An Examination of Cities' Policy Instrument Selection for Local Land and Water Management

Rachel M. Krause, University of Kansas

Angela Y.S. Park, University of Kansas

Abstract

Cities' prioritization of economic development goals have traditionally been viewed as hindering local environmental sustainability efforts – particularly in terms of the adoption of policies that go beyond what is necessary to achieve compliance with basic standards mandated from higher levels of government. However, with the decline of industry in urban areas and the increase of a mobile creative class, some cities view explicit sustainability initiatives as a competitive advantage. Policy initiatives consist of a set of objectives as well as the specific policy instruments employed to attain them – which together shape their likely impact. This paper empirically examines the factors that influence instrument choice and the content of policy mixes developed by local governments in the pursuit of sustainable local land and water use. It utilizes 2015/2016 survey data collected from 504 US cities with populations over 20,000 and employs bivariate probit regressions to assess the factors that influence cities to pursue three different environmental objectives by using regulations, financial incentives, or a combination thereof. Results point to the strong influence that environmental prioritization has on cities' instrument type decisions but reveal a more complex relationship between government institutions, regional pressures and instrument choice. The latter supports previous findings on the influence of target population identity.

Introduction

Around the world and particularly in the United States, where political conflict has stymied national and state policy action, cities are increasingly seen as the level of government "where things get done" (Castro, 2016). This is notably the case around issues of environmental sustainability, where – both in traditional local governance arenas, like land use management, and in less traditional ones, like climate protection – cities are frequently being described as policy leaders and innovators (Krause 2011a; Portney 2013; Joss 2015). In recent years, many US cities have embraced sustainability as an objective and have undertaken ambitious planning processes and developed policies in pursuit of this aim. Although some portion of these efforts have been criticized as symbolic (Betsill and Bulkeley 2007; Krause 2011b), a substantial number of cities have implemented meaningful actions that employ relatively strong policy instruments, including regulations and financial incentives.

This dynamic is seemingly at odds with two old tropes: namely that economic growth and environmental protection almost inherently pull in opposite directions and that economic development pressures have an outsized influence in shaping local government decisions (Molotoch 1976; Peterson 1981). Together they contribute to the conventional wisdom that cities are unlikely to engage in meaningful environmental protection above and beyond what is mandated by higher authorities. This is particularly expected to be the case in places with intense interjurisdictional competition, such as in metropolitan areas with a large number of cities in close proximity to each other (Osgood, Opp, and Bernotsky, 2012). However, the decline of traditional industry in urban areas and the growth of a mobile creative class, whose members are able to select a city of residence based in part on the quality of life amenities it offers, are increasingly challenging these assumptions (Portney 2013; Florida 2002). In this

context, effective environmental protection and sustainability initiatives may offer cities a competitive advantage. Still, local policies that are not seen as "business friendly" – such as those that restrict choice or add to costs – continue to face uphill battles in many cities.

A sizable literature has examined the factors, including those comprising the environment-economy dynamic described above, which lead cities to adopt sustainability policies. However, these studies fail to examine the factors that influence the choice of policy instruments type used to achieve them. The latter is important because the combination of a policy's objective and the instruments it employs together shape its likely impact on the local economy and environment. Although the number of specific combinations and calibrations is infinite, governments have a rather small number of general instrument types available for use; and each of these general types is associated with a set of features and behavioral assumptions that give insight to and enable basic predictions about their impact (Schnieder and Ingram 1990; Salomon and Elliot 2002). For example, regulations tend to be relatively coercive and thus are frequently associated with high levels of effectiveness but lower levels of manageability and political support. Financial incentives, on the other hand, are generally less coercive and are associated with higher levels of efficiency and political support, but often more moderate effectiveness (Salomon and Elliot 2002).

This paper sits at the nexus of three literatures – that on urban sustainability, local economic development, and policy instrument choice – and uses insights from each to explore the dynamic shaping cities' selection and design of their environmental policies. Specifically, it addresses the question of how regional dynamics, economic pressure, and policy and institutional context, influences cities' choice of instruments within their policy mix for environmental sustainability. The next section of the paper reviews scholarship on the relationship between

3

interjurisdictional competition, economic development, and sustainability in metropolitan areas. This is followed by an overview of the literature on policy instruments and the factors that influence and constrain governments' selection choice. Next we describe the sample, data, and methods used in this analysis, followed by a presentation of both descriptive and analytical results. We close with a discussion of the policy implications of our findings.

Competition, Economic Development and Sustainability

A long literature establishes the role that economic development plays as a priority for local governments (Molotch 1976; Peterson 1981). The arguably disproportionate emphasis placed on attracting and maintaining local economic growth is often attributed to the strength of pro-development interests and the competitive pressures that exist between cities as a result of the ease with which residents, businesses, and industry can move between them, particularly in fragmented metropolitan areas. The dynamic, famously captured by Tiebout (1956) with the notion that people "can vote with their feet" and select to locate in the jurisdiction whose policy and services bundle best matches their preferences, motivates cities to vie for businesses and desirable residents. The "most attractive" bundles for these groups have traditionally been characterized by low taxes and lax regulatory standards, which work against the local adoption of environmental policies not mandated by a higher authority.

