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Cities and Sustainability: Polycentric Action and Multilevel Governance

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Abstract

Polycentric theory, as applied to sustainability policy adoption, contends that municipalities will act independently to provide public services that protect the environment. Our multilevel regression analysis of survey responses from 1,497 municipalities across the United States challenges that notion. We find that internal drivers of municipal action are insufficient. Lower policy adoption is explained by capacity constraints. More policymaking occurs in states with a multilevel governance framework supportive of local sustainability action. Contrary to Fischel's homevoter hypothesis, we find large cities and rural areas show higher levels of adoption than suburbs (possibly due to free riding within a metropolitan region).

Keywords

Sustainability, municipal policy, environmental governance

Introduction

You know that the action today is in cities. You want to save the world? You start saving it in cities... We will save the world one plan at a time, one initiative at a time, one strategy at a time, but make no mistake, we will save the world.

George Heartwell, mayor of Grand Rapids, Michigan¹

Mayor Heartwell's confidence in local governments is echoed in research and practice literature as municipalities are increasingly viewed as innovators, laboratories, and groundswell actors of environmental sustainability. Polycentric action by municipalities requires internal motivation, and researchers have sought to identify the factors that contribute to local sustainability policy adoption. These include concerns with preserving home values (Fischel 2001), city governments' interest in achieving certain co-benefits (e.g. cost savings) (Bulkeley and Betsill 2003; Kousky and Schneider 2003; Svara, Read, and Moulder 2011),

competition for economic development (Jochem and Madlener 2003), fiscal capacity (Lubell, Feiock, and Handy 2009), and citizen advocacy (Portney and Berry 2010).

Despite the enthusiasm among researchers and practitioners for bottom-up policymaking, most municipalities do not take action to promote environmental sustainability (Svara 2011; Saha and Paterson 2008; Conroy and Iqbal 2009). Municipalities that do act have traditionally been pushed or incentivized by the federal or state governments. Such top-down, command and control regulation allowed the U.S. to become an environmental leader by achieving remarkable results cleaning up the worst pollution problems (Fiorino 2006). Municipalities that adopt sustainability policies on their own are the handful of pioneering cities with sufficient capacity and with leaders willing to be environmental policy entrepreneurs (Bulkeley and Kern 2006). Action on environmental sustainability by local governments requires public officials to think beyond typical short-term budget and political cycles. Issues of climate change, energy use, agricultural land and watershed protection, and transportation, among others, stretch beyond the budget frames, municipal geography, and election cycles of most local government officials.

An emerging group of scholars has started to position the problem of local government sustainability action within a system of multilevel governance (Bulkeley 2010; Bulkeley and Betsill 2005; Corburn 2009; Homsy and Warner 2013). In this framework, state and federal governments might use incentives or regulations to establish broad goals and provide technical or fiscal capacity for local action. Municipalities decide upon the appropriate action for each local situation. In this co-production approach, knowledge and policy innovation flow up from local governments, down from higher authorities, and horizontally across networks of municipalities (Homsy and Warner 2013).

The purpose of this paper is to test polycentric versus multilevel governance theory on local government sustainability action. We use a broad survey of U.S. municipalities to test the hypothesis (H_0) that a polycentric framework will result in more independent environmental protection policies in municipalities against the alternative (H_A) that local governments are more likely to adopt sustainability policies in a multilevel governance environment, in this case with support from states. We conduct this test by measuring three sets of factors. First, we test internal municipal drivers of polycentric action to see if competition among local governments correlates to increased environmental action. Second, we examine whether local government capacity limits sustainability policy adoption. Finally, using a state influence variable, we explore

the role of state government in fostering a multilevel policy atmosphere conducive to environmental action by municipalities.

Theorizing about municipal action on sustainability

Most of the previous research on sustainability policy adoption has taken place in large cities, metropolitan areas, or among cities in a single state (Krause 2011a; Krause 2011b; Lubell, Feiock, and Handy 2009; O'Connell 2009; Portney and Berry 2010; Sharp, Daley, and Lynch 2011; Zahran et al. 2008). Recently, Portney (2013) extended his case research to smaller cities, but these smaller municipalities still had populations greater than 85,000 and were known to have strong environmental policies.

Such research, while important, is incomplete. According to the 2010 Census, less than one-third (29.7%) of Americans live in the 313 municipalities with more than 100,000 people. Nearly half of U.S. citizens (46.5%) live in municipalities with a population of less than 25,000 or in rural unincorporated areas. Only 35 cities have more than 500,000 residents, and only 278 have between 100,000 and 500,000 residents.

In this paper we focus on the differences in environmental sustainability policy adoption of larger and smaller municipalities. Our measure of policy adoption includes local policies such as the creation of a greenhouse gas emissions inventory, energy and water conservation strategies, alternative transportation incentives, and smart growth land use controls. (A more detailed definition is presented in the methodology.) Research shows that smaller and rural communities adopt general sustainability policies at a lower rate (Conroy and Iqbal 2009; Homsy and Warner 2012; Lubell, Feiock, and Handy 2009); are three times less likely to protect their drinking water (Phoenix 2002); and tend to resist land use planning more than larger places (Wolensky and Groves 1977). These municipalities have lower rates of government service provision (Johnson et al. 1995; Warner 2006) and are less likely to experiment with service reforms (Hefetz, Warner, and Vigoda-Gadot 2012; Warner and Hefetz 2003). Smaller places also demonstrate lower quality plans for environmental protection (Tang 2009). Our analysis includes measures for polycentric action and for multilevel governance to determine which have more power in explaining levels of local government sustainability policy adoption among US municipalities.

