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Second-Order Devolution or Local Activism?: Local Air Agencies Revisited

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Abstract

In response to calls from previous scholarship for further bottom-up examination of local government roles in environmental policy, the authors revisit local air agencies to examine two separate phenomena occurring in environmental federalism: one from the top-down (second-order devolution) and one from the bottom-up (local activism). Using survey data from local air agencies on devolved authorities to set air quality standards and to enforce federal and/or state standards, the authors identify three different types of local agencies: state administrative sub-units (only enforcement authority), fully devolved agencies (authority to both set and enforce standards), and activist agencies (neither authority). Further findings indicate that state administrative sub-units and fully-devolved agencies are likely functions of second-order devolution, while activist agencies are likely functions of local activism. Conclusions suggest that both top-down and bottom-up approaches to environmental federalism are shaping local government roles in environmental management.

Introduction

Although federal-to-state devolution (i.e., first-order) has been a key component of U.S. environmental policy since the 1970s, state-to-local devolution (i.e., second-order) receives little attention as a tool of intergovernmental environmental management (Woods and Potoski, 2010; Bowman and Kearney, 2011). However, in examining local air agencies, Woods and Potoski (2010) conclude that variation at the local-level can potentially provide important insights into environmental federalism that state-focused research cannot, and as such, local environmental agencies deserve further examination. The U.S. Clean Air Act (CAA) serves as a textbook example of these trends, where the U.S. Environmental Protection Agency (EPA) sets minimum national standards, states develop plans to achieve standards, and local governments are largely overlooked. As such, the mass of scholarship is state-centric with few analyses of local-level variations (Ringquist, 1993; Potoski and Woods, 2002; Konisky and Woods, 2010; Woods and Potoski, 2010; Fowler, 2016). Nevertheless, analyses that do exist indicate that local air agencies are innovative, responsive to both socio-political and technical challenges, and have a positive impact on air quality (Woods and Potoski, 2010; Fowler, 2016, 2018). Furthermore, second-order devolution can serve important political and administrative purposes for states by providing local implementation capacity or opportunities to shift responsibilities and avoid blame for program performance (Woods and Potoski, 2010; Bowman and Kearney, 2011).

However, second-order devolution may only explain a portion of local air agencies, as some lack authority for either setting standards or enforcing federal and/or state standards. Consequently, other trends in intergovernmental relations may partially account for their emergence. In this vein, some scholars suggest that local governments are prone to innovative approaches to complex policy problems when faced with policy challenges or institutional barriers, such as those created by state-centric federalism (Agranoff and McGuire, 2001; Feiock and Scholz, 2009; Riverstone-Newell, 2013). Accordingly, we revisit local air agencies to determine: when local air agencies exist, what factors are associated with their different forms? We argue variations are driven by two separate phenomena in environmental federalism: one from the top-down (second-order devolution) and one from the bottom-up (local activism). We use data on devolved authorities to set air quality standards and to enforce federal and/or state standards to identify three different types of local agencies: state administrative sub-units, fully devolved agencies, and activist agencies. Then, we examine how second-order devolution and local activism explain patterns of devolved authorities. We find that state administrative sub-units are more common when policy challenges are greater and state institutional control over local governments is weaker, and fully-devolved agencies, when there is a strong presence of political interest groups.

On the other hand, activist agencies are more likely where there is limited state capacity to manage air quality and high availability of local resources. We conclude that both top-down and bottom-up approaches to environmental federalism are shaping local governments roles in environmental management.

Second-Order Devolution or Local Activism?

Second-Order Devolution

In federalism, devolution is the transfer or delegation of responsibilities and functions from a higher-level government to a lower-level government, with first-order referring to federal-to-state delegation and second-order to state-to-local delegation (Conlan, 1998; Woods and Potoski, 2010; Bowman and Kearney, 2011). Devolution became a prominent feature of intergovernmental relations with President Ronald Reagan's "Devolution Revolution," which created a state-centric approach to intergovernmental management by shifting program authority from federal agencies to states. Consequently, states had more control over designing and implementing national programs and in directing local government roles and responsibilities; however, this led to variations among states which contributed to differences in programs and policy outcomes. Most commonly, these trends are discussed within the context of social programs, such as welfare. However, devolution has been a key feature of environmental federalism since the 1970s with state power expanding in new iterations of legislation, such as the CAA of 1970 and subsequent amendments in 1977 and 1990 (Ringquist, 1993; Cho, Kelleher, Wright, and Yackee, 2005; Conlan, 2006; Lowi, 2006; Woods and Potoski, 2010).

Although a majority of scholarly attention has focused on first-order devolution, some scholars previously recognized the important implication second-order devolution has for federalism and intergovernmental management (Cho, Kelleher, Wright, and Yackee, 2005; Woods and Potoski, 2010; Bowman and Kearney, 2011). These scholars generally argue that states devolve powers to local governments for two reasons. First, states may need to access local implementation capacity to compensate for state-level deficits, where local governments have more refined information, administrative processes, and resources to overcome local socio-economic, political, or technical challenges (Agranoff and McGuire, 2001; Gainsborough, 2003; Cho, Kelleher, Wright, and Yackee, 2005; Woods and Potoski, 2010). Second, states may want to shift blame for program shortcomings by redirecting policy and/or administrative decisions to local governments, with pressure from political interests expected to follow (Volden, 2005; Woods and Potoski, 2010). However, devolution creates information asymmetries and reduces state control over implementation processes, which may lead to transaction costs, inefficiencies, and program failures. For example, local managers may overstate problem severity in order to extract more resources from state agencies, or use lax enforcement to satisfy business interests (Moe, 1984; Waterman and Meier, 1998; Wood and Bohte, 2004).

From the local perspective, while second-order devolution typically does not include adequate resources from states to compensate for new responsibilities, local governments may be willing to trade some independence for additional authorities in order to better adapt state programs to local needs (Woods and Potoski, 2010; Bowman and Kearney, 2011; Riverstone-Newell, 2017; Langan and McFarland, 2017). Nevertheless, local governments tend to have few avenues to resist devolution as states wield coercive tools, such as preemption and control over resources (i.e., fiscal federalism) (Bowman and Kearney, 2011; Riverstone-Newell, 2017). Furthermore, some states possess more authority over local governments than others. In general, local governments in Home Rule states have broad policymaking authorities, while in Dillon's Rule states, they have narrow authorities that are explicitly defined by the state legislature (Kraine, Rigos, and Hill, 2001; Richardson, 2011).

