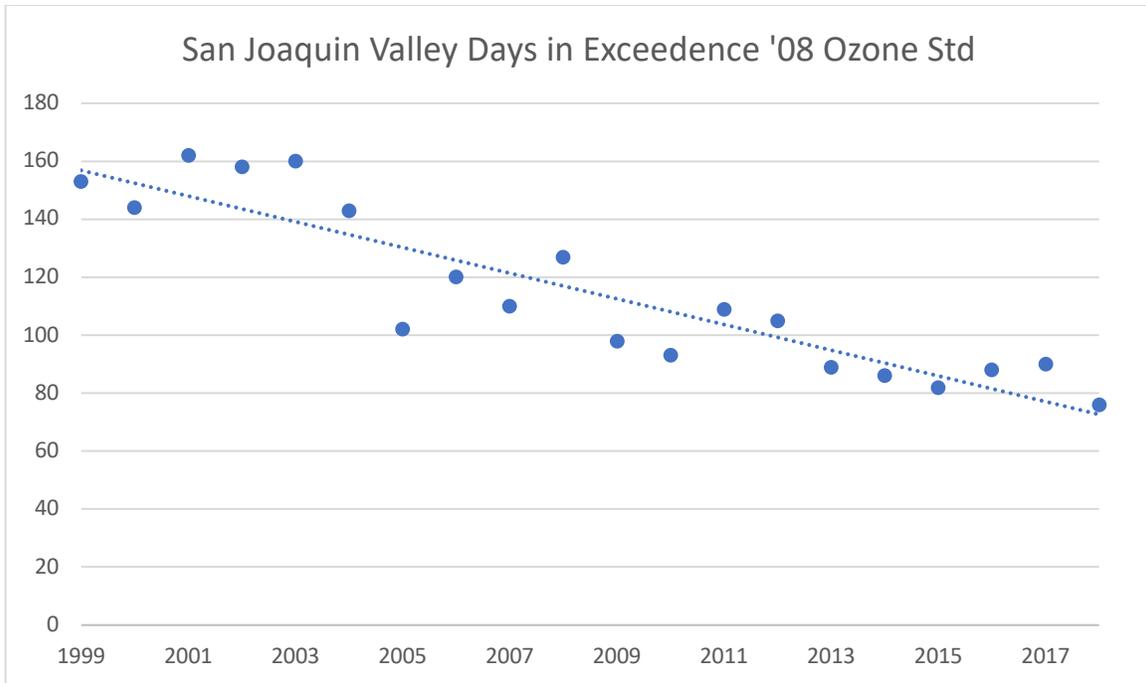


Figure 23 demonstrates moderate to significant success addressing ozone pollution; the slope of the trendline is -4.431