Polycentric drivers of action

Support for polycentrism evolves from public choice theory. The hypothesis, that local governments will adopt sustainability actions on their own, emerges from the notion of individual localities acting independently in a variety of public policy areas to promote efficiency (Tiebout 1956). In opposition to mid-20th century calls for more metropolitan-wide, regional governance structures, some political economists argued that many public goods are best provided at the local level; and this metropolitan-level polycentrism would engender competition between municipalities, which would ensure more cost-effective outcomes, local innovation, and a diversity of choice (V. Ostrom, Tiebout, and Warren 1961). Policy development in this way is based on the notions of individualism, instrumentality, and rationality and is modeled on economic markets (Christensen and Laegreid 2002). The actors in this system better understand local needs and thus better provide for local public goods than a higher governmental authority (McGinnis 1999).

This notion of community competition relies on internal drivers that push local governments to provide a variety of public goods at a price acceptable to residents. Fischel (2001) identifies those drivers as homeowners. He coins the term “homevoters,” acting as consumer-voters, who will invest in environmental protection to preserve home values and quality of life. He contends that homevoters keep out polluting industries and other locally unwanted land uses thereby providing environmental protection. Other common internal drivers are cost savings for the municipality, for example through energy conservation (Kousky and Schneider 2003), and competition for economic development (Jochem and Madlener 2003; Warner and Zheng 2013). Internal factors linked to sustainability action are population size, population growth and population density (Conroy and Berke 2004; Lubell, Feiock, and Handy 2009). In particular, population change can cause concern among residents about changes and result in municipal action to protect the local environment (Hanna 2005). Communities also act on issues of regional or global concern when action is tied to items already on the local agenda (Betsill 2001).

Elinor Ostrom (2010b) extends the polycentrism of metropolitan public goods provision to a model of climate change governance. She contends that a variety of public and private actors (including municipalities, utilities, households, firms, nations, etc.) will be driven independently by competition and local advantages to create local solutions to greenhouse gas reduction. Benefits of such a polycentric approach include: more experimentation and innovation, tailoring to fit local circumstances, political testing of policies, and local

enforcement (Lutsey and Sperling 2008). Local solutions more easily match ecological and social conditions to the incentives of governing users (Nagendra and Ostrom 2012). Local action also might spur higher levels of government to act (E. Ostrom 2010a).

Critics argue that polycentrism makes huge assumptions about the services available, the information that citizens can access, and the true mobility of people, who are typically constrained to a particular locale by proximity to work, cost of housing, and location of family (Oliver 2001; Warner and Hefetz 2002). Critics also challenge polycentrism theory for its inadequate attention to the role of power. Residents are simply consumers who create policy by voting for leaders (Gendron and Domhoff 2009). Yet powerful actors often frustrate voters. For example, development interests regularly succeed in pushing projects ahead despite citizen preferences to the contrary (Siskind 2006). Critics also talk about the need for coordination and sanctioning power to protect common pool resources (Homsy and Warner 2013).

Capacity for government action

Polycentric theory rests critically on local capacity to enable independent municipal action on sustainability. Resources are needed for policy action and these resources include funding and technical skills (Thompson 1965). To add public services, such as environmental protection, local governments must have the capacity to seize new opportunities (Watson 1997) and, as problems become increasingly complex, the need for capacity increases (Honadle 2001).

Gargan (1981) devised three broad components of local government capacity. *Expectations* involve the public's understanding of appropriate policies and levels of service. *Problems* represent different issues with a different set of preferences upon which action is required. *Resources* are those elements of the local government or greater community that can be brought to bear on problems. Expectations and Problems represent internal drivers of action; the public wants local government to tackle particular issues. From a polycentric perspective, the public's presumed expectation is that local governments will undertake local sustainability policies to address perceived environmental concerns (Hanna 2005). The challenge for local government actors is to bring the right resources to bear on the problem to meet public expectations.

For our purposes, the Resources component of Gargan's typology can be disaggregated into three sub-components for analysis: managerial capacity, fiscal capacity, and civic capacity. We expect that all three

would be positively correlated to environmental policymaking. In a polycentric system, these components of capacity are crucial to motivating and enabling action. However, the importance of all three also illustrates the multilevel governance concerns about constraints to local action. *Managerial capacity* can be defined as local government having the human resources to undertake new policy. Within municipalities, city managers tend to be the most entrepreneurial (Schneider, Teske, and Mintrom 1995) and research finds council-manager forms of government implement more innovative policies (Nelson and Svava 2012) including more sustainability policies (Svava 2011). Another aspect of managerial capacity is technical capacity, which is the ability to craft policies based upon information from advisors and experts in a central government. For example, climate change action suffers in smaller communities because of a poor scientific understanding of the problems and few peer communities from which to draw inspiration (Carter and Culp 2010).

Fiscal capacity is the ability of local governments to enact policies. Counties with more financial resources undertake a greater range of economic development policies (Betz et al. 2012). Local governments fail to undertake complex hazard mitigation strategies due to a lack of capacity (May et al. 1996) and municipalities, particularly smaller ones, can enter a vicious downward cycle in which weak economic development and small tax bases limit fiscal capacity and the ability to adopt innovative policies (Warner and Pratt 2005; Zheng and Warner 2010). In the same way, sustainability policies are significantly more likely to occur in cities with better fiscal health (Lubell, Feiock, and Handy 2009; Sharp, Daley, and Lynch 2011; Zahran et al. 2008;) and this is particularly true in smaller places (Tang 2009). Fiscal stress has been shown to reduce the implementation of climate change policy (Sharp, Daley, and Lynch 2011; Zahran et al. 2008). Fiscal capacity is often correlated with wealth. Cities with more sustainability policies had higher stores of intellectual capital and per capita incomes (Lubell, Feiock, and Handy 2009), although in large cities Portney (2013) found the relationship with per capita income is weak and not significant with educational attainment. Voting to preserve open space has been linked to higher per capita income (Schmidt and Paulsen 2009).