However, as traditional business and industry interests lose influence in urban areas and quality of life becomes an increasingly important draw, there is evidence that this dynamic may be changing (Portney 2013). Quality of life amenities, which include aesthetically pleasing natural and built environments and opportunities for outdoor recreation, are pointed to as particularly important in attracting the highly skilled and educated workforce associated with the

"creative class" (Florida 2002; Hawkins, Kwon, and Bae 2016). Local governments appear cognizant of this shift and recent research has observed that a significant portion of the US cities that are actively pursuing sustainability initiatives are at least partially motivated to do so by the desire to obtain a "green reputation," which can help them attract mobile residents seeking to live in a place that offers a high quality of life (Krause 2013; Portney 2013). Scholars have previously characterized amenity-based aspects of local economic policy as "unself-conscious," whereby amenities are promoted although not explicitly incorporated into economic development strategies (Johnson and Neiman 2005). More recent studies observe that some cities are extending their economic development policy frames to explicitly include sustainability and environmental protection initiatives. For example, Hawkins, Kwon, and Bae (2016) find that larger cities and those where traditional development faces political opposition are more likely to pursue environmental sustainability to directly promote economic development; and Osgood, Opp, and Demasters (2016) find cities that report using sustainability as an economic development strategy implement a modestly larger number of sustainability policies.

A sizable literature examines the factors that influence cities' decisions about whether or not to pursue sustainability efforts. Findings from this literature often point to the importance of local government capacity in terms of both financial and human resources (Wang et al 2012; Homsy and Warner 2015) and having a supportive local political climate (Ramirez de la Cruz 2009; Portney and Berry 2015). Local institutions are also impactful, with the council-manager form of government appearing to reduce cities' community oriented sustainability efforts, but increasing those aimed at internal operations (Bae and Feiock 2013; Deslatte and Swann 2015). The literature yields mixed results in terms of the impact that economic and competitive pressures, have on cities' efforts: some studies indicate that local governments whose economies

5

are tied to the manufacturing sector or other carbon intense industries are less likely to engage in climate protection and sustainability efforts (Portney 2013; Zaharan et al 2008), whereas others find no such impact (Krause 2011a; Sharp, Daley, and Lynch 2011). Few studies in this literature stream have explicitly incorporated interjurisdictional competition measures into their empirical models, but those that do tend to find a limited effect on cities' decisions to pursue sustainability initiatives (Krause 2011a; Bae and Feiock 2012). Moreover, studies on local sustainability have largely failed to consider the factors that influence the selection of type of policy tool employed, leaving the gap this paper intends to start to fill.

Policy Instrument Choice

Although policy instruments have been well-studied from theoretical economic and political perspectives (e.g. Schnieder and Ingram 1990, 1993; Keohane et al 1998; Salamon 2002; Howlett 2009) and their selection empirically examined at higher levels of government including states and counties (Soss et al 1990; Feiock, Tavares, and Lubell 2008; Matisoff 2008; Yi and Feiock 2012), the specific factors influencing cities' choices for policy instruments have received less empirical attention. In part because the city context is characterized by more intense interjurisdictional competition for attracting residents and industry, the insights gained at these higher levels of government do not necessarily translate downward.

Even among cities pursing similar environmental aims, there is often considerable variation in the types of policy instruments that they employ to address them. The extant literature offers discussions of the objectives and context that may shape these choices. Salamon (2002) describes the basic guiding logic of selecting policy instruments as matching the characteristics of the instrument to the nature of the task; but other scholars emphasize the

6

economic, intergovernmental, and political constraints which can challenge the success of this matching process (Schneider and Ingram 1993; Richards 1999; Howlett 2009). In this politicized context, the identity and social reputation of policies' target populations has been found to meaningfully influence policy design, whereby instruments that maximize discretion and material benefits are more frequently selected when the behavior of advantaged groups are being targeted for change (Schneider and Ingram 1993, 1997).

Previous policy choices made by a government also influence the types of policy instruments it considers feasible and desirable. Howlett (2009) observes that policies are constructed as part of nested arrangements and that decisions made at different levels "co-determine" each other. At the macro-level, general aims and objectives are identified by a government. Reflecting those preferences, the governing mechanisms, i.e. the instruments for achieving stated objectives, are specified at the meso-level. Finally, the micro-level involves the calibration of those instruments to achieve particular targets. Deslatte and Swann (2015) utilize a macro-perspective in their examination of cities' selection of green policy tools in the context of organizational goals, e.g. greenhouse gas reduction and energy efficiency. By contrast, this paper emphasizes a meso-level program operationalization where specific types of policy instruments are selected to advance identified environmental objectives, but they are not calibrated to reach particular targets.

Multiple instruments are often used to achieve a particular objective, and their combination can cause interactions that amplify or diminish their individual effect and efficiency (del Rio Gonzalez 2007; Bennear and Stavins 2007). Although interactions remain an important focus, a growing literature on policy mixes takes a conceptually larger approach and additionally considers the processes by which particular combinations of instruments emerge (e.g.Howlett

2009; Howlett and Rayner 2013; Rogge and Reichardt 2016). Ideally, policy mixes consist of objectives and instruments that are "consistent, coherent, and congruent," but the rational approach needed to acheive this design is often outweighed by opportunism and the context and constraints created by existing governance arrangements (Howlett and Rayner 2013).