A key issue here is which level of government possesses policy-making authority. For instance, in the top-down form of second-order devolution, states treat local governments as administrative sub-units with local program managers serving primarily as compliance managers and having few opportunities for independent policy action. On the other hand, in the donor-recipient form, states treat local governments as partners. Subsequently, local governments have more power to negotiate and bargain how programs function within their jurisdictions, but also take on more accountability for performance and become more vulnerable to political interests (Agranoff and McGuire, 2001; Cho, Kelleher, Wright, and Yackee, 2005; Woods and Potoski, 2010). While both forms of second-order devolution serve important administrative and political purposes, differences carry important implications for where policy-making authority is concentrated within intergovernmental systems (Agranoff and McGuire, 2001; Woods and Potoski, 2010; Bowman and Kearney, 2011).

As such, some scholars contend that bottom-up perspectives may provide important insights into second-order devolution that are missed by state-centric analyses (McGuire, 2006; Woods and Potoski, 2010; Mills and Gore, 2016). For instance, Bowman and Kearney (2011) find that city managers are generally more negative in their perceptions of state-local relationships than state legislators. Specific to local air agencies, Woods and Potoski (2010) argue that "aggregating to the state level may obscure several important features of environmental policy implementation, and that a greater focus on the role of local agencies is warranted" (p. 734). To this point, there is a growing body of literature on local-level variations in intergovernmental management and policy choices. Importantly, this literature places emphasis on blurring distinctions between state and local policy-making authorities (Feiock and Scholz, 2009; Langan and McFarland, 2017).

Local Activism

Although scholars offer different perspectives on political and administrative explanations of local activist behavior, they are consistent in contending that some local governments are using their policy authority to strategically design and administer policies that challenge conventional federal systems when faced with legal, fiscal, institutional, or political constraints (Agranoff and McGuire, 1998; Feiock and Scholz, 2009; Langan and McFarland, 2017; Riverstone-Newell, 2012). In general, scholars indicate there are two factors that drive local activist policy choices. First, local governments respond to deficiencies in state policies or administrative actions. In many cases, when states fail to adequately address a policy problem it leads to increased pressures on local governments to act (Agranoff and McGuire, 1998, 2001; Volden, 2005; Shipan and Volden, 2006, 2008; Feiock and Scholz, 2009; Riverstone-Newell, 2012, 2013; Becker, 2017). Second, local governments respond to the service marketplace. From a political perspective, this response occurs when local governments try to align policies with political or social values in order to attract citizens and businesses to their jurisdictions (Agranoff and McGuire, 1998, 2001; Volden, 2005; Shipan and Volden, 2008; Riverstone-Newell, 2012, 2013). From an administrative perspective, the service marketplace may breed competition between agencies to improve public services, or it may create opportunities for collaboration with other agencies in order to overcome institutional barriers (Agranoff and McGuire, 1998, 2001; Brown and Potoski, 2003; Wood and Bohte, 2004; Chen and Thurmaier, 2009; Feiock, 2009; Feiock and Scholz, 2009; Kwon and Feiock, 2010).

This behavior is particularly important in environmental federalism, where problems transcend jurisdictional boundaries and effects are heterogeneously distributed across regional areas (i.e., states) (Ferraro, 2003). Additionally, most major environmental policies rely on legislative frameworks that focus on aggregate outcomes and/or management strategies developed at a level that is disconnected from local impacts. On the other hand, communities are increasingly branding themselves as "green" in response to emerging socio-political values that favor environmental amenities, adding pressure to adopt innovative policies (Levinson, 2003; Kunce and Shogren, 2005; Wu, 2006). As such, goal incongruence and moral hazards tend to emerge as state governments are incentivize towards different behaviors than local governments (Waterman and Meier, 1998; Brown and Potoski, 2003; Ferraro, 2003; Burby, 2006; Birkland and Waterman, 2008; Samson, Berteaux, McGill and Humphries, 2011).

Consequently, environmental issues create acute challenges to federalism and divergent incentives for state and local actions. As such, scholars find evidence of local policy activism in other complex environmental challenges, such as climate change (Sharp, Daley, and Lynch, 2011; Krause, 2011, 2013; Gerber, 2015; Kalafatis and Lemos, 2017), energy (Byrne, Hughes, Rickerson, Kurdgelashvili, 2007; Davis and Hoffer, 2010; Davis, 2014), and watershed management (Tarlock, 2002; Lubell and Fulton, 2008). For instance, Davis and Hoffer (2010) finds that county commissioners "can facilitate or slow the construction or siting of energy-related projects within county boundaries… [and] have increasingly assumed a greater number of policymaking responsibilities over time" in regards to energy issues (p. 308). Krause (2011, 2013) also finds that local governments engage in bottom-up policymaking in climate change policy in response to a lack of federal or state leadership. Nevertheless, local governments are more likely to engage in policy activism when there is a lack of clear federal or state regulatory structures, or existing regulatory structures have failed to adapt to emerging problems (Feiock and Scholz, 2009; Krause, 2011, 2013; Riverstone-Newell, 2013).

Local Air Agencies

The CAA is managed under a federal-state partnership. EPA sets minimum air quality standards for the nation and general regulatory rules that govern programs. On the other hand, states establish specific air quality standards within their jurisdictions that either meet or exceed national standards, and develop implementation plans to achieve those

standards (Belden, 2001; Woods and Potoski, 2010; Fowler, 2016). This creates a partial preemption system that "allows the federal government to grant program responsibility to states, while retaining the ultimate authority to decide on the adequacy of state action" (Woods and Potoski, 2010, p. 724). While EPA retains oversight authority, states have significant discretion in developing State Implementation Plans (SIPs), which dictate how programs operate (i.e., pollution control strategies). In general, EPA is wary of revoking state program responsibilities, which has caused states to use SIPs as a political tool. More specifically, when conflicts emerge, EPA prefers to negotiate program adjustments, rather than rely on coercion to force compliance. As a result, states have significant leverage in modifying programs to align with their interests and capacities (Crotty, 1987; Derthick, 1987; Belden, 2001; Woods and Potoski, 2010).

Previous research indicates this is particularly true for determining the role of local governments. States may devolve authority to existing local governments, create special purpose districts specifically for air quality, or preempt local governments from setting or enforcing standards. In the case of the first two options, states design SIPs so that local governments or special purpose districts are responsible for setting or enforcing standards within their specified jurisdictions. This version of second-order devolution largely mimics the relationship between EPA and the states. In other words, states delegate authorities to establish air quality standards that either meet or exceed minimum national requirements and design procedures to enforce those standards to local agencies. However, if SIPs completely disregard local governments (i.e., neither outlining a role or preempting them), they can still develop pollution control strategies or emission regulations outside of state efforts, based on their existing authority as a governmental unit. Typically, when this happens, these agencies rely on initiatives like transportation or energy planning, or regional cooperation agreements, rather than more conventional command-and-control regulatory strategies. In general, how states design their SIPs determines how much space there is for local policy in air quality management (Lester and Lombard, 1998; Woods and Potoski, 2010; Fowler, 2016, 2018).