Civic capacity is a way that local governments can supplement their ability to craft or implement policy through the use of citizen-based expertise (Taylor 2000; Wallis and Dollery 2002). This is a key driver for polycentric action. Innovation often requires that government agencies engage citizens in problem-solving scenarios (Fung 2008). Citizen engagement creates political legitimacy over time, which is important for local action (Kronsell 2013; Nalbandian 2005). Increased political action and citizen involvement can lead to more

sustainability policy adoption (Portney 2013; Portney and Berry 2010) though stakeholder involvement also can slow the policy process (Andrews et al. 2008). Cities also benefit from the political involvement and volunteerism of seniors (Brown and Glasgow 2008), which may lead to more civic support for sustainability policy. However, issues of local capacity raise questions about the limits of polycentric action and the need for multilevel governance framework.

Multilevel governance - the role of states

The alternative theory is that local governments will adopt more sustainability policies in a multilevel governance environment. Municipalities in the American federated system are not isolated actors. The ability of municipalities to enact policies, including those dealing with local environmental protection issues, is limited or enhanced by powers, which are granted by the different states (Frug and Barron 2008; Sharp, Daley, and Lynch 2011). Peterson (1981) contends that much municipal research overestimates the importance of local agency, and city managers report that their authority to act has been increasingly limited by state governments (Bowman and Kearney 2012). Legal frameworks at higher governmental levels play an important role in shaping the local policy options for social equity and conservation (Benner and Pastor 2011; Schmidt and Paulsen 2009).

Absent a coordinated approach, research indicates that independent action by local governments raises important challenges: capacity constraints of smaller cities, coordination across the metropolitan region, and the problem of service spillovers and negative externalities – all of which undermine regional equity (Lowery 2000; Pastor, Lester, and Scoggins 2009; Warner and Hefetz 2002; Warner 2011). Across municipalities, greater heterogeneity also makes the challenge of reaching consensus on policy action both more important and more difficult (Frug 1999; Lowery 2000). Indeed, service spillovers from core cities are often used to explain why suburbs invest less in programs, such as affordable housing, higher density housing or industrial development (Pastor, Lester, and Scoggins 2009; Pendall 2000). This enables suburbs to shoulder a lower tax burden than rural or urban core communities (Orfield 2002; Warner 2006). Individual municipal attempts at open space preservation threaten to undercut regionalism by diverting the political energy of environmental activists and other stakeholders to city-by-city action rather than across the region (Howell-Moroney 2004a).

Municipalities must navigate the “sustainability triangle” of economic, environmental and equity concerns (Campbell 1996). The sustainability challenges facing local governments are complex with intertwining issues of environmental science, social equity, and economic development (Fiorino 2010; Zeemering 2009). Sustainability is a contested concept and local officials must chart paths to resolving conflicts (Jordan 2008). Some environmental advocates understand that the economy plays an important role in achieving their goals, although economic interests may not recognize the value of environmental protection (Neugarten, Wolf, and Stedman 2012). Neighborhoods and communities of color bear a greater share of environmental risks than white areas (Bullard and Johnson 2000). Sustainability must balance environment, economy, and social equity in a governance framework going forward in the 21st century (Fiorino 2010); an equilibrium that is easier to attain with a multilevel, multifunctional approach (Homsy and Warner 2013).

In a multilevel governance framework, federal, state and local actors coordinate in a network that respects local knowledge and diversity but sets common goals and standards upon which all parties can act (Bulkeley 2010; Corburn 2009). In some cases, local governments are simply agents of federal or state policies (Salkin and Ostrow 2008). In other instances, local governments enforce a minimum standard, but are free to set rules that exceed it (Sovacool 2008). Multilevel governance emphasizes the co-production of knowledge and policy both up and down levels of government (Corburn 2009; Homsy and Warner 2013), and it recognizes the importance of integrating scientific technical knowledge with the local knowledge of society (Jasanoff 2004).

State programs have been shown to be important in boosting the impact of local government policymaking, such as sustainable development programs (Conroy and Berke 2004), municipal recycling (Feiock and West 1993), and open space conservation (Howell-Moroney 2004b; Schmidt and Paulsen 2009). Massachusetts was the first state to incorporate climate change in its environmental review procedure and New Jersey recommends that farmland conservation be an element of comprehensive plans (Salkin 2009). In their three-state study, Conroy and Iqbal (2009) found significant state-to-state differences in local government sustainability action, although that result played little role in their analysis. Oregon coordinates local land use among rural and urban governments by requiring communities to work together to draw urban growth boundaries that protect forest and farmland, concentrate development, and curb the local spillover

impacts of sprawl (Daniels 2001). Burby and May (1998) find that absent state mandates, local governments fail to undertake adequate hazard risk reduction.