Sample and Data

Our analysis examines the factors that influence the instrument content of policy mixes – particularly the inclusion of incentives and regulations – developed by local governments in the pursuit of environmental sustainability. It focuses on US cities and utilizes a new dataset comprised of survey and government archival data. The Smart and Sustainable Cities Survey was administered via an online questionnaire, which ran from late 2015 through early 2016, and was sent to all cities in the United States with populations over 20,000 (n=1282). The questionnaire was sent directly to a staff member in each city government who was pre-identified, through website searches and/or phone calls to the city, as being "most responsible" for its sustainability efforts. Up to three electronic follow-up invitations were sent to non-respondents and a paper version of the survey was sent via first class mail to the work address of individuals who did not respond electronically. The survey took approximately 20 minutes to complete and asked about cities' sustainability priorities, administrative structure, internal and external collaboration on sustainability, and actions implemented.

Completed responses were received from 504 cities, located in 48 states and Washington D.C., for a response rate of 39.8 percent. The respondent cities reflect non-respondents on basic demographic indicators (See Table 1). The only metric on which there is a statistically significant (α=0.05) difference between them is that the residents of respondent cities are, on

8

average, more highly educated than those in non-respondent cities. However, the substantive size of this difference is modest: approximately 2.5% more of the adults in the responding cities have attained a Bachelor's degree or higher.

Table 1: A Comparison of Survey Respondents and Non-Respondents

	Respondents (n=510)	Non-respondents (n=772)	Significantly different at α=0.05
Population (2010)	107,221	102,035	No
Median Household Income	54,661	55,046	No
Percent in poverty	10.82	10.71	No
Education (Bachelors +)	31.71	29.21	Yes

Dependent Variables

Six dependent variables are used in this analysis, two each associated with a distinct local environmental objective: water conservation, greenspace preservation, and increased mixed-use development. The dependent variables are dichotomous and separately indicate whether cities have used financial incentives and regulations in the pursuit of each environmental objective. Numerous scholars have engaged in exercises to classify policy instruments into categories or typologies based on a shared attribute of interest (E.g. Salamon and Elliot 2002; Schneider and Ingram 1990; Vedung et al 1998; Weimer and Vining 2011). Although these classification schemes each yield a somewhat different number and organization of basic instrument types, incentives and regulations consistently emerge as important. However, even the most parsimonious instrument typologies include additional categories; perhaps most notably, information or education-based instruments. Thus, this paper's use of incentive- and regulation-based dependent variables represents a selective focus. The dynamic surrounding cities' decisions to employ these policy instruments is of particular interest because they are used relatively frequently while also potentially contributing to the local regulatory or tax burden,

which the traditional economic development literature suggests cities strive to avoid. Moreover, compared to other generic policy instrument types, like information-based instruments, regulations and incentives are typically regarded as being more effective but can require significantly greater political capital and transaction costs to adopt and implement (Salamon and Elliot 2002).

Although the dependent variables used in this analysis are dichotomous, cities' decisions about whether to utilize incentives and/or regulatory instruments to pursue a particular environmental aim may not be independently determined. For example, a city's decision to use financial incentives to promote local water conservation may increase or decrease its likelihood of also using a regulation to pursue the same aim. The data is cross-sectional and the statistical models employed account for this potential tetrachoric correlation. The values for all dependent variables come from the 2016 Smart and Sustainable Cities survey.

Independent Variables

Reflecting insights from the contributing literature, the models include independent variables that fall into three main substantive groupings – regional positioning and interjurisdictional characteristics, local economic health, and policy mix characteristics – and a series of controls. The regional variables are related to regional fragmentation and each cities' structural position in the larger metropolitan statistical area (MSA) where they are located, which serve as frequent proxies for interjurisdictional competitive pressure (Jimenez 2014). A larger number of independent city or town governments in a metropolitan area suggest greater interjurisdictional competition, which has traditionally acted as a barrier to adopting strong environmental policies, particularly regulations. We hypothesize that, although it may be weaker

than in the past, this dynamic will persist. On the other hand, being the central city in an MSA or having a proportionately large share of its population may indicate a regional dominance or influence that can provide a buffer from these competitive pressures and enable the use of policy tools that less regionally secure cities would be wary of. We thus hypothesize that, all else equal, regionally dominant cities will be more likely to have implemented environmental policies using incentives and/or regulations.

The economic variables provide a profile of the economic health and composition of each city. Higher rates of population growth, higher median income, and a larger proportion of a city's jobs that fall within "creative class" industries indicate a healthy modern economy that may view environmental sustainability as an economic advantage. We thus hypothesize that cities with these characteristics are more likely to spend political and financial resources to meet environmental objectives through the use of financial incentives and regulations.

The policy mix variables indicate the importance of environmental sustainability as a governmental goal and the degree to which it is seen as complimentary to other city objectives. The degree of prioritization a city government places on environmental sustainability reflects a macro-level objective that creates the context in which policies are designed and specific instruments chosen. California has more stringent environmental and land-use policies than most other states, creating a distinct state-level policy context in which its cities operate. This may potentially minimize a local "race to the bottom" incentive. Thus, a higher prioritization, minimal conflict with other budgetary objectives, and being located in California is hypothesized to increase the use of both incentives and regulations. Control variables include city population size, racial composition, and each city's form of government.