The National Association for Clean Air Agencies (NACAA) lists 118 local-level members (including Washington, D.C.) in 26 states, with 38% county, 18% city, and 45% regional agencies (NACAA, 2018). Although air quality is the most common predictor, previous research indicates local air agencies are more likely to exist in states with decentralized operations and urban areas that are geographically scattered. In most cases, these tend to be indicators of state resources being dispersed across air quality monitoring sites, so local governments fill gaps by taking on more responsibility in specific areas state agencies struggle with (Woods and Potoski, 2010; Fowler, 2018). However, local air agencies do not exist in 24 states (NACAA, 2018). Most obviously, this occurs in states that explicitly preempt local governments from air quality regulations via SIPs, which excludes them from this policy area. In other states even where they are not preempted, local governments may still not be active in this policy area. This is likely most common where air quality is not an issue, so there is little incentive for local governments to innovate, regardless of state. Nevertheless, these issues are underexplored in current scholarship efforts (Lester and Lombard, 1998; Woods and Potoski, 2010; Fowler, 2016, 2018).

Woods and Potoski (2010) provides the most detailed examination of local air agency to date. More specifically, they find only a few states allow local agencies to set air quality standards, compared to nearly 40% that allow local inspection and enforcement actions. However, they rely on survey data from 2000, and other scholars suggest local agencies have become more active in recent years (Fowler, 2016, 2018). Importantly though, Woods and Potoski (2010) argues that setting "air standards is an activity that allocates resources among competing claimants…[while] enforcement programs are central to implementing policy objectives" (p. 725-726). In other words, setting standards is a political task whereas enforcement is an administrative task (Potoski and Woods, 2002; Woods and Potoski, 2010). Consequently, they find that determinants of local authorities to set standards are different from determinants to enforce standards.

However, Woods and Potoski (2010)'s analyses are limited to a top-down view of federalism. Conversely, recent scholarship suggests that top-down and bottom-up lenses of state-local relations may provide different perspectives, and local air agencies may act independently of state agencies (McGuire, 2006; Bowman and Kearney, 2011; Mills and Gore, 2016; Fowler, 2018). From a bottom-up perspective, local air agencies are defined by delegation of political versus administrative authorities that shape their functions in the intergovernmental management system (Woods and Potoski, 2010). However, without delegated authorities, local agencies are capable of defining their own functions and re-organizing accordingly through local activism. As such, local air agencies fit into one of three models: state administrative sub-units (only enforcement authority); fully-devolved agencies (authority to both set and enforce standards); or, activist agencies (no state-delegated authorities).

The most obvious incentive for states to devolve authorities to local air agencies is to improve capacity to overcome a policy challenge. According to Woods and Potoski (2010, "the policy challenge underlying pollution is balancing its environmental and health costs against its economic benefits. Achieving the optimal balance between the two is easier when the pollution is narrowly concentrated in a region rather than widely dispersed across different local climates and geographies" (p. 723). Under the CAA, primary responsibility for managing air quality falls on the states, so there is significant pressure from EPA to maintain standards. Compounding this issue though is uneven geographic distribution of state administrative capacity to manage local-level air quality. Since the overarching goal of the CAA is to meet and/or maintain air quality standards, states are incentivized to invest resources into areas which may come under scrutiny from federal regulators, media or the public, rather than to improve air quality in general (Wood, 1988, 1991; Brody, Peck, and Highfield, 2004; Konisky and Woods, 2010). Additionally, proximity may limit bases for states to build local administrative capacity, lead to underestimation of problems, and increase information asymmetries (McGuire and Silvia, 2010; Nohrstedt and Weible, 2010; Bushouse, 2011; Campante, 2014). In these cases, states can co-opt local expertise on socio-economic, political, or technical challenges by delegating authorities (Agranoff and McGuire, 2001).

However, delegating authorities is a double-edged sword that creates uncertainty in how local agencies may use their authority. If state agencies suspect goal conflicts, they must then invest resources into monitoring or incentivizing local agencies in order to prevent work shirking or payoff maximization (Brown and Potoski, 2003; Wood and Bohte, 2004; Miller, 2005; Krueger and Bernick, 2010; Reed, 2014). Additionally, local governments have far less autonomy in Dillon's Rule states than in Home Rule states (Krane, Rigos, and Hill, 2001; Richardson, 2011). In either case, state policymakers can hedge their bets and turn local agencies into administrative sub-units of state agencies by delegating responsibility for enforcing state standards, but not authority to set local standards (Agranoff and McGuire, 2001; Fowler, 2016). For example, Shelby County, Tennessee is responsible for permitting, facility inspections, and enforcement of CAA requirements within its jurisdictions, but the Tennessee Department of Environment and Conservation (TDEC) has sole authority for establishing regulations governing those activities. Consequently, Shelby County's air agency is essentially an extension of TDEC, with compliance management as its primary administrative responsibility (Agranoff and McGuire, 2001; Shelby County Department of Health, 2018; EPA, 2018c). If local air agencies exist and states face challenges in managing local-level air quality, then states are more likely to use local governments as state administrative sub-units by delegating enforcement authorities, as compared to delegating both administrative and political authorities.

Policy Challenge Hypothesis: *As air quality decreases, probability of existing local air agencies being state administrative subunits will increase.*

State Control Hypothesis: *As state control over local governments increases, probably of existing local air agencies being state administrative subunits will increase.*

Unfortunately, when it comes to intergovernmental relations, "often the allocation of responsibility is based on credit claiming and blame avoidance, rather than efficiency grounds" (Volden, 2005, p. 328). When states face difficult policy problems or limited capacity, they can delegate authorities to shift accountability to the local level. While local policy actors tend to be better positioned to adapt national programs to local needs, this does not necessarily assume local governments have the capacity to manage these programs; it only assumes that states have an incentive to shirk responsibility for program outcomes. More specifically, if political pressures on program performance are too great, states redistribute responsibilities to local governments in order to avoid blame and shield state officials from political accountability (Volden, 2005; Shipan and Volden, 2008; Woods and Potoski, 2010). Under this arrangement, local governments may become more responsive to the local populace, which ideally enables programs to be managed in a way that aligns the balance of environmental costs and economic benefits with local political values (Fording, Soss, and Schram, 2007; Woods and Potoski, 2010).