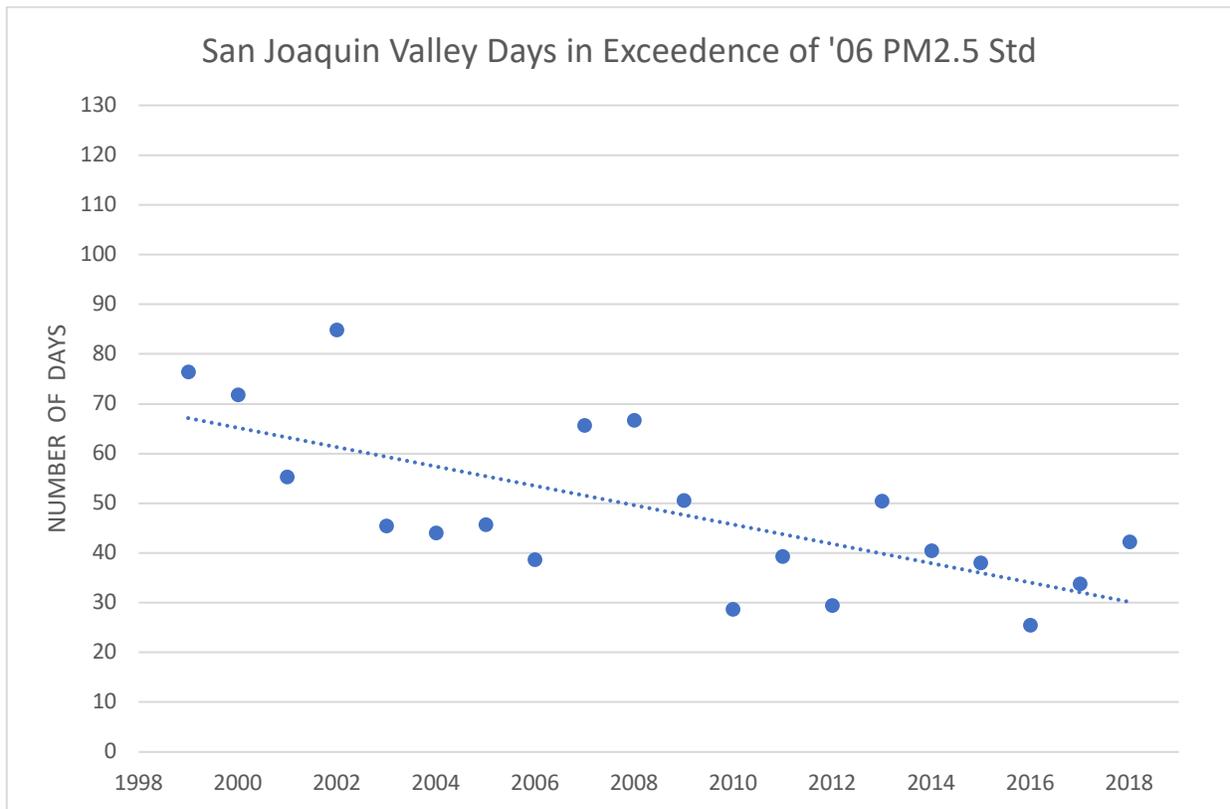


Figure 24 demonstrates low to moderate progress in addressing PM2.5 pollution; the slope of the trendline is -1.945

### iii. Discussion

The composition of the San Joaquin Valley Air Pollution Control District differed starkly from the Bay Area and the South Coast. Progress on PM<sub>2.5</sub>, the levels of which the board has disproportionate control over, appears to have been significantly stymied as a result of this capture. The relative success of ozone reductions in the region only appear when compared to the lack of ozone mitigation in the South Coast. With populations and mobile emissions roughly one third that of the Coast, the Valley's relative ozone success seems far more tame. With less control over ozone reductions, it seems far more likely that mobile source emissions reductions created by the state-level California Air Resources Board are to blame for the relative ozone success. Figures 25 and 26, originally published in the San Joaquin Valley 2018 PM<sub>2.5</sub> Attainment Plan, demonstrate the minimal reductions to stationary source emissions achieved over the 18-year period (San Joaquin Valley, *2018 Plan*).