It is worth noting that two of the aforementioned independent variables – population growth and being in the State of California – may indicate problem severity in addition to their originally described effect. Cities with faster growing populations face greater pressures on their land and water resources, potentially increasing their probability of adopting stringent tools, particularly regulations, to manage their use. California has faced a severe drought for much of the 2000's, which reached historic levels by 2014, forcing municipalities and other users to take meaningful steps towards conservation. The problem severity driver associated with being located in California is expected to be relevant only for the dependent variables associated with water conservation and not the land use aims. Although the analysis will not be able to fully untangle the problem severity dynamic from the economic and policy mix ones also associated with these variables, the aims and instruments around which significance emerges may yield some insights. Table 2 provides a summary of the independent variables included in the model.

Table 2: Independent Variable Description and Source

Regional/Interjurisdictional Positioning	
Number cities in metro	The number of independent city or town governments in a city's metro- or micropolitan statistical area. *Source:* US Census.
Central city	A dichotomous variable indicating whether a city is the census designated "central city" in its MSA (1) or not (0). *Source:* US Census.
Percent of MSA population	The percent of its total MSA population that a cities' population contributes: *Source:* 2015 Census Estimates.
Economic Indicators	
Population growth	The percent change in a cities' population between 2010 and 2015. *Source:* 2010 US Census and 2015 Census Estimates.
Median income	The median household income in a city in $1000s. *Source:* 2010 US Census.
Creative class	The percent of a city's workforce employed in the following industry sectors: information, finance/insurance, professional scientific, education/health/social, arts/entertainment/recreation. *Source:* 2010 US Census.
Policy Environment Characteristics	
Environmental priority	The extent to which a city considers the environment a priority, ranging from (1) Not at all a priority to (5) Very high priority. *Source:* 2015 Smart and Sustainable Cities survey.

Conflict with other budget priorities	The degree to which conflict with other budgetary priorities is an obstacle for sustainability, ranging from (1) Not an obstacle to (5) Substantial obstacle. *Source:* 2015 Smart and Sustainable Cities survey.
California	A dichotomous variable indicating whether or not a city is located in the state of California.
Controls	
Population	2015 city population in 1000s. *Source:* 2015 Census Estimates.
Percent non-Hispanic White	Percent of city population that is non-Hispanic White. *Source:* 2010 US Census.
Mayor-Council government	Dichotomous variable indicating whether a city has a mayor-council form of government (1) or some other form (0). *Source:* International City/County Management Association.

Methods and Results

Descriptive Findings

An examination of descriptive statistics reveals several relevant findings. First, considering the two instruments together, the majority of cities in the sample have at least one regulation or incentive in place to pursue each of the three environmental objectives. On the high end, 81% of cities in the sample utilize at least one of these tools to promote mixed use development. On the low end, 64% of cities address residential water use through regulations and/or incentives.

A second observation from descriptive data is that the cities in our sample utilize regulations more frequently than incentives to advance their environmental sustainability goals. Figure 1 shows the percent of cities that utilize incentive and regulatory instruments to promote each environmental objective. Across the three policies, regulations are used 44% more often. The largest gap between the frequency of incentive and regulation use is seen with greenspace preservation: only 21% of cities use incentives in attempt to protect greenspace, whereas 63% utilize regulations to do so. Table 3 shows this information broken down slightly differently, indicating the number of cities that utilize regulations and incentives jointly, separately, and not at all for each policy aim.

Figure 1: Percent of Cities Utilizing Incentives and Regulations for each Environmental Policy
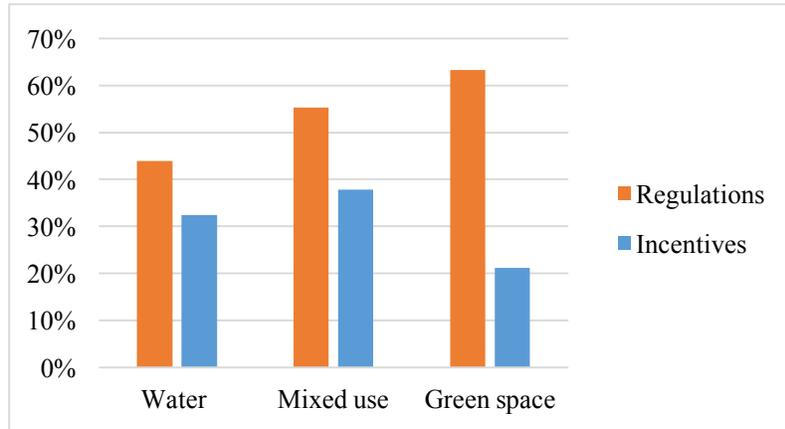

Table 3: Number of Cities Associated with each Policy Tool Use Category (n=504)

Dependent Variable	Incentive only	Regulation only	Both	Neither
Water conservation	165	224	62	182
Greenspace preservation	108	323	43	118
Mixed-use development	193	282	67	96