For example, under Alabama's SIP, Jefferson County serves as the lead agency for CAA implementation in the air quality control region surrounding the City of Birmingham. As such, Jefferson County officials have authority to both enforce state regulations and to develop their own regulations to address local challenges that may emerge (EPA, 2018c; Jefferson County, 2018). Notably, Jefferson County has a history of grass-roots environmental advocacy while simultaneously housing much of the state's steel and iron production facilities (Jackson, 2017). However, this also provides advocacy groups with more opportunities to influence policy (Woods and Potoski, 2010). In recent years, environmental advocacy groups have become more adept at strategically targeting access points to policymakers at both state and local levels to become more influential in policy choices (Davis and Hoffer, 2012; Holyoke, Brown,

and Henig, 2012; Ley and Weber, 2015). Industry groups have followed a similar pattern and identified venues in regulatory processes that allow them to minimize the influence of opposition groups (Shipan and Volden, 2006, 2008; Davis and Hoffer, 2012). As a result, some critics contend that blame avoidance behavior causes local governments to respond to economic competition and pressures from industry groups, rather than the public interest (Kim and Fording, 2010; Riverstone-Newell, 2012, 2013).

Although advocacy groups tend to specialization in certain areas, venue shopping occurs across both legislative and bureaucratic domains (Holyoke, Brown, and Henig, 2012; Buffardi, Pekkanen, and Smith, 2015; Ley and Weber, 2015). In addition to more conventional lobbying of legislators, advocacy groups can also influence administrative agencies by lobbying their rule-making processes, interpretations of legislation, or enforcement actions, which can substantively alter environmental regulations in practice (Furlong and Kerwin, 2005; Kochtcheeva, 2009). However, lobbying administrative activities is more difficult when local managers are mostly responsible for ensuring compliance with state program guidelines, compared to when local political and administrative capacities are intertwined (Svara, 1998; Agranoff and McGuire, 2001; Gainsborough, 2003; Terman and Feiock, 2015). Therefore, state officials are likely more willing to devolve both political and administrative authorities when advocacy groups increase political pressure on program management. If local air agencies exist, then the presence of advocacy groups seeking to influence environmental regulatory processes makes states more likely to devolve increased political and administrative authorities over air quality to local governments, as compared to delegating only administrative authorities.

Blame Avoidance Hypothesis: *As advocacy groups increase, probability of existing local air agencies being fully-devolved agencies will increase.*

Nevertheless, local agencies may be a function of local activism rather than state delegation. When faced with complex policy problems, local governments may find more utility in local activism and self-organization around shared policy goals than cooperating with state-led approaches (Agranoff and McGuire, 2001; Feiock and Scholz, 2009; Krueger and Bernick, 2010; Riverstone-Newell, 2013). Although a large portion are regional agencies that function differently than general purpose governmental units, a majority of local air agencies are connected to city or county governments (Fowler, 2016). As such, we should expect that they are susceptible to these same trends in political and administrative activism. For example, Fort Collins, Colorado's air quality plan establishes the City's goals to: "[c]omplement and fill gaps left by federal, state and county efforts…[and]…[r]espond to a strong citizen mandate for the City to protect and improve air quality" (Fort Collins, 2018, p. 4). This highlights perceptions from local officials that local and state goals do not align, and state management efforts are not adequate to address local challenges.

Although the CAA places primary implementation responsibility on states, local governments may be faced with the consequences of state decisions when air quality outcomes affect inter-jurisdictional competition. As previous scholars note, inter-jurisdictional competition is a key source of local activism, and that competition is tied to aligning public services with social and political values (Shipan and Volden, 2006, 2008; Wu, 2006; Riverstone, 2012, 2013). Instances of goal incongruity and moral hazards are not new to the federal system or the management of complex environmental problems though (Waterman and Meier, 1998; Ferraro, 2003; Burby, 2006; Birkland and Waterman, 2008; Samson, Berteaux, McGill and Humphries, 2011). While strong state agencies can likely force top-down approaches to federalism, weak states agencies likely cause local governments to respond with bottom-up innovations for managing environmental problems.

However, local innovation is highly dependent on local resources to improve upon existing efforts and to ward off state control (Shipan and Volden, 2008; Blair and Starke, 2017; Riverstone-Newell, 2013, 2017; Langan and McFarland, 2017). As such, previous research suggests that local air agencies must either have large enough service areas to unilaterally impact regional air quality or opportunities to cooperative with other local agencies in order to be effective (Fowler, 2016). Other research contends that socio-political factors shape local resources and capacity to both provide public services and contest state-led efforts (Rice, 2001; Coffe and Geys, 2005; Tavits, 2006; Wood, 2011; Langan and McFarland, 2017). While states always retain preemption power, local governments with independent resources are less reliant on states and have more political capital to resist state coercive tools (Jimenez, 2009; Wood, 2011; Rivestone-Newell, 2013, 2017; Langan and McFarland, 2017). Consequently, both state- and local-level capacity is a key issue in influencing local activism (Agranoff and McGuire, 2001; Volden, 2005; Shipan

and Volden, 2006, 2008). If local air agencies exist where state capacity is limited and there are sufficient local resources, local governments are more likely to have created air agencies without state-delegated authorities in order to play activist roles in managing local air quality, as compared to states devolving authorities to local agencies.

State Capacity Hypothesis: *As state capacity to manage local air quality decreases, probability of existing local air agencies being activist agencies will increase.*

Local Resources Hypothesis: *As local resources increases, probably of existing local air agencies being activist agencies will increase.*

Methods

Data and Dependent Variables

We collected data from local agencies via survey of NACAA local-level membership (NACAA, 2018). Previous researchers, including Woods and Potoski (2010), rely on this as an accurate representation of local air agencies. Of 117 local-level agencies listed (excluding Washington, D.C.) and contacted, 70 (59.8%) completed enough of the survey to be usable for this analysis. Appendix A provides a breakdown of agencies by state. Respondents are both diverse and representative of NACAA membership regionally and institutionally and there are no systematic differences between our survey respondents and non-respondents. However, local air agencies do not exist in 24 states as a result of both state- and local-level socio-political, economic, and environmental factors, which may create systematic differences between states with and without local air agencies (Woods and Potoski, 2010; Fowler, 2018). As such, this may create limitations in generalizing to local agencies with different missions; although, we do not believe our data is biased in generalizations to local air agencies.

Based on Potoski and Woods (2002) and Woods and Potoski (2010), we asked respondents questions concerning their authorities to: set criteria pollutant ambient standards (*set standards*); and, enforce federal and/or state air quality standards (*enforce standards*). We then operationalized these responses into two types of dependent variables. First, we used nominal variables that compare local agencies responding yes and no to *set standards* and *to enforce standards*. Second, we used a categorical variable that groups local agencies into three categories based on the distribution of those two powers: 1) those responding yes to both *set standards* and *enforce standards* (fully-devolved agencies); 2) those responding yes to *enforce standards*, but no to *set standards* (state administrative sub-units); and, 3) those responding no to both *set standards* and *enforce standards* (activist agencies). While theoretically there are agencies with only authority to *set standards* and not *enforce standards*, these agencies do not exist in practice. However, this is not surprising considering the practical implications of allowing local agencies to set standards that state agencies would have to enforce. Appendix B provides descriptions and descriptive statistics for variables used in analyses. We conducted survey data collection in 2016 and 2017, and observe predictor variables for 2016.