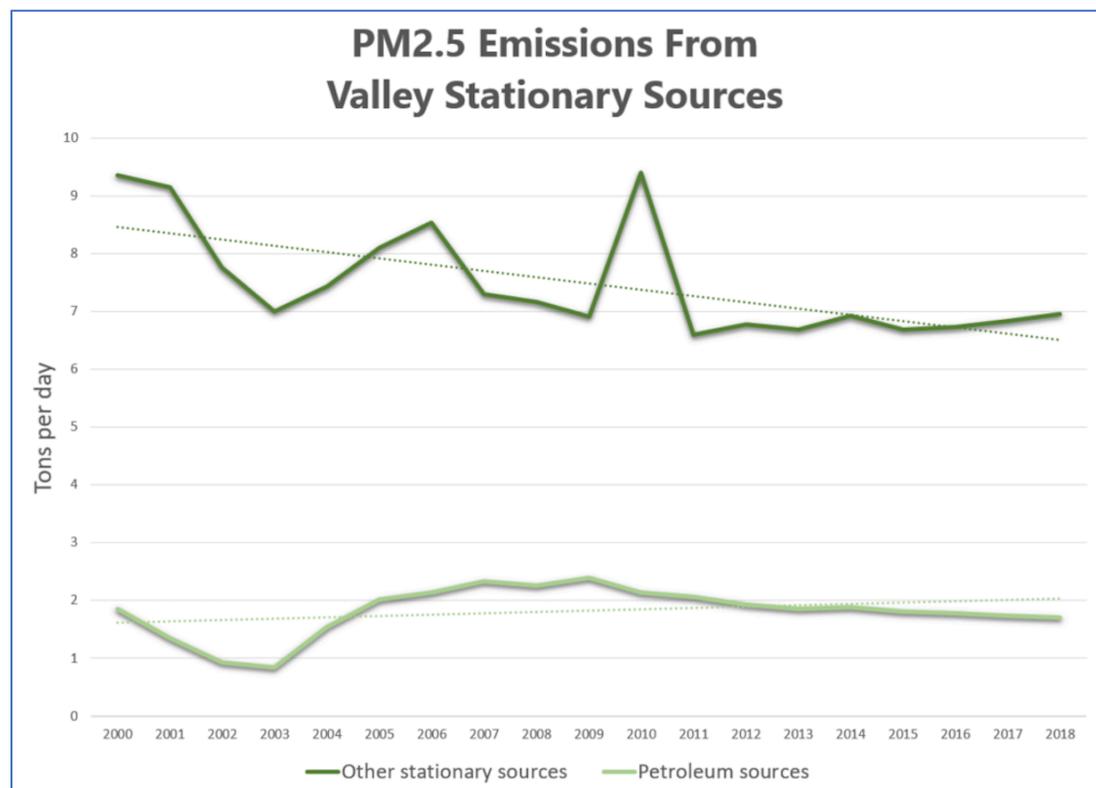


Figure 25 demonstrates a 2 ton/day PM reduction from stationary sources and a 1 ton/day increase from stationary sources over 18 years

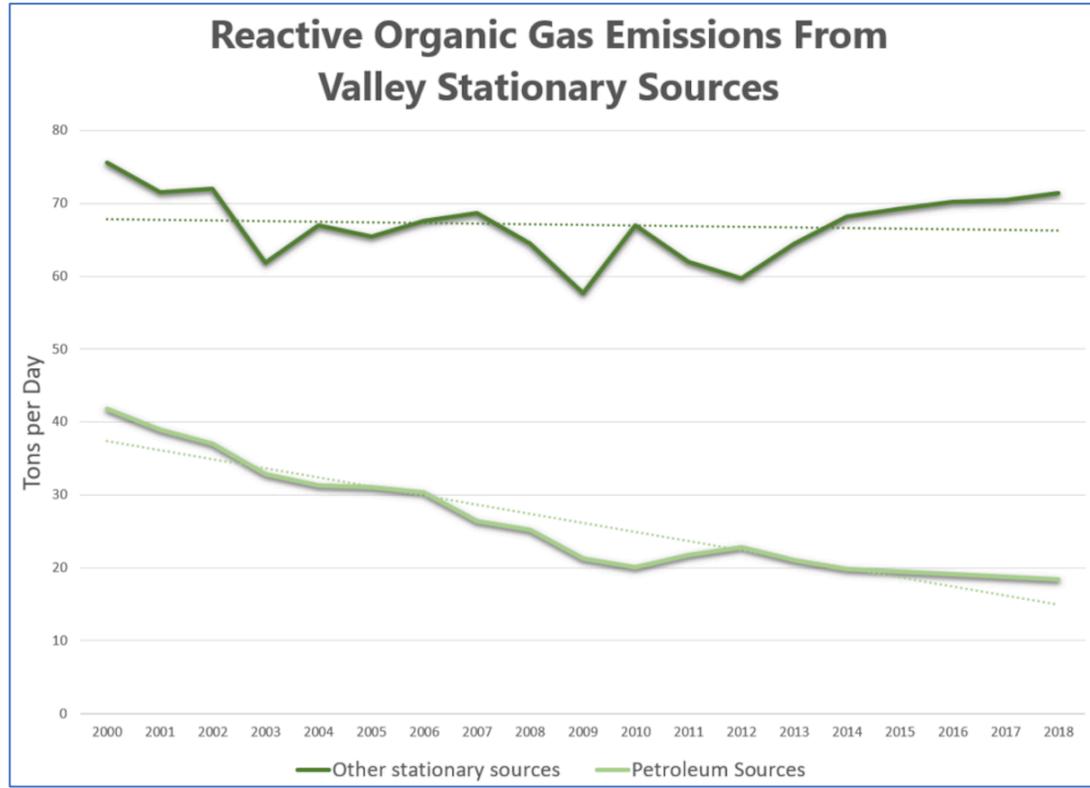


Figure 26 demonstrates a reduction in ROG (VOCs) from Petroleum sources but a nearly flat trendline for other sources

While the composition of the board represented far more capture on the whole, it again underlined the point that partisanship was not a perfect indicator of industry capture. For example, Henry Perea was a Democrat on Fresno's city council who used the position as a steppingstone before entering the State Assembly. Perea served on the San Joaquin Valley Air Pollution Control District for three years before taking a job as a lobbyist with the Western States Petroleum Association and eventually being employed in the same role by Chevron. While it is difficult to definitively say that his future employment had a bearing on his policy decisions, it seems unlikely that oil companies would employ someone who regulated them harshly.