Empirical Findings

We employ three separate bivariate probit regressions to assess the factors that influence cities to purse each of the considered environmental aims utilizing particular policy instruments or combinations of instruments. Specifically we model cities' decisions about whether to utilize an incentive or not *and* whether to utilize a regulation or not as part of policy for water conservation, greenspace preservation, and mixed use development. Instrument selection may be jointly determined and bivariate probit models estimate decisions that are interrelated as opposed to independent. It is a joint model for two binary outcomes that may be correlated and can be thought of as a binary analogue to Seemingly Unrelated Regressions (Green 2012). Tables 4 through 6 present results as the marginal effect on the joint probability of the two dependent

14

variable outcomes. The columns in each table correspond to the four possible combinations of joint outcomes across the two instruments: neither instrument being utilized ($y_1=0$, $y_2=0$), incentives being utilized but not regulations ($y_1=1$, $y_2=0$), regulations being utilized but not incentives ($y_1=0$, $y_2=1$), and both instruments being utilized ($y_1=1$, $y_2=1$). Absent rounding, the marginal effects would sum to zero across the four joint probabilities. Coefficients are interpreted as the change in the likelihood of seeing each joint outcome given a one unit change in the independent variable, holding all other continuous independent variables at their means and dichotomous ones at zero.

As mentioned above, we employ bivariate probit model instead of binary or multinomial probit or logit models in order to account for the possibility that the outcome variables are not independent of each other. This expectation is largely supported as shown by the models' Rho statistics. Rho, included at the bottom of each table indicates the tetrachoric correlation between the bivariate outcomes in each model. It is significant at $\alpha = 0.05$ for water conservation and at $\alpha = 0.01$ for the two models related to land-use. This suggests that in these policy areas, instrument choice is jointly determined, whereby a city's decision about whether to utilize an incentive influences its decision about whether to use a regulation, and vice versa.

Looking first at Table 6, the results show that the choice of tools used to promote water conservation are meaningfully shaped by metropolitan fragmentation, whereby the addition of any one city in an MSA increases the likelihood of regulation use by the cities within it by 0.1% and decreases the likelihood of incentive use by the same amount. Given that the MSAs in our sample range from having one to 178 cities, the size of the effect is substantive. Cities that consider the environment to be a very strong local priority are 14.5% more likely to utilize both incentives and regulations to promote water conservation and are a fully 30% less likely not to

use either instrument, compared to otherwise equivalent cities that do not consider the environment to be a priority at all (prioritization is measured using a five point scale). Being located in California increases the odds that a city will use only regulations by 19.6% and use regulations and incentives jointly to by 14.3%. Several of the control variables, notably city population size and its racial composition are likewise significant.

Table 5 shows the factors associated with the choice of policy instruments for greenspace preservation. Notable results include that being designated the central city in a metropolitan region reduces the likelihood that a city will use regulations alone to encourage greenspace preservation, but increases the odds that it will use incentives and/or both instruments jointly to do so. Considering the environment to be a high priority significantly increases the likelihood of incentive use and joint instrument use, but does not significantly impact regulation use. Being located in California and having a mayor-council form of government increases the likelihood that neither instrument will be used, although having a mayor-council form of government has a large negative effect on cities' use of regulations and a smaller positive one on the use of regulations.

The results in Table 6 on the factors that influence instrument choice for mixed-use development show the being the central city in an MSA and having a mayor-council form of government are both associated with a decrease in the probability of regulation use and the increase of incentive use. Prioritizing the environment is likewise associated with a greater likelihood of incentive use and reduced likelihood of regulation use, but also the increased likelihood of both tools used together.

Table 4: Joint Probability of Instruments for Water Conservation (marginal effects)

	Neither instrument		Incentive- only		Regulation- only		Both instruments	
	$P(y_1=0, y_2=0)$		$P(y_1=1, y_2=0)$		$P(y_1=0, y_2=1)$		$P(y_1=1, y_2=1)$	
Number cities in metro	0.000		-0.001	**	0.001	***	0.000	
	0.001		0.000		0.000		0.000	
Central city^	0.005		-0.083		0.079	*	-0.001	
	0.060		0.057		0.046		0.030	
Pct of MSA population	-0.002	*	0.001		0.000		0.001	*
	0.001		0.001		0.001		0.001	*
Population growth	-0.005	*	-0.001		0.003		0.002	
	0.002		0.002		0.002		0.001	
Median income	-0.002		0.000		0.001		0.001	
	0.001		0.001		0.001		0.001	
Creative class	0.004		0.003		-0.005	*	-0.002	
	0.003		0.003		0.003		0.002	
Environmental priority	-0.060	**	0.042	*	-0.011		0.029	**
	0.027		0.024		0.023		0.014	
Budgetary conflict	0.024		0.006		-0.018		-0.012	
	0.021		0.019		0.018		0.010	
California^	-0.283	***	-0.056		0.196	***	0.143	***
	0.066		0.059		0.052		0.031	
Population (logged)	-0.094	***	0.062	**	-0.014		0.046	***
	0.029		0.027		0.025		0.017	
Non-Hispanic White	-0.001		0.002	***	-0.002	**	0.001	
	0.001		0.001		0.001		0.001	
Mayor-Council government^	0.100	**	-0.051		0.000		-0.049	*
	0.045		0.042		0.039		0.026	

n=497   Wald χ^2=114.76 (0.000)   Rho = 5.18 (0.023)

Results in Marginal Effects. All continuous IVs held at mean, dichotomous IVs held at 0.