Predictor Variables

We operationalize our hypotheses with nine predictor variables that examine effects of air quality, state control and capacity, political interests, and local resources on probability of local air agency authority. First, we measure air quality as the portion of total days of air quality monitoring in which the air quality index (AQI) was above 100, with data from EPA. AQI is used to evaluate air quality and program success by creating a standardized measure of air quality across criteria pollutants and monitoring sites. Operating as a piecewise linear function of pollutant concentration measured on a scale from 0 to 500, AQI levels of 100 correspond to the maximum concentration of pollutants that is still within allowable limits based on the National Ambient Air Quality Standards (NAAQS) (EPA, 2018a, 2018b). As such, this variable measures the number of days in which air has reached unhealthy levels of pollutants, which allows for the distinction between healthy and unhealthy days rather than the documentation of marginal changes in AQI (Fowler, 2016). Importantly, as the portion of days above 100 increases, air quality decreases and the policy challenge increases.

Second, based on previous studies of local air agencies (Fowler, 2016, 2018), we measure state control and capacity with three variables: state expenditures, Dillon's Rule, and distance between regional state offices and local air agency offices (Ringquist, 1993; Potoski and Woods, 2002; Konisky and Woods, 2012; Fowler, 2016). We measure state-level capacity as state environmental expenditures per capita, with data from the U.S. Census Bureau (Census, 2018). Additionally, this takes into account resources controlled by state agencies that can be used to incentivize or

compensate for increased local responsibilities (Bowman and Kearney, 2011; Riverstone-Newell, 2017). We measure legal structures of state-local relations with an ordinal variable comparing states with Dillon's Rule, modified Dillon's Rule, or Home Rule. Currently, thirty-one states apply Dillon's Rule, ten states Home Rule, and nine states a modified or limited version of Dillon's Rule that allows for broad authority in some areas but narrow authority in other areas (Krane, Rigos, and Hill, 2001; National League of Cities (NLC), 2016).

Although most local air agencies are located near urban areas that include a regional state environmental office, this is not the case everywhere; particularly in large, rural states in which there are few regional state offices, and urban areas are geographically dispersed (e.g., Montana). To account for state access to local jurisdictions, using Google Maps, we measure geographic isolation of local areas with distance between the nearest regional state environmental agency office and local air agency office. As state expenditures increase, where local agencies operate in Dillon's Rule states, and distance between regional offices and local agencies decrease, we assume state control over local governments increases. Additionally, we assume that as state expenditures increase and distance between regional offices and local agencies decrease, state capacity to manage local air quality increases.

Third, we measure political interest groups with two variables: industry groups and environmental groups. Similar to previous studies, we measure these concepts with economic power of manufacturing industries and environmental group membership (Ringquist, 1993; Woods and Potoski, 2010; Konisky and Woods, 2012; Fowler, 2016, 2018). With data from the US Bureau of Economic Analysis (BEA), we measure local industry groups as personal income per capita generated from manufacturing industry (Konisky and Woods, 2012; Fowler, 2016, 2018; BEA, 2018). While mobile sources are key contributors to air pollutants, they tend to fall outside of local regulatory controls, so political advocacy from these groups is unlikely to affect local authorities. On the other hand, manufacturing industries form politically important local advocacy coalitions and serve as a primary stationary source of air pollutants. Although this is not a direct measure of political advocacy from industry, it does capture their relative economic power, which likely correlates to their potential capacity to influence policy decisions (Ringquist, 1993; Woods and Potoski, 2010; Fowler, 2016, 2018).[1]

We measure environmental interest groups as Sierra Club members per 10,000 state residents, with data from Sierra Club (Konisky and Woods, 2012; Fowler, 2018; Sierra, 2018). While political interests are not geographically limited, we assume that industry groups will be concerned primarily with policy that has direct implications for local operations, and will be unwilling to expend political capital to influence policy in other jurisdictions, so industry groups are measured at the local-level. On the other hand, we assume environmental groups will be more mobile and willing to leverage state-wide influence for local-level policies, so environmental groups are measured at the state-level (Fowler, 2016). As industry and environmental group size increases, we assume their capacity for political advocacy increases.

Finally, we measure local resources with three variables: jurisdictional size, inter-local, and local wealth. We measure jurisdictional size as percentage of metropolitan area within the jurisdiction of the local air agency, and inter-local as a nominal variable comparing metropolitan areas with and without multiple local air agencies (Shipan and Volden, 2005; Fowler, 2016; BEA, 2018). Additionally, we measure local wealth as personal income per capita to capture community resources, as well as political capital, with data from the BEA (Wood, 2011; BEA, 2018). As a whole, these three variable capture resources available to local agencies, within the inter-local service market, and within the community that can be leveraged to support air quality management efforts. As jurisdictional sizes of local agencies, the number of air agencies within a metropolitan area, and local wealth increase, we assume that local resources to more independently manage policy problems will increase as well.

Analyses

Our analyses proceed in three parts. First, we use crosstabs to analyze the distribution of delegated authorities across local agencies; likelihood-ratio Chi^2 and Cramer's V test for statistical significance and strength of association, respectively. Second, we use probit models to analyze predictors of delegated authorities for *set standards* and *enforce standards*. Third, we use multinominal probit models to compare predictors of agencies with fully-devolved agencies and activist agencies to state administrative subunits. Since raw coefficients for probit and multinominal probit models are difficult to interpret, we use Average Marginal Effects (AMEs) to create a directly interpretable estimate of

[1] We tested additional measures of economic power from industry, including those that incorporated utilities and mining industries. Findings across models were consistent with those reported here, but diagnostic tests indicated that this measure produced the most efficient results.

covariate effects on authority distribution (Hanmer and Kalkan, 2013). Additionally, we cluster standard errors at the state-level, which assumes that model errors are correlated within the same state, but uncorrelated in different states (Bartlett, Kotrlik, and Higgins, 2001; Menard, 2002; Shelley, 2008).[2] Diagnostic tests indicated no assumptions of probit or multinominal probit were violated (Menard, 2002).

Results

Table 1 presents a breakdown of the distribution of *set standards* and *enforce standards*. Local agencies with only enforcement authority (state administrative sub-units) is the most common scenario with 67.1% of respondents reporting yes to *enforce standards* but no to *set standards*, which indicates the most likely scenario for local air agencies is serving as a state administrative sub-unit. On the other hand, 17.1% of respondents report yes to both *enforce standards* and *set standards* (fully-devolved agencies), while 15.7% reported no to both *enforce standards* and *set standards* (activist agencies). Not surprisingly, no agencies respondents reported yes to *set standards* but no to *enforce standards*. Cramer's V and Chi^2 tests indicate the relationship is moderately strong and the distribution is statistically significant.