Similarly, Harold Hanson a city councilor representing Ward 5 in Bakersfield served 5 years as a Republican member of the board. While officially employed as the President of Valley

Republic Bank, he also held positions as the Chairman of the Kern Economic Development Corporation and the President of the Petroleum Club of Bakersfield. The Kern Economic Development Corporation is a lobbying group producing whitepapers on fuel source opportunities and advocates for increased extraction in the region. While it is certainly conceivable that the President of the Petroleum Club would be a good faith regulator of extractive economies, it again seems unlikely.

While capture from the oil and gas industry was prevalent, capture by agriculture, a significant source of PM and nitrogen emissions in the valley, was also ubiquitous. Leroy Ornellas, a Republican Supervisor from the 5<sup>th</sup> District of San Joaquin County served six years on the board, including terms as both the Chair and Vice-chair. Ornellas is a third-generation dairy farmer in the region whose Form 700 Statement of Economic Interests documents two farms netting him more than \$2,000,000 in annual income along with a stake in a trucking company that bears his name. As the treasurer of the Dairy Farmers of America's Western Area, he represents a cooperative of 13,000 dairy farmers. While farming as an occupation, especially in the context of small familial farms is laudable, it would be hard to remain independent in regard to regulations that would impact his personal financial standing.

More openly antagonistic to regulatory progress was Jack "Stephen" Worthley, a Republican representative of Tulare's 4<sup>th</sup> District and former member of its city council. Serving the longest tenure of all the surveyed members, Worthley spent 15 years on the board after serving as a lobbyist for Sequoia Forest Industries, which specialized in removing timber from redwood forests. While a member of the board, he advocated for shrinking the Giant Sequoia Monument by nearly 70% because it impeded logging interests. He served as both Chair and Vice-chair of the board and, in 2018, created significant controversy in Fresno after video

emerged of him denying the existence of climate change in California. It is impossible to directly tie his relationship to extractive industries to any votes made on the air board, but again it seems unlikely he was acting in accordance with the preferences of the median voter he represented.

Perhaps the most glaring example of capture in the case of the San Joaquin Valley comes by way of an audit that is currently being undertaken by the California Air Resources Board. After environmental groups funded an inventory of the valley's Emissions Credit Reductions (ERC) bank and found more than half of all the credits to be fraudulent in some capacity, the state was forced to intervene. The credits are intended to reward companies that go beyond their pollution reduction requirements with credits for the pollution they save, which can be redeemed to pollute additional tonnage at later points. Under District Rule 2201, a unique alteration only existing in the regulatory language of the valley's ERC bank, emissions credited are only required to be surplus at the time of issuance, meaning credits obtained for a reduction in 1990 are valued in perpetuity regardless of whether that reduction is still considered above and beyond current emissions standards (Steinzor & Baizel 7). The group found 56% of all credits in the bank, and 96% of credits held by energy companies to be fraudulent in this regard (Steinzor & Baizel 19). As a result, Chevron's emissions have increased in the time since they obtained the credits despite ostensibly being subject to forced reductions under the statewide cap and trade program (Steinzor & Baizel 21). When the rules around regulation are as esoteric as District Rule 2201, there is no doubt they constitute a "thin political market" under Ramanna's definition, prone to capture by the industry they're intended to regulate (Ramanna 2015).

## 6. Conclusion

This analysis employed a market-based understanding of regulatory structure, pioneered by Dal Bó (2006) and the insights of Stigler (1971), wherein regulations occur specifically at the direction of and benefit for the industries being regulated. When this capture thwarts the preferences of the median voter, it represents a distortion of the regulatory system whose improper functioning threatens the lives of citizens and robs them of democratic self-determination. To investigate these theories in a tangible situation, an extensive biographical analysis of regulatory authorities in the San Joaquin Valley, South Coast, and Bay Area Air Quality Management Districts was undertaken. All said, the dataset covered all board members since 2002 who represented 49% of the nationwide counties designated as out of attainment of national air quality standards established by the Environmental Protection Agency, and 71% of the counties out of attainment in California. Estimates by the California Air Resources Board indicate that 14,000 to 24,000 die prematurely on an annual basis as a result of the pollution in these regions, disproportionately those of racial minorities and the economically disadvantaged (CARB, *PM Mortality*).