^ indicates dichotomous IV.   Standard errors in parentheses.

Table 5: Joint Probability of Instruments for Green Space Preservation (marginal effects)

	Neither instrument		Incentive- only		Regulation- only		Both instruments	
	$P(y_1=0, y_2=0)$		$P(y_1=1, y_2=0)$		$P(y_1=0, y_2=1)$		$P(y_1=1, y_2=1)$	
Number cities in metro	0.001		0.000		0.000		0.000	
	0.000		0.000		0.000		0.000	
Central city^	0.008		0.048	**	-0.091	*	0.036	*
	0.042		0.021		0.053		0.021	
Pct of MSA population	0.001		0.000		-0.001		0.000	
	0.001		0.001		0.001		0.001	
Population growth	-0.001		0.000		0.001		0.000	
	0.002		0.001		0.002		0.001	
Median income	0.000		0.001		-0.001		0.001	
	0.001		0.001		0.001		0.001	
Creative class	0.002		-0.002		0.002		-0.002	*
	0.002		0.001		0.003		0.001	
Environmental priority	-0.081	***	0.029	**	-0.012		0.064	***
	0.021		0.013		0.028		0.017	
Budgetary conflict	0.019		-0.001		-0.007		-0.010	
	0.015		0.009		0.020		0.009	
California^	0.139	***	0.013		-0.093		-0.058	*
	0.041		0.027		0.059		0.033	
Population (logged)	-0.017		0.008		-0.007		0.016	
	0.020		0.013		0.028		0.013	
Non-Hispanic White	0.000		0.001		-0.001		0.000	
	0.001		0.000		0.001		0.000	
Mayor-Council government^	0.089	***	0.036	**	-0.111	***	-0.014	
	0.029		0.017		0.041		0.020	

n=496   Wald χ^2=69.67 (0.000)   Rho = 40.10 (0.000)

Results in Marginal Effects. All continuous IVs held at mean, dichotomous IVs held at 0.

^ indicates dichotomous IV. Standard errors in parentheses.

Table 6: Joint Probability of Instruments for Mixed-Use Development (marginal effects)

	Neither instrument		Incentive- only		Regulation- only		Both instruments	
	$P(y_1=0, y_2=0)$		$P(y_1=1, y_2=0)$		$P(y_1=0, y_2=1)$		$P(y_1=1, y_2=1)$	
Number cities in metro	0.000		0.001		-0.001		0.001	*
	0.000		0.000		0.001		0.000	
Central city^	0.012		0.083	***	-0.128	**	0.032	
	0.040		0.032		0.059		0.029	
Pct of MSA population	0.001		0.001		-0.002		0.000	
	0.001		0.001		0.001		0.001	
Population growth	-0.002		-0.001		0.002		0.001	
	0.002		0.002		0.003		0.001	
Median income	0.001		0.001		-0.002	*	0.000	
	0.001		0.001		0.001		0.001	
Creative class	-0.002		-0.001		0.003		0.001	
	0.002		0.002		0.003		0.002	
Environmental priority	-0.042	**	0.038	**	-0.047	*	0.051	***
	0.018		0.018		0.027		0.016	
Budgetary conflict	0.017		-0.005		0.004		-0.016	
	0.014		0.013		0.021		0.011	
California^	0.030		0.041		-0.069		-0.002	
	0.040		0.038		0.062		0.033	
Population (logged)	-0.032	*	0.004		0.001		0.026	
	0.019		0.019		0.030		0.017	
Non-Hispanic White	0.000		0.001		-0.001		0.000	
	0.001		0.001		0.001		0.001	
Mayor-Council government^	0.037		0.067	**	-0.110	**	0.005	
	0.030		0.027		0.045		0.024	

n=496   Wald χ^2= 51.39 (0.001)   Rho = 57.51 (0.000)

Results in Marginal Effects. All continuous IVs held at mean, dichotomous IVs held at 0.

^ indicates dichotomous IV.   Standard errors in parentheses.

Considering these results in light of the hypotheses presented earlier regarding the effects of a city's position within a larger region, its economic health and composition, and its larger policy context, we see limited support for the hypothesis related to local economics. None of the relevant independent variables – population growth rate, median income, or the proportion of creative class industries – had a meaningful impact across any of the three issue areas, offering

strong support to the conclusion that local economic health is not a significant factor influencing cities' decisions to utilize regulations and/or incentives to pursue environmental objectives. The results associated with the other two hypotheses and control variables are more mixed.

Tables 7-10 offer an alternative way to view the information previously presented. They reorganize the results so that each table corresponds with one of the four instrument category outcomes (i.e. neither, incentives only, regulations only, and both) and present the policy issue areas side-by-side. The results are again presented in terms of marginal effects. This organization facilitates the ability to compare effects across policy issues.