[Table 1 about here]

Table 2 displays raw coefficients and AMEs from probit models of *set standards* and *enforce standards*; table 3, raw coefficients from the multinominal probit model comparing distribution of authorities to local agencies; and, table 4, AMEs for multinominal probit model. First, findings suggest poor air quality increases the probability that local agencies have only enforcement authority. Multinominal AMEs for non-attainment days indicate that for every one percent increase in non-attainment days as a portion of annual monitoring days, the probability of agencies being state administrative sub-units increases by 51.0%. However, there is no statistically significant relationship between non-attainment days and either *set standards* or *enforce standards* individually. As such, there is some (but limited) evidence to support our policy challenge hypothesis, where decreased air quality is correlated with increased probability of agencies being state administrative sub-units (compared to other local air agency forms).

[Tables 2, 3, and 4 about here]

Second, findings suggest high state control over local governments increases the probability that local agencies have only enforcement authority, but low state capacity increases the probability of local agencies with authorities to neither set standards nor enforce standards. In probit models, AMEs indicate that agencies in Dillon's Rule states are 23.8% less likely to respond yes to *set standards*, but for every mile increase between regional state offices and local air agencies, probability of responding yes decreases by 0.3%. Additionally, for every one dollar increase in per capita state environmental expenditures, probability of agencies responding yes to *enforce standards* increased by 0.3%, but increases in distance between regional state offices and local agencies, decrease probability of responding yes by 0.2% per mile.

Multinominal AMEs indicate that increases to state expenditures decrease the probability of agencies being activist agencies by 0.2% and increase the probability of being state administrative sub-units by 0.5%. Additionally, local agencies in Dillon's Rule states are 22.0% more likely to be state administrative sub-units and 23.9% less likely to be fully-devolved agencies. Lastly, increases in distance between regional state offices and local agencies increase the probability of agencies being activist agencies by 0.2% but decrease the probability of being fully-devolved agencies by 0.3%. As such, there is sufficient evidence to support our state control and state capacity hypotheses, where increased state control over local governments is correlated with increased probability of agencies being state administrative sub-units, and decreased state capacity to manage local air quality is correlated with increased probability of agencies being activist agencies.

Third, findings suggest interest groups increase the probability of local agencies with authorities to both set standards and enforce standards. In probit models, AMEs indicate that for every increase of $1,000 in per capita income from local manufacturing industries and one Sierra Club member per 10,000 residents, probability of agencies responding

[2] While 26.8% of survey respondents are from California, there is no evidence to suggest these respondents bias results: 1) chi-squared tests indicate there is no statistically significant difference between California and non-California respondents; 2) a dummy variable for California respondents in probit models was not statistically significant; and, 3) when California respondents were dropped from the dataset, directional relationships in probit models remained consistent. Additionally, while Florida, Ohio, and Washington represent 8.5% of respondents each, there is also no evidence to indicate these respondents bias results.

yes to *set standards* increases by 70.0% and 1.7%, respectively, and probability of responding yes to *enforce standards* increases by 22.6% and 0.1%, respectively; although, environmental groups is not a statistically significant predictor of *enforce standards*. Furthermore, multinominal AMEs indicate that increases in local manufacturing industries and Sierra Club membership increase the probability of agencies being fully-devolved agencies by 66.7% and 1.8% respectively. Additionally, environmental groups decrease the probability of agencies being state administrative sub-units by 1.8%. As such, there is sufficient evidence to support our blame avoidance hypothesis, where increased interest groups are correlated with increased probability of agencies being fully-devolved agencies.

Fourth, findings suggest local resources increase the probability of local agencies with authority to neither set nor enforce standards. In probit models, while local resources variables are not statistically significant predictors of *set standards*, AMEs indicate that agencies in metropolitan areas with multiple local air agencies are 21.9% less likely to respond yes to *enforce standards*, and for every $1,000 increase in income per capita, probability of responding yes to *enforce standards* decreases by 20.6%. Additionally, multinominal AMEs indicate that agencies in metropolitan areas with multiple local air agencies are 21.1% more likely to be activist agencies and 12.2% less likely to be state administrative sub-units; and, for every $1,000 increase in income per capita, probability of being an activist agency increases by 20.6% and probability of being a state administrative sub-unit decreases by 27.4%. However, jurisdiction size is not statistically significant in any model. As such, there is sufficient evidence to support our local resources hypothesis, where increased local resources are correlated with increased probably of agencies being activist agencies. Finally, both probit and multi-nominal models are moderately to very strong predictors of local agency authorities, and findings are consistent between probit and multinominal models suggesting reliability of results.

Limitations

Our analyses rely on cross-sectional research designs, so findings only indicate correlations between predictor and dependent variables. A key concern here are temporal aspects of policy innovations (i.e., how much fluctuation in local authorities occurs over time?). While SIPs likely structured most local air agencies early on, SIPs are routinely revised through incremental processes in response to changing conditions (Belden, 2001). Furthermore, activist agencies only emerged in the last few decades, and are not directly a product of SIPs (Lester and Lombard, 1998; Woods and Potoski, 2010). For instance, Colorado developed its initial SIP in 1979 (with revisions as recent as 2016) and some local agencies were structured at that time, but Fort Collins independently ventured into air policy in 1993 (Fort Collins, 1996; EPA, 2018c). As such, we should expect contemporary conditions to influence, at least partially, contemporary agency structures or authorities. However, incremental policymaking is a powerful force and institutional features developed decades ago carry significant influence. Since local authorities are not always explicit in SIPs or other governing legislation, it is difficult to determine if or when changes may have occurred.

Additionally, there may be an issue with causality as it relates to air quality (i.e., do local air agencies affect air quality or does air quality affect local agencies?). Consequently, our results only indicate how contemporary conditions are related to agency structures, but do not account for institutional development or environmental changes over time. Furthermore, as our dataset only includes existing local air agencies, analyses examine why these local air agencies are structured the way they are, but not why local air agencies exist in general. Previous scholarship offers some insights into this broader question though. Fowler (2018) argues the existence of local air agencies are a function of need and opportunity; or, whether there is a local air quality problem that local agencies need to address and a sufficient combination of resources and institutional mechanisms that allow local agencies to enter the air management network. Using a dataset of 497 metropolitan and micropolitan statistical areas in the US, Fowler (2018)'s empirical findings for several factors (e.g., air quality, state expenditures, Dillon's Rule, local wealth, jurisdictional size) are consistent with our findings here; however, they do not offer support for the role of environmental or industry groups.