Still, there are limits to a multilevel approach. State coordinated policy systems have tended to promulgate prescriptive regulations, which restrict opportunities for local innovation and fail to frame issues to include local priorities and promote social learning (Fiorino 2006). State rules can chill local land use action as in the case of Florida's Bert Harris Act, which requires compensation for regulatory takings by municipalities (Homsy 2005). Local implementation of state or federal regulations can be insufficient and top-down schemes often lack local support (Burby and May 1998). Some researchers have found that state policies do not impact local climate action planning (Krause 2011a; Pitt 2010) or smart growth policy adoption (Portney 2008). Our analysis below tests the relative importance of the two theories of local government policymaking – polycentrism and multilevel governance. We do this by examining the relationship between drivers of action in each theory and the adoption of environmental sustainability policies. We control for capacity as well as for equity and economic growth.

Data and methodology

Data collection

We use a 2010 national survey of municipalities conducted by the International City/County Management Association,² which measures the adoption of environmental sustainability policies in counties and municipalities across the U.S. The survey was mailed to the chief elected or appointed official in all city-type governments and all counties. This person has the broadest knowledge of policies in the community.³ A follow-up survey was mailed to those officials who did not respond initially. For this study, we exclude counties and focus on cities with fewer than 1,000,000 residents. Within this subset, we had a response rate of 25.7 percent, or 1,497 municipalities in the final sample. The sample is representative of the universe of US cities by population and metro status.⁴ Additional data were drawn from the U.S. 2010 Decennial Census, 2005-2009 American Community Survey, and the 2002 Census of Government.

Our main interest is extending academic investigation into drivers of sustainability action among smaller communities, thus we test differences in our models between large and small municipalities. We define small communities as those with a population of fewer than 45,684 people – a breakpoint we

determined through a statistical strategy of segmented regression. The challenge of segmented regression is determining whether the relationship between the dependent variable and an independent variable varies across different subdomains of the predictor value (Liu, Wu, and Zidek 1997). We solved this by means of non-linear fitting, which produced different slopes and intercepts for the relationship between sustainability policy adoption and population size. This approach provides us a statistically valid breakpoint as well as a sufficient number of observations in each category for analysis: large cities (n=246, 16.5% of our sample), small cities (n=1,251, 83.5% of our sample).

The survey measured 109 sustainability activities across 12 issue areas and asked respondents to indicate whether or not each policy had been adopted within their municipality. For this analysis, we focused on the 101 environmental questions on the survey in eleven of the issue areas. (The twelfth category measured aspects of social equity.) Summaries of the eleven environmental issue areas can be found in Table 1 and cover energy, greenhouse gas reduction, water, recycling, transportation, buildings, land use and purchasing policies. Policy adoption options were quite detailed. For example, under recycling, respondents were given a list of eight policies, which covered both municipal operations (e.g. “Internal program that recycles paper and plastic and glass in your local government”) and private sector activity (e.g. “Community-wide recycling collection program for paper and plastic and glass for residential properties”). For a complete listing of all activities on the survey as well as descriptive statistics of the responses, see Svava (2011).

Table 1 – Descriptions of the issue areas that comprise the environmental policy adoption score

- (1) *Greenhouse gas reduction and air quality* (8 policies) measured if communities undertake basic emission inventories, and set emissions reduction goals. It also asked about local air pollution initiatives and tree planting programs.
- (2) *Water quality* (5 policies) inquired about whether a community had policies to conserve water from aquifers, reuse grey water, and incentivize water conservation. Policies relating to encouraging conservation through water pricing also fell under this issue area.
- (3) *Recycling* (12 policies) asked about recycling and composting programs in government offices as well as the broader community. It also asked about Pay-As-You-Throw residential trash programs, hazardous waste collection, and restrictions or incentives on plastic bag use in local retail and grocery stores.

- (4) *Energy use in transportation and exterior lighting* (9 policies) included fuel efficiency targets for government fleet vehicles, purchase of natural gas fueled vehicles, upgrading of traffic lights, installation of electric car charging stations and utilization of dark sky compliant light fixtures.
- (5) *Reducing building energy use* (15 policies). This category asked about local government actions such as energy audits of government buildings, purchasing of energy efficient appliances, upgrading HVAC systems in government facilities, support for energy audits and weatherization of residential and commercial structures, and financial support for residential and/or commercial HVAC upgrades.
- (6) *Alternative energy generation* (5 policies) included activities such as the installation of solar panels on government buildings, financial incentives for solar installations on homes or businesses, and generation of electricity through municipal operations, such as landfills.
- (7) *Transportation alternatives* (8 policies) dealt with policies to encourage government workers to use mass transit, carpool, bike, or walk to work. It also asked about telecommuting by government employees.
- (8) *Transportation improvements* (12 policies) asked if communities had adopted policies to add biking and walking trails, require sidewalks in new developments, require charging stations for electric vehicles, and require bike storage facilities.
- (9) *Building and land use regulations* (14 policies) included policies such as green construction requirements, transit oriented development, reduced fees and tax incentives for sustainable project development. It also asked about zoning to allow solar, wind and other renewable energy as well as to increase densities.
- (10) *Land conservation and development rights* (5 policies) sought to learn about brownfield redevelopment, land conservation, historic building protection, and transfer of development rights programs.
- (11) *Local production and green purchasing* (8 policies) measured city actions to purchase local materials, environmental education programs, green product purchasing for the local government, and support for community gardens.

Our dependent variable, the *environmental policy adoption score* weights the average adoption of these 101 environmental policies across the 11 issue areas and produces a range from 0 to 100. Our score is modeled on a sustainability score developed by Svava (2011) to capture both the amount and the breadth of activity, and prevents a local government that focuses only on policy adoption in a narrow range of issue areas from getting a deceptively high score, which could result by simply averaging all the individual policies.

Independent Variables

The independent variables for the regression model are comprised of socio-economic, demographic, political, and local government factors derived from our literature review of previous research. Table 2 provides summary statistics for all variables in the model. We grouped the independent variables into the following subject areas.