This analysis grouped local industries into “polluting” and “anti-polluting” based on the likely effect of regulation on their direct economic interests. In the Bay Area, of 68 members investigated, 3 had affiliations with polluting industries, 16 with anti-polluting, 39 were not aligned with either, and 10 lacked sufficient evidence to make a determination. In the South Coast dataset of 40 board members, 11 were aligned with polluting interests, 10 with anti-polluting, while 14 were non-aligned, and 4 others could not be determined. In the San Joaquin Valley, of 49 members surveyed, 23 were found with significant connections to emittive industries, 6 were affiliated with anti-polluting industries, 11 were non-aligned, and 9 lacked

sufficient evidence to be determined. All said, 157 regulatory officials were investigated with 37 demonstrably connected to the industries they were intended to regulate, 32 were connected to economic interests opposed to pollution, 64 were non-aligned, and 23 lacked sufficient evidence to be categorized. Three to four regulators were selected to discuss at length because of their personification of the theoretical principles advanced by Stigler, Vogel, and others. While this subset was constrained, these members are representative of the larger trends observed in each district, with each captured member having substantial but somewhat varied degrees of relationship with a given industry.

As hypothesized, the case of the San Joaquin Valley showed a distinct lack of progress on air quality issues, particularly in the realm of particulate matter over which the board exercises the most authority. The ability of polluting interests to assemble a majority of regulators on the board for several different years was likely responsible for their uniquely low rates of air quality progress. This demonstrates one of the underlying difficulties in assessing political capture, namely, that internal mental states are impossible to prove. While it seems highly likely that being financially dependent on extractive industries would influence regulator's decisions, there is no way to definitively prove this is the case. The best that can be done is what has been done here; the assemblage of a body of evidence that puts forth the most probable determination given the findings.

The results of this study, in combination with contributions from the critical ecological and common pool and public resources literatures, demonstrate important and inescapable facts about resource exploitation and its socio-environmental consequences. Contributions by Foster (2014) and Ostrom (1997) demonstrate the declining marginal improvements of technological approaches to emissions reductions and the unique harms created by a centralized agricultural

production system. The specific concentration and consolidation of agricultural interests in the Central Valley create the conditions that degrade air quality while simultaneously preventing its amelioration. The co-location of money and political power creates the conditions for capture, baking path dependence into the regulatory process. Once the air has been degraded by agricultural and oil interests, those interests have already accumulated the financial capital required to exert control over regulatory processes, preventing the fractured and localized regulatory state from acting in accordance with the preferences of the median voter.

Foster (2014) also helps drive home the point that a portion of air quality progress has only occurred by means of exporting the production of goods overseas. But, as the pandemic that has set upon the globe in the course of writing this thesis has proved, not all production can or should be exported. As a result, not all of the emissions associated with the production of those goods can be exported, either. Foster demonstrates the insidious feedback mechanisms of such a system, wherein polluting interests are located near their sources of labor, degrading property values, impoverishing those who live there, further attracting those with limited economic resources, in turn further attracting more polluting industry. Multiple, compounding disadvantages impede the proper functioning of democratic systems of redress, exacerbating the political asymmetries between impoverished communities and racial minorities and the industries who employ them while polluting their communities.

This leads to two other fundamental discoveries of this study. First, it offers some empirical evidence for the theory of Moore & Giovinazzo (2012) of the conditions under which regulatory centralization will produce greater aggregate welfare. They describe scenarios in which interest groups are moderately present and opposed to the median voter as situations in which greater protection is offered by a centralized regulatory body. Second, these results also

provide evidence for the theory of regulatory incentives advanced by Wilson (1980). Specifically, that high salience issues and officials are less likely to succumb to regulatory capture because of greater personal, reputational, and legal risk in the case their capture is discovered. The relative lack of capture in supervisors representing more populous counties across the dataset offers some evidence in favor of the theory. If Wilson's theory had empirical backing, it would represent another argument for the centralization of regulatory authority, as state-level officials occupy offices of greater salience—while this would not eliminate all regulatory capture, it would largely confine it to the esoteric domain of “thin political markets” as described by Ramanna (2015).