There are several areas of similarity across all three issues, perhaps most notably with the policy context variables. As expected, cities that prioritize the environment as an important local objective are more likely to utilize incentives, both on their own and in conjunction with regulations, all else equal. They are less between 21% and 30% less likely than otherwise similar cities not to use either policy instrument on these issues. The positive effect of environmental prioritization, however, does not carry over to the use of regulations-only with the result being negative although either modestly or not significant across the three policy issues. Having environmental sustainability being in conflict with other budgetary commitments priorities is insignificant across all policy issues. As a policy mix variable, California is only significant in the expected direction for water conservation, increasing the likelihood that cities in that state use regulations both alone and jointly with incentives. This finding suggests that being located in California may indicate problem severity – in the form of the California-centric drought – as opposed to a indicating a state-level policy context that encourages cities to use regulations and incentive more often to promote environmental issues in general.

20

More variation across issues is seen with the regional variables and control variables. In both of these variable sets, the drivers of instrument choice for land use issues are more similar to each other than to those influencing water conservation. Specifically, being a central city increases the likelihood of incentive use and decreases the likelihood of regulation use for both greenspace preservation and mixed-use development. Having a mayor-council government generates the same effect for the two land issues. On the other hand, metropolitan fragmentation and racial composition significantly influence instrument choice only for water conservation and city population size is far more meaningful for it than for the other issues.

Table 7: Probability of using Neither Instrument

	Water	Mixed use	Greenspace
Number cities in metro	0.000	0.000	0.000
Central city^	0.005	0.012	0.012
Pct of MSA population	-0.002 *	0.001	0.001
Population growth	-0.005 *	-0.002	-0.002
Median income	-0.002	0.001	0.001
Creative class	0.004	-0.002	-0.002
Environmental priority	-0.060 **	-0.042 **	-0.042 **
Budgetary conflict	0.024	0.017	0.017
California^	-0.283 ***	0.030	0.030
Population (logged)	-0.094 ***	-0.032 *	-0.032 *
Non-Hispanic White	-0.001	0.000	0.000
Mayor-Council government	0.100 **	0.037	0.037

Table 8: Probability of using Incentives only

	Water	Mixed use	Greenspace
Number cities in metro	-0.001 **	0.001	0.000
Central city^	-0.083	0.083 ***	0.048 **
Pct of MSA population	0.001	0.001	0.000
Population growth	-0.001	-0.001	0.000
Median income	0.000	0.001	0.001
Creative class	0.003	-0.001	-0.002
Environmental priority	0.042 *	0.038 **	0.029 **
Budgetary conflict	0.006	-0.005	-0.001
California^	-0.056	0.041	0.013
Population (logged)	0.062 **	0.004	0.008
Non-Hispanic White	0.002 ***	0.001	0.001
Mayor-Council government	-0.051	0.067 **	0.036 **

Table 9: Probability of using Regulations only

	Water	Mixed use	Greenspace
Number cities in metro	0.001 ***	-0.001	0.000
Central city^	0.079 *	-0.128 **	-0.091 *
Pct of MSA population	0.000	-0.002	-0.001
Population growth	0.003	0.002	0.001
Median income	0.001	-0.002 *	-0.001
Creative class	-0.005 *	0.003	0.002
Environmental priority	-0.011	-0.047 *	-0.012
Budgetary conflict	-0.018	0.004	-0.007
California^	0.196 ***	-0.069	-0.093
Population (logged)	-0.014	0.001	-0.007
Non-Hispanic White	-0.002 **	-0.001	-0.001
Mayor-Council government	0.000	-0.110 **	-0.111 ***

Table 10: Probability of using Both Instruments Jointly

	Water	Mixed use	Greenspace
Number cities in metro	0.000	0.001 *	0.000
Central city^	-0.001	0.032	0.036 *
Pct of MSA population	0.001 *	0.000	0.000
Population growth	0.002	0.001	0.000
Median income	0.001	0.000	0.001
Creative class	-0.002	0.001	-0.002 *
Environmental priority	0.029 **	0.051 ***	0.064 ***
Budgetary conflict	-0.012	-0.016	-0.010
California^	0.143 ***	-0.002	-0.058 *
Population (logged)	0.046 ***	0.026	0.016
Non-Hispanic White	0.001	0.000	0.000
Mayor-Council government	-0.049 *	0.005	-0.014

Discussion and Conclusion

Local governments are playing a large role in the policy efforts promoting environmental sustainability in the United States. This is despite the competitive pressures and collective action challenges that have traditionally been seen as incentivizing them not to exceed the minimum standards set by higher levels of government. Whereas previous research has examined the factors that lead cities to pursue sustainability aims, this paper additionally considers the tools they select to do this. Specifically, it considers the factors that shape cities' decisions to utilize financial incentives and/or regulations as part of policies to promote water conservation, greenspace preservation, and mixed-use development. We hypothesized that regional and interjurisdictional characteristics, local economic performance, and the larger policy context would shape cities' use of instruments across these environmental objectives.