Table 2 – Descriptive statistics of variables

	All observations (n=1,497)			Large municipalities (n=246)	Small municipalities (n=1,251)
	Mean ^a	Stan. Dev	Min./Max	Mean ^a	Mean ^a
Environmental policy adoption score	18.4	12.4	0 / 73.6	31.2	15.8
<u>Polycentric variables</u>					
Population ^b	28,239	52,533	1,997 / 731,424	108,770	12,403
Pop. change 2000-10 (percent) ^b	13.8%	30.9%	-36.6 / 510.8	18.6%	12.9%
Population density (person / sq. mile) ^b	2,315.4	1,912.9	3.1 / 17,112.5	3,279.3	2,215.8
Home ownership (percent) ^c	64.3%	13.0%	20.3 / 97.5	59.5	65.2%
Metro status (Number in sample)					
- Suburb (1=yes)	57.1%	N/A	0 / 1	47.2%	59.1%
- Central city (1=yes)	10.2%	N/A	0 / 1	49.2%	2.4%
- Rural (1=yes)	32.7 %	N/A	0 / 1	3.6%	38.5%
<u>Multilevel governance variable</u>					
State influence score	1.2	1.2	0 / 3.25	1.6	1.1
<u>Managerial capacity variables</u>					
Council manager government (1=yes) ^d	63.1%	N/A	0 / 1	84.6%	58.8%
Staff for sustainability (1=yes) ^d	27.1 %	N/A	0 / 1	59.3%	20.7%
<u>Fiscal capacity variables</u>					
Local govt. revenue per capita (\$) ^e	\$978	\$934	0 / 18,279	\$1,277	\$919
Change in employment (1999-2009) ^f	2.7%	18.8%	-57.5 / 178.9	3.8%	2.5%
Local economy in manufacturing ^c	12.8 %	6.4%	0.7 / 67.1	10.6%	13.2%
Per capita income (\$) ^c	\$27,169	\$12,677	6,399 / 124,327	\$27,576	\$26,891
<u>Civic capacity variables</u>					
Citizen commission (1=yes) ^d	25.5%	N/A	0 / 1	41.9%	22.2%
Population over age 65 ^b	14.7%	5.8%	2.7 / 68.7	12.4%	15.1%
Educ. attainment (BS/BA or more) ^c	27.8%	15.8%	2.4 / 86.8	33.0%	26.8%
Percent white ^b	79.6%	17.8%	3.3 / 99.3	68.6%	81.8%
Poverty rate ^b	9.6%	7.0%	0 / 46.8%	9.6%	9.6%

^a For dichotomous variables, percent in sample is presented.

^b U.S. Census of Population and Housing 2010

^c American Community Survey Five Year Avg. 2006-2010

^d derived from survey responses

^e Census of Government 2002

^f County Business Patterns

Polycentric variables. Municipalities acting on their own must have some internal motivation. The literature indicates that population, population growth, and density (Lubell, Feiock, and Handy 2009) as well as homeownership rate (Fischel 2001) are internal drivers in a polycentric framework. We draw these variables from the 2010 US Census of Population and Housing. A positive relationship between these variables and the adoption of sustainability policies would indicate that local governments have internal pressures to protect the environment and prompt action in a polycentric manner. Metro status is the final public choice variable. In a polycentric system, environmental policy adoption could be higher in the suburbs and rural areas due to the competitive local government landscape. However, differences in policy adoption due to metro status should be minimal when controlling for other factors such as size, capacity, and economic condition.

Multilevel governance variables. To test the influence of state government, and therefore the importance of a multilevel governance environment, we developed a state influence score that measures whether the state government creates a policy and political atmosphere that is conducive to sustainability policy adoption. The index is based on a survey of state climate change and renewable energy planning undertaken by Wheeler (2008). Climate change is one of the most controversial and complex sustainability issues and thus state policy leadership in this area may be particularly important in motivating local policy adoption. The equation to calculate our state influence score is: State influence score = greenhouse gas reduction goal (percent reduction) / number of years to goal starting from 2000 + renewable energy goal (percent in portfolio) / number of years to achieve that goal, starting from 2000. This measures both the goal and the progress toward meeting that goal. For example, California, Oregon, and Vermont have high scores because they adopted aggressive greenhouse gas reduction targets and set high goals for renewable energy production. As of Wheeler's article in 2008, 24 states had neither greenhouse gas reduction targets nor energy portfolio goals and therefore receive a score of zero. In a polycentric framework of local government action, we would expect no correlation between the state influence score and our environmental sustainability policy adoption index. However, if our alternative hypothesis regarding the importance of a multilevel governance framework is true, then we would expect higher local government policy adoption in states which set policy standards and goals.

Capacity variables. Local capacity to carry out environmental policies requires both government

resources and citizen involvement. Researchers have devised numerous variables to serve as proxies for local government capacity. The variables we use are described below. We expect all to be positively correlated with the adoption of sustainability policies.

For managerial / administrative capacity, we measure two variables. First, the presence of a city manager form of government as those municipalities have been shown to undertake more innovative policies in general (Nelson and Svava 2012) and more sustainability policies in particular (Svava 2011). Our second measure is whether the community has staff specifically assigned to support sustainability policies. These data come from the ICMA sustainability survey.