With this evidence, a strong argument can be made that centralized, state-level regulation of air quality in California's San Joaquin Valley is the only way significant progress on air quality will ever occur. As it currently exists, all incentives are aligned against proper regulation and without centralized government oversight, localized factions tied to polluting industry will exercise their power over regulatory instruments to the unique health detriment of the local community. The path dependence and multiple, compounding socio-economic disadvantages aligned against community organization, will be impossible to negotiate from within local structures. Therefore, the responsibility falls to officials at the state level to intervene, correcting policy to correspond with the preferences of the Central Valley median voter in the name of social, economic, and environmental justice.

## 7. Future Research

Having attempted an analysis that does not currently exist in the capture literature, there were distinct shortcomings and many opportunities for further research. First, the primary drawback of this study was potentially over constraining the anti-pollution classification. Limiting the qualification to real estate, tourism, and health/environmental professionals may have been slightly too narrow to represent the coalitions formed in regulatory decisions. Recalling the case study that prompted the classification, Vogel (2019) listed three specific industries as parts of a broader coalition of business interests that pressured Los Angeles County officials to take drastic measures limiting pollution. In reality, a wide array of business industries would have varying degrees of vested interest in reducing pollution and it is unclear how industries whose profits are not directly or obviously affected by air quality would seek input in the regulatory process. Having a better understanding of cross-industry collaboration and the formation of interest group coalitions may offer more insight into this process. While this constraint likely accounts for a good number of the non-aligned prevalence on the Bay Area and South Coast boards, a generalized income control could shed additional light on regulatory decisions. In places with exceptionally high property values with low levels of economic reliance on polluting industry, there is reason to believe that the opposite feedback mechanism identified in the Central Valley is at play. Polluting industries are pushed away from high income areas by land use ordinances and other political actions, increasing property values, attracting high earning residents, who in turn redouble the push toward clean air.

Additionally, being able to control for some of the limitations discussed prior to the results, could do a significant amount to decrease noise in the case comparisons and provide a clearer picture of the effects of capture on air quality outcomes. While it seems highly unlikely

that a better topographic comparison than Los Angeles and the San Joaquin Valley is possible, it can't be ruled out entirely. More specifically, if there is a better way to evaluate the rate of diminishing returns in regard to air pollution control measures, or account for the rate at which production dependent emissions are being off-shored, that could better illustrate the relative success of the boards in addressing their air pollution problem.

Expanding the diversity of the case study sample also represents an area of potential improvement. There are eight other California counties out of attainment of national air quality standards that are not included in this dataset. Investigation of those areas, particularly counties with small populations and small regulatory boards, offers a unique opportunity to create a very complete picture of air quality regulation and the prevalence of capture in California.

Finally, more work needs to be done in order to separate the variance in air quality between boards that is purely a result of their different representative appointment structures. To a degree this issue is not separable from capture itself, as captured members have an incentive to maintain the current political structures that led to their occupation of positions of power. In the same vein, a closer examination of the high-profile capture phenomenon, wherein the relative stakes of being captured increase in proportion to constituency size and make capture less likely, could provide strong evidence for the centralization of regulatory decision making under certain circumstances.

If the regulatory apparatus of California and the nation as a whole were to internalize the prevalence of capture on air quality regulatory boards, there would be an impetus to treat the symptoms of air pollution, knowing that attempts to address the causes would be opposed and diverted by the prevalence of industry groups. Theoretically, there would be no opposition to addressing the consequences of pollution on health from industries as it wouldn't threaten their

productive capacity and total economic throughput. Intuitively, they may actually be incentivized to address the direct health consequences of pollution in order to divert popular sentiment away from the conspicuous health impacts of prolonged pollution. In more tangible terms, this may look like the research being conducted by Stanford's Sean N. Parker Center for Asthma research, which is looking at the health benefits of home air purifiers, especially in low income communities. If it turns out that purifiers substantially reduce the health consequences of pollution, incentive programs for their purchase, or wide scale distribution by air districts may represent an immediate improvement to health in polluted places, without being subject to the impeding forces of capture.

The individual-level, biographical approach to capture study has opened multiple doors for additional research and highlighted paths of least resistance within existing regulatory frameworks. If governments are committed to the health of their populations, these insights may prove beneficial to the health of many.

**All datasets are available for public access on request. Email [ccannedy@stanford.edu](mailto:ccannedy@stanford.edu) for inquiries.**

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