Consequently, we can infer that factors that influence both state (i.e., policy challenge, state control) and local (i.e., local resources, state capacity) decision-making on agency type also likely affect decision-making on whether agencies should exist in general. However, some of the more nuanced components of state delegation decisions (i.e., blame avoidance) may only come into play after the choice to delegate authorities has been made though. While this creates a limitation to our inferences concerning second-order devolution and local activism, our analyses still provide support for hypotheses as it relates to the probability that agencies take on one form compared to other forms. Further research is necessary to determine if these hypotheses hold up when considering broader questions concerning the creation of local air agencies though. Finally, as with any empirical analysis, there are certain limitations that arise

from variable selection, particularly as it relates to our measurement of local wealth, industry groups, and distance. Although alternatives may exist, those will likely also have shortcomings, and we believe this set of variables sufficiently measure the underlying concepts.

Conclusions

Results of probit and multinominal probit models largely support our five hypotheses concerning types of local air agencies and factors that contribute to their structure. In general, these results suggest four conclusions about local air agencies. First, local agencies are not "one-size-fits-all," with significant variations arising in authorities. Although most local air agencies serve as state administrative sub-units, some agencies can also set air quality standards providing them both political and administrative authorities. More interestingly though, there is a group of agencies that have no formal authority over air quality, and operate mostly outside of state-led implementation efforts. Second, states turn local agencies into their administrative sub-units when they are faced with policy challenges and have mechanisms to coerce local governments. The primary argument for second-order devolution is that local agencies provide local implementation capacity to states, so state-centric federalism creates a framework for states to use local agencies according to their needs (Woods and Potoski, 2010; Bowman and Kearney, 2011). Therefore, it is not surprising that states co-opt local agencies into implementing policies when they have the tools to do so and where state agencies struggle with effectiveness.

Third, states fully devolve authorities (i.e., both political and administrative) to local governments when they are seeking to shift responsibility and avoid blame (Volden, 2005; Woods and Potoski, 2010). More specifically, our findings indicate that as advocacy groups become more prominent, local agencies are more likely to be fully-devolved compared to administrative subunits, and that there is a stronger relationship between advocacy groups and *set standards* than *enforce standards*. Taken together, these findings suggest states are more interested in shifting blame for political decisions than for administrative decisions. There are two important concerns surrounding this finding though. Theoretically, the blame avoidance hypothesis does not explain the increasing use of preemption in recent years, although this trend has not been prominent in air quality (Lester and Lombard, 1998; Woods and Potoski, 2010; Riverstone-Newell, 2017). Since our data does not include local governments in states where they are preempted from air policy, we cannot make inferences into what factors contribute to preemption as a form of credit claiming by states (i.e. the inverse of blame avoidance) (Volden, 2005). Methodologically, while previous scholars use Sierra Club as a proxy for environmental advocacy groups, membership in specific groups may exhibit regional bias. Additionally, in many cases, legal processes (i.e., lawsuits) have been more readily relied upon than public advocacy (i.e., campaigns) when addressing clean air issues (Wikle, 1995; Melnick, 2010; Woods and Potoski, 2011; Fowler, 2016, 2018). Consequently, further research on the blame avoidance hypothesis is necessary to sort through these issues.

Fourth, activist agencies emerge when local governments have sufficient resources and states have insufficient capacity to manage local problems. Unlike other types of local air agencies, these appear to result from bottom-up rather than top-down mechanisms which may make these findings seem counterintuitive in comparison. More specifically, local agencies become active in response to deficits in state-led implementation plans and local contexts, rather than have authorities delegated to them. While previous scholarship examines some these behaviors, our findings are limited in identifying how activist agencies function differently within the federal-state CAA regulatory structure compared to fully-devolved or administrative sub-units (Agranoff and McGuire, 2001; Riverstone-Newell, 2013). Although additional research is necessary on this point, our findings do add a new dimension to this scholarship by indicating this behavior occurs concurrently with second-order devolution. As such, these findings highlight the growing complexity surrounding local government roles in managing complex environmental problems. While second-order devolution has previously defined local responsibilities in environmental policy, local governments are becoming more engaged in these issues and are finding ways to innovatively pursue better local conditions with or without state involvement. Notably, these types of activist behaviors from local governments may both be influenced by state actions and influence state actions, suggesting top-down and bottom-up federalism co-exist and create a complicated state-local dynamic in environmental policy (Volden, 2005; Scheurs, 2008; Riverstone-Newell, 2013).

Consequently, the emerging conflict between top-down and bottom-up federalism is an important one, especially as scholars and policymakers alike struggle with how to understand and manage complex environmental problems in a multi-level governance system. While more traditional views of top-down federalism only focus on state influence over local governments, bottom-up views of federalism provide a different perspective of intergovernmental relations (McGuire, 2006; Bowman and Kearney, 2011; Mills and Gore, 2016). More specifically, in comparison to Woods

and Potoski (2010), these findings suggest much more diversity occurring at the local-level than is indicated by state-centric analyses. Importantly, this contributes to blurring distinctions between which level of government wields policymaking authority. While second-order devolution presents a rigid framework for sorting out state versus local powers, local activism adds a complicated dimension to these relationships. As such, additional research should begin to build conceptual frameworks that account for both top-down and bottom-up factors influencing state and local roles in intergovernmental management in general and environmental management, specifically.

Furthermore, this area of research is underexplored by scholars, and there continue to be many important research questions to examine. To that end, future research should utilize longitudinal analyses to further examine these issues and determine when bottom-up federalism took root or how it may interact with existing influences from second-order devolution. Additionally, scholars should also employ research designs that are capable of making a broader comparison between areas with and without local air agencies to determine what factors contribute to their development. By doing so, we can gain further insights into the emerging roles of local governments in managing complex environmental problems. Although local air agencies represent a unique subset of subnational environmental policy actors, these trends likely exist in one form or another in other policy areas. As such, research is also necessary to determine how hypotheses identified here may apply to issues such as watershed protection, land redevelopment, energy production, and most importantly, climate change. By revisiting local air agencies, our findings have highlighted important phenomena occurring in environmental federalism with implications for understanding state-local dynamics in managing complex environmental problems that challenge traditional institutions.

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Tables

Table 1. Distribution of *Set Standards* and *Enforce Standards*

		Enforce federal/state standards	
		Yes	No
Set criteria pollutant ambient standards	Yes	12 (17.1%) *Fully-devolved agencies*	0 (0%)
	No	47 (67.1%) *State administrative sub-units*	11 (15.7%) *Activist agencies*

Note: $Chi^2 < .05$. Cramer's V= .196.