Fiscal capacity is primarily determined by economic development and the tax base of the community. Prior research finds local government resources impact investment in sustainability (Lubell, Feiock, and Handy 2009). We use local government revenue raised per capita as an indicator of fiscal capacity and we derive this ratio from data in the 2002 U.S. Census of Governments. Regarding economic development, we include change in employment from 1999 to 2009 (U.S. County Business Patterns) to capture economic growth. We also use median capita per income, which has been shown to correlate to increased environmental protection efforts (Lubell, Feiock, and Handy 2009; Schmidt and Paulsen 2009; Zahran et al. 2008). Multilevel governance theory gives more attention to capacity constraints and would expect places with lower capacity to engage in fewer policies.

We employ two measures of civic capacity. First, the sustainability survey inquired about the presence of an official appointed commission or committee of citizens to deal with sustainability-related issues. Second, we use educational attainment, specifically the percentage of the population with a bachelor's degree or more, to measure the potential for community members to provide expertise for undertaking environmental policy implementation (Lubell, Feiock, and Handy 2009; Zahran et al. 2008). We also include the portion of the population over 65 years of age as this group has more retired people with time to invest in community leadership on new policy challenges (Brown and Glasgow 2008). Poor and minority communities have less environmental protection (Bullard and Johnson 2000) and thus we include the portion of the population in poverty (2005 - 2009 U.S. American Community Survey) and the portion that are white (2010 U.S. Census of Population and Housing) to control for social equity concerns. Multilevel governance theory gives more attention to equity and coordination concerns.

Analysis of Results

We ran multilevel, maximum likelihood regression models to test each factor across the entire sample (model 1) and two subsamples: large municipalities with populations greater than 45,684 (model 2), and small municipalities (model 3). We ran all three models as multilevel regressions to account for any other state effects that might impact decision making. Examination of the Variance Inflation Factors diagnostic indicates no multicollinearity problems. The results of the three models can be found in Table 3.

Table 3 – Results: Environmental Sustainability Policy Adoption, US Municipalities, 2010

Model	1 All cities (n=1,497)	2 Large cities (n=246)	3 Small cities (n=1,251)
<u>Polycentric variables</u>			
Population (ln)	**3.342	**4.150	**3.444
Pop. change 2000-10 (percent)	**0.029	*0.058	**0.024
Population density	0.000	0.000	0.000
Home ownership (percent)	**-.093	**-.0341	**-.068
Metro status (suburb is reference)			
- Central city	**2.619	*4.504	1.616
- Rural	*1.473	3.789	1.168
<u>Multilevel governance variable</u>			
State influence score	**1.873	**2.455	**1.676
<u>Managerial capacity variables</u>			
Council manager government (1=yes)	**1.728	3.931	**1.822
Staff for sustainability (1=yes)	**6.764	**7.686	**6.117
<u>Fiscal capacity variables</u>			
Local govt. revenue per capita (\$/capita)	**0.001	**0.003	**0.001
Change in employment (1999-2009)	0.001	-0.038	0.004
Percent manufacturing	0.028	0.151	-0.012
Per capita income (\$)	**0.000	0.000	**0.000
<u>Civic capacity variables</u>			
Citizen commission (1=yes)	**3.242	2.954	**3.286
Percent of population over 65	0.043	0.173	0.046
Educ. attainment (% bach. or more)	**0.113	0.036	**0.094
Percent white	0.024	0.012	0.021
Poverty rate	*-0.126	**-.1.031	-0.083

** indicates significance at the 0.01 level* indicates significance at the 0.05 level

Among the polycentric variables, two (population and population change) support the hypothesis (H_0) that public choice drives municipal action in a polycentric manner, while three (homeownership, population density, and metro status) do not. Population size is significant across all three models. It confirms previous research that larger places have a higher rate of environmental policy adoption. Population change was positive in all three models. This is consistent with observations made by Hanna (2005) in case studies of two resource communities in which population growth provides an internal motivation to act.

However, homeownership and metro status run counter to polycentric expectations for independent action. Homeownership rate is negatively correlated to sustainability policy action. This runs counter to Fischel's (2001) contention that homeowners will support local government efforts to protect the environment because they protect property values. Since our environmental adoption score includes a broad range of actions including those that would not directly affect home values (such as local government energy use), we tested this result using a sub-index of environmental policies that would directly impact local home values in the short-term and be visible to homeowners.⁵ We found consistent results: municipalities with higher rates of homeownership engaged in fewer sustainability policies. Perhaps Fischel's hypothesis accurately reflects situations in which a community faces the threat of a dirty industry or mega-shopping mall coming to town, however, the evidence undercuts his general implication that homeowners will encourage local officials to protect the broader environment.

The last polycentric variable is metro status: central city, suburban, or rural. Our results indicate that both central cities and rural municipalities have higher environmental policy adoption scores than suburbs. This contradicts Fischel's (2001) suburban research, which finds that homeowners can influence local government actions related to property values and quality of life. Service spillovers from core cities are often used to explain why suburbs can invest less in environmental protection as well as a range of other programs, such as affordable housing, higher density housing or industrial development (Norris 2001; Orfield 2002). This enables suburbs to shoulder a relatively lower tax burden than rural or urban core communities (Warner 2006) and raises the need for higher levels of government to provide capacity in some form to municipalities. Therefore, our model results support the multilevel governance framework, which gives greater emphasis to equity and coordination concerns.

The alternative hypothesis, that local government sustainability policies increase in a multilevel

environment, is further supported by the state influence score, which shows that a supportive state policy environment correlates to a higher environmental policy adoption score among local municipalities. The impact of the state policy environment is stronger in big cities than in smaller ones. This was an unexpected finding as we had anticipated that state influence would be stronger in the smaller places where sustainability actions are less common and where state technical and fiscal resources would be more needed. We suspect the reason for the more positive relationship between the policy adoption score and larger cities is the increased interaction that larger communities have with state government on a wide variety of issues. They can utilize these existing avenues of communication as they seek funding or expertise for sustainability.