The results presented above notably do not support the hypothesis that cities characterized by better local economic performance and a modern economies are more likely to spend political and financial resources to meet environmental objectives through the use of financial incentives and regulations. This lack of significance associated with the economic

variables is interesting, as it is counter to the idea that strong environmental policies are pursued by more economically robust municipalities or that they are being used to (successfully) woo a mobile creative class to their jurisdictions. It is possible, however, that these particular issue areas and policy instruments do not signal the superior quality of life amenities that have been pointed to in the previous literature as important the high income creative class (Florida 2002; Hawkins, Kwon, and Bae 2016). The hypotheses regarding the importance of the larger policy context and proposes that cities will be more likely to utilize incentive and regulatory instruments if the target issues are seen as part of a larger government goal and complimentary to other objectives, was largely, although not entirely, supported. The greater prioritization given to environmental quality as a local goal increased the likelihood that cities used incentives and both tools jointly across all issues, but the effect did not extend to regulations alone. Support for the regional hypotheses which suggested that fragmentation would the use of these instruments and regional dominance would increase the likelihood of their use was mixed, with water conservation experiencing different effects from the two land use issues both in terms of significance and direction across the relevant variables.

The latter observation suggests that a further assessment of the three policy issues is warranted, particularly as it concerns the differentiated affects seen with water conservation. There are two main explanations for why water appears a bit of an outlier: First, water is obviously a different type of natural resource than land and the choices of policy tools to encourage it may have been driven more by a problem severity dynamic. The strong significance that being located in California has on increasing the likelihood of regulation and joint tool use for water conservation, and neither of the other issues, supports this interpretation. Also, water is transboundary in a way that land is not. Within a region, each jurisdiction can

manage how land is used within its own geographically determined boundaries. Water, however, transcends those boundaries making its use and scarcity true regional problems. This may explain why the extent of metropolitan fragmentation is a significant determinant of instrument type for this issue. The finding that the probability of regulations significantly increases with fragmentation may suggest that they are preferred above incentives – whose probability significantly declines with fragmentation – to manage such regional issues. The greater outcome certainty associated with the implementation of regulations may make them more attractive instruments to manage a shared resource in a regional context (Cite).

A second key difference between the objectives is the nature of their target populations. Whereas policies aimed at promoting greenspace preservation and mixed-use development typically target specific groups in the community, most prominently developers and business interests, water conservation policies more often target the public at large. The identity of the target population is known to systematically affect the type of policy instrument utilized (Schnieder and Ingram 1993). All else equal, cities with a larger minority population are significantly more likely to use regulations and less likely to use incentives to restrict water use. This is consistent with the literature in other issue areas that find that regulations are more commonly applied to shape behavior in minority communities (Soss 2001). However, it is notable that race does not significantly impact the likelihood of regulation use for the policy objectives where developers are the primary target population. This suggests that the impact of a jurisdiction's racial makeup on regulation use may depend on whether the policy is focused on the community at large or a narrower population. Additional research is warranted to determine whether this observed difference is indeed due to differences in target population identity and the transboundary nature of water.

References

Bae, J and Richard Feiock. (2013) Forms of government and climate change policies in US cities. Urban Studies 50(4): 776–788.

Bennear, Lori Snyder, and Robert N. Stavins. "Second-best theory and the use of multiple policy instruments." *Environmental and Resource Economics* 37.1 (2007): 111-129.

Betsill, Michele, and Harriet Bulkeley. "Looking back and thinking ahead: a decade of cities and climate change research." *Local environment* 12.5 (2007): 447-456.

Castro, Julian. (2014). "Creating Cities of Opportunity." The HUDdle: U.S. Department of Housings and Urban Development's Official Blog. August 25, 2014. (Accessed 1 August, 2016). Available: http://blog.hud.gov/index.php/2014/08/25/creating-cities-of-opportunity/.

del Río González, Pablo. "The interaction between emissions trading and renewable electricity support schemes. An overview of the literature." *Mitigation and adaptation strategies for global change* 12.8 (2007): 1363-1390.

Deslatte, Aaron and William L. Swann. (2015) "Is the Price Right? Gauging the Marketplace for Local Sustainable Policy Tools." Journal of Urban Affairs. DOI: 10.1111/juaf.12245.

Feiock, Richard C., Antonio F. Tavares, and Mark Lubell. "Policy instrument choices for growth management and land use regulation." *Policy Studies Journal* 36.3 (2008): 461-480.

Florida, Richard. "The rise of the creative class, and how it is transforming work, leisure, community and everyday life." (2002): 89-98.

Greene, W. H. 2012. Econometric Analysis. 7th ed. Upper Saddle River, NJ: Prentice Hall.

Hawkins, Christopher V., Sung-Wook Kwon, and Jungah Bae. "Balance between local economic development and environmental sustainability: a multi-level governance perspective." *International Journal of Public Administration* (2016): 1-9.

Homsy George C. and Mildred W. Warner. (2015) Cities and sustainability: Polycentric action and multilevel governance. Urban Affairs Review 51(1): 46–73

Howlett, Michael. "Governance modes, policy regimes and operational plans: A multi-level nested model of policy instrument choice and policy design." *Policy Sciences* 42.1 (2009): 73-89.

Howlett, Michael and J Rayner. (2013). Patching vs Packaging in Policy Formulation: Assessing Policy Portfolio Design. *Politics and Governance*, *1*(2), 170-182.

Jimenez, Benedict S. "Separate, unequal, and ignored? Interjurisdictional competition and the budgetary choices of poor and affluent municipalities." *Public Administration Review* 74.2 (2014): 246-257.

Johnson, Martin and Max Neiman. "Courting Business: Competition for Economic Development Among Cities" In *Metropolitan Governance: Conflict, Competition