Table 2. Probit Models of *Set Standards* and *Enforce Standards* (Raw Coefficients and Average Marginal Effects)

	Set criteria pollutant ambient standards		Enforce federal/state standards	
	Raw coefficients	Average marginal effects	Raw coefficients	Average marginal effects
Non-attainment days	-1.121 (.862)	-.206 (.157)	2.861 (1.513)	.300 (.171)
Inter-local	.240 (.479)	.044 (.088)	-2.090 (.982)*	-.219 (.078)**
Jurisdiction size	-.512 (.720)	-.094 (.133)	1.712 (1.113)	.179 (.101)
Local wealth	-.430 (.266)	-.008 (.005)	-1.969 (.469)***	-.206 (.005)***
State expenditures	-.013 (.013)	-.002 (.002)	.025 (.009)**	.003 (.001)*
Dillon's Rule	-1.297 (.313)***	-.238 (.059)***	-.151 (.317)	-.016 (.034)
Distance	-.019 (.009)*	-.003 (.002)*	-.021 (.008)**	-002 (.001)***
Industry groups	3.815 (1.706)*	.700 (.301)*	2.157 (.957)*	.226 (.111)*
Environmental groups	.951 (.386)*	.017 (.007)*	.115 (.337)	.001 (.003)
Constant	-2.222 (1.857)	-	6.162 (2.112)**	-
Log likelihood	-23.012		-13.314	
Pseudo-R2	0.282		0.563	
N size	70		70	

Note: *<.05, **<.01, ***<.001

Table 3. Multinominal Probit Model Comparing Agency Types (Raw Coefficients)

	Activist agencies	*Fully-devolved agencies*
Non-attainment days	-4.094 (2.067)*	-2.018 (.971)*
Inter-local	2.831 (1.406)*	.730 (.477)
Jurisdiction size	-2.414 (1.488)	-1.045 (1.139)
Local wealth	2.598 (.642)***	-.438 (.405)
State expenditures	-.033 (.012)**	-.026 (.020)
Dillon's Rule	-.012 (.407)	-1.873 (.486)***
Distance	.028 (.010)**	-.023 (.011)*
Industry groups	-2.257 (1.536)	5.024 (2.522)*
Environmental groups	-.002 (.432)	.150 (.063)*
Constant	-8.480 (3.037)**	-3.159 (2.719)
Log likelihood	-35.041	
Pseudo-R2	.451	
N size	70	

Note: *<.05, **<.01, ***<.001

Table 4. Multinominal Probit Model Comparing Agency Types (Average Marginal Effects)

	Activist agencies	*State administrative sub-units*	*Fully-devolved agencies*
Non-attainment days	-.295 (.172)	.510 (.191)**	-.214 (.128)
Inter-local	.211 (.087)*	-.274 (.114)*	.063 (.059)
Jurisdiction size	-176 (.099)	.284 (.157)	.284 (.145)
Local wealth	.206 (.004)***	-.122 (.006)*	-.008 (.006)
State expenditures	-.002 (001)*	.005 (.002)*	-.003 (.003)
Dillon's Rule	.019 (.031)	.220 (.068)***	-.239 (.063)***
Distance	.002 (.001)***	.001 (.001)	-.003 (.001)*
Industry groups	-.228 (.120)	-.438 (.349)	.667 (.294)*
Environmental groups	-.002 (.003)	-.018 (.008)*	.018 (.008)*

Note: *<.05, **<.01, ***<.001

Appendix A. Distribution of Local Agencies by State

State	No. of local agencies/No. of respondents	Agency types	State	No. of local agencies/No. of respondents	Agency types
Alabama	2/2	2	Montana	3/2	2
Alaska	1/0	Insufficient data	North Carolina	3/2	1,2
Arizona	3/2	2	North Dakota	0/0	n/a
Arkansas	0/0	n/a	Nebraska	2/1	2
California	35/19	1,2	New Hampshire	0/0	n/a
Colorado	6/4	2,3	New Jersey	0/0	n/a
Connecticut	0/0	n/a	New Mexico	1/0	Insufficient data
Delaware	0/0	n/a	Nevada	2/1	2
Florida	9/6	2,3	New York	2/2	3
Georgia	0/0	n/a	Ohio	9/6	2
Hawaii	0/0	n/a	Oklahoma	0/0	n/a
Iowa	2/1	2	Oregon	2/1	1
Idaho	0/0	n/a	Pennsylvania	2/2	1,2
Illinois	1/1	3	Rhode Island	0/0	2
Indiana	4/2	2,3	South Carolina	0/0	n/a
Kansas	3/3	2,3	South Dakota	0/0	n/a
Kentucky	1/0	Insufficient data	Tennessee	4/2	2
Louisiana	0/0	n/a	Texas	8/3	1,2,3
Massachusetts	1/0	Insufficient data	Utah	0/0	n/a
Maryland	2/1	3	Virginia	0/0	n/a
Maine	0/0	n/a	Vermont	0/0	n/a
Michigan	0/0	n/a	Washington	7/6	1,2
Minnesota	0/0	n/a	West Virginia	0/0	n/a
Missouri	2/2	2	Wisconsin	0/0	n/a
Mississippi	0/0	n/a	Wyoming	0/0	n/a

Key for agency types: 1= *Fully-devolved agencies*; 2= *State administrative sub-units*; 3= *Activist agencies*; n/a = state has no local agencies.

Appendix B. Variable Descriptions

Variable	Description	Mean (or %)	St. Dev.	Min.	Max.
Set standards (DV)	Nominal variable comparing local air agencies with and without authority to set criteria pollutant ambient standards	.171	.380	0	1
Enforce standards (DV)	Nominal variable comparing local air agencies with and without authority to enforce federal and/or state air quality standards	.843	.367	0	1
Non-attainment days (EPA, 2018a)	Percentage of monitored AQI days above 100	.492	.227	.074	.940
Inter-local (NACAA, 2018)	Nominal variable comparing metropolitan areas with and without multiple local air agencies	.214	.413	0	1
Jurisdiction size (BEA, 2018)	Percentage of metropolitan area within the jurisdiction of the local air agency	.617	.349	.008	1
Local wealth (BEA, 2018)	$1000s of personal income per capita	43.791	6.944	29.701	70.241
State expenditures (Census, 2018)	$1s per capita in state environmental expenditures	80.792	42.392	21.551	237.663
Dillon's Rule (NLC, 2016)	Ordinal variable of state-local relations system, ordered as Home Rule, modified Dillon's Rule, and Dillon's Rule.	1.114	.069	0	2
Distance	Miles from nearest state environmental agency regional office to local air agency office	24.621	40.436	0	219
Industry groups (BEA, 2018)	$1000s of employee compensation from manufacturing industry per capita	2.583	1.593	0	7.057
Environmental groups (Sierra Club, 2018)	State Sierra Club members per 10,000 state residents	24.419	11.917	6.925	43.861