Capacity variables show support for polycentrism (as internal drivers) as well as support for a multilevel governance approach, which is concerned more about capacity constraints and equity. In support of polycentrism, communities that had staff dedicated to sustainability issues adopted many more policies, as expected. Also, local governments with a council-manager form of government showed higher environmental policy adoption scores in models 1 (all municipalities) and model 3 (small municipalities). Council-manager forms of government are linked to more innovative municipal policies in general (Nelson and Svava 2012). The difference in our results between larger and smaller places may result from the nature of professional management. City managers move from city to city and are exposed to innovative ideas from their professional organizations (Schneider, Teske, and Mintrom 1995). These appointed leaders have access to more sustainability strategies and recognize the importance of such strategies that elected political leadership may lack. In larger places, there exists more technical staff and a broader connection to professional networks by more staff members and elected officials, which make the professional manager less important in determining levels of environmental policy adoption.

Fiscal capacity is also important. Communities with higher local government revenue per capita show higher environmental policy adoption scores. We find that per capita income is not a driver in large cities (similar to Portney 2013), but it does have an effect in small municipalities. Taken together these fiscal capacity variables show support for multilevel governance, which argues that resource constraints limit independent sustainability action by municipalities. Neither economic growth nor manufacturing dependence shows a relationship to the adoption of environmental policies. We had anticipated a goal conflict between economic development (jobs) and the environment, but our models show no effect. Local leaders find ways to

promote environmental sustainability without harming economic development.

In terms of civic capacity, two variables were significantly related to increased adoption of sustainability strategies in model one (all communities) and model three (small communities): educational attainment and the presence of a citizen commission tasked with sustainability issues. This is not surprising. Large cities have technical staff and access to resources that make dependence on citizen involvement less necessary. For smaller places, citizen-based resources are critical and citizen involvement is a key to sustainability policy adoption. The percent of the population over 65 was not significant in any of the models. Polycentrists argue that local action is responsive to citizen interests and these results lend support to that thesis, especially in smaller municipalities.

Poverty is negatively correlated with sustainability policy adoption, but this is primarily a problem in larger cities, according to our model. This could be because communities with higher poverty lack the additional resources needed to pursue sustainability investments or because these communities face goal conflicts between rich and poor residents regarding sustainability policy. Thus social equity with regards to class appears to be a barrier to environmental policy adoption, lending support to the multilevel governance thesis. The racial makeup variable had no effect.

Discussion

The results provide very limited support for the hypothesis that public choice drivers will propel independent action on sustainability in a polycentric manner. Although population and population change positively correlates with sustainability policymaking, the other internal driver variables portray a different picture. Rather than homeownership fostering environmental protection as a means to preserve property values (Fischel 2001), homeownership is negatively correlated with increased sustainability policy action. It could be that Fischel portrays the power of NIMBYism exactly backwards. Instead of protecting the environment, homevoters, through NIMBYism, may block important sustainability actions, such as increased density, public transit, mixed-used development, or permitting of renewable energy (Downs 2005). Rather than embrace such environmental measures, homevoters may oppose them out of fear these would change the character of their community. Portney (2013) has noted the conundrum with regards to the dual outcomes of civic participation, which can both help overcome and contribute to NIMBYism and challenges of

the regional commons. Issues of class may work the same way. Opposition to affordable housing, regional transit and other environmental sustainable actions may be motivated by a desire to maintain residential homogeneity (Frug 1999).

Polycentric theory argues that suburbs, which most closely reflect the competitive Tiebout world of public choice, should exhibit higher sustainability action in an effort to protect property values (Fischel 2001). However, our analysis shows suburbs exhibit the lowest adoption rates. Suburbs may be free riding on the sustainability policies of their central cities, rather than protecting the environment on their own. At the same time, they produce negative externalities, such as increased greenhouse gas emissions, water runoff, and air pollution by nature of their built environment. The cost of such policy fragmentation and externality spillovers is borne by the larger metropolitan region (Norris 2001). Urban planners have long sought to identify strategies that bring suburbs into collaborative policymaking at the metropolitan level (Orfield 2002; Pastor, Lester, and Scoggins 2009). Our analysis confirms the need for a coordinated regional effort, which may be facilitated by a multilevel governance framework.

Interestingly, our analysis indicates that municipalities in nonmetropolitan areas are engaging in higher levels of environmental sustainability policy adoption than we expected. Since rural areas do not enjoy the urban adjacency spillover benefits that suburbs do, these non-metro areas may have higher incentives to act. Given that rural communities are the custodians of our most critical water and land resources, this level of activity in sustainability policy is promising, and lends some support to the polycentric thesis.

The results of this study illustrate the importance of state government in increasing the adoption of sustainability policies among municipalities. State influence promotes a discussion of environmental protection in addition to offering incentives or technical assistance. In this way, state governments can create a political atmosphere that educates and encourages local action on these issues. Multilevel governance enables a broad and coordinated discussion, which is important since most environmental issues cross local political boundaries. In addition, state government can serve as a source of scientific expertise and a repository of local best practices. Policy produced in a multilevel framework can more effectively create policies for complex environmental issues than municipalities working alone.

We find the role of civic capacity is important, particularly in smaller places. While educational attainment of residents is not a significant factor in the sustainability policymaking of larger municipalities, it

is significant in smaller places. In the same way, citizen commissions are strongly correlated with sustainability action in smaller municipalities, though not in bigger ones. In these smaller communities, citizens may feel they can have a significant impact in terms of policymaking by adding their expertise and energy to local government efforts at environmental protection. The use of officially appointed citizen commissions charged with developing and overseeing sustainability actions extends the capacity of local government in smaller places with fewer staff. Engagement is not simply as a homeowner voting their own interests, as argued by Fischel (2001), but as participants from a broader community perspective (Portney 2013; Portney and Berry 2010). When citizens are engaged in the policy design process, they may build support for policies and ensure that they are framed appropriately for local situations. These results lend support to the polycentrism thesis that sustainability policymaking is driven from the bottom-up.

Our results show that environmental protection and economic development are not closely linked; a finding that undermines the polycentric view of economic development as a driver of environmental protection. The finding does offer support, at least in part, for sustainability's triple bottom line of meeting environmental, economic, and social goals simultaneously (Campbell 1996; Fiorino 2010; Hart and Milstein 2003). However, while we find that economic and environmental goals do not have to be in conflict, the challenge of bridging equity and the environment remains. Poor people often bear the brunt of environmental degradation in the siting of polluting or hazardous facilities (Bullard and Johnson 2000). Multilevel governance is needed with higher-level government policies equalizing environmental impacts across regions so that poorer communities, which may have the most to gain from sustainability policies, can participate.

Conclusion

Our research shows both the potential and the limits to local government leadership on environmental sustainability initiatives. While we find some support for internal drivers of local action in a polycentric framework (population, local civic engagement), other factors deemed important to promoting polycentric policymaking by municipalities, such as population density, homeownership and economic development, have no impact – or, in the case of homeownership, appear to be an impediment. Individual municipalities, on their own, seem to have little economic or political incentive to act on sustainability policies. Indeed our model results show strong support for the capacity constraints, spillover, and

coordination concerns raised by multilevel governance theory.

This study finds that suburbs, despite their polycentric drivers, are laggards in the sustainability arena. Rather than internal drivers pushing towards environmental protection policies, their drivers (most likely NIMBY responses to growth) press those communities to oppose sustainability policies, such as dense development and public transit. Suburbs' failure to act in a polycentric manner, therefore, may undermine the sustainability efforts of the entire metropolitan region. In the absence of a broad coordinating framework or effective sanctions to ensure compliance, suburban communities can enjoy positive spillovers from central city investments and pass the negative externalities of their actions (or inaction) onto the larger region. Thus they lack incentive to promote policies with local, short-term costs but long-term, regionally (or globally) diffuse benefits – the classic tragedy of the commons (Hardin 1968).

This study has demonstrated the important role of a coordinating, multilevel governance framework in motivating municipal environmental policy action. Municipal sustainability actions are higher when they occur in a multilevel governance framework where the strengths of all levels of governments as well as citizens are harnessed. For example, states like California and Massachusetts, which create a framework for local policy regarding environmental policy, growth controls, or transit show higher levels of sustainability policy adoption – even among suburbs. Future research should give more attention to state level policy frameworks that can promote regional coordination and policy targets, as these seem to encourage more local sustainability action.

Our research has identified important differences between large cities and smaller communities in sustainability policymaking. Smaller places rely more heavily than large cities on citizen commissions, an educated populace, and professional managers. Most previous studies have not included the small city/town and suburban areas in their analyses; yet these are the places where most Americans live. Understanding what motivates them to act is important both to academic researchers and policymakers. Our results suggest states should give more attention to addressing capacity constraints of smaller communities and facilitating more citizen involvement.

Finally, our research findings offer a promise and a challenge for sustainability planning at the local level. The promise is the evidence that communities need not make the false choice between economic development and environmental protection. Local leaders in many communities have found ways to bridge

the potential conflict between these two aspects of sustainability. The challenge is to balance environmental protection and equity and alleviate the capacity constraints of smaller municipalities. This is why a multilevel governance framework is critical to promote sustainability policy adoption.

Notes

¹ Mayor George Heartwell spoke on a panel about climate change at the 2013 Mayors Innovation Project conference in Washington, DC on January 15, 2013.

² The ICMA survey was designed and conducted in collaboration with researchers at Arizona State University's Center for Urban Innovation and ASU's Global Institute of Sustainability.

³ Surveys were mailed to the chief administrative officer of each jurisdiction. Of those respondents who provided their job titles, 71.0 percent reported they were the chief appointed or elected official. (Titles in this category included: mayor, city manager, village manager, city administrator, etc.) Another 5.9 percent reported they were in the office of the chief appointed or elected official. (Titles in this category included: assistant city manager, assistant to the city manager, assistant to the mayor, etc.) Another 3.5 percent were staff in the planning office.

⁴ Central cities represented 10.1 percent of our sample vs 7.5 percent in our universe of all city-type local governments over 2500 population, suburbs are 57.1 percent in our sample versus 59.9 percent in the universe, and 32.8 percent of our sample is rural compared to 32.6 percent in the universe.

⁵ The sub-index tracked whether or not a municipality had adopted the following local policies: air pollution, tree preservation and planting, residential recycling, household hazardous waste recycling, household electronics recycling, residential energy audits, residential weatherization, HVAC upgrades for homes, energy efficient appliance purchasing, solar equipment installation, bike lanes on streets, biking and walking trails, bike parking facilities, expanded bus routes, subway or streetcar system, development fee reduction for

environmentally friendly development, brownfield revitalization program, land conservation, transfer of development rights for open space preservation, and support for a local farmer's market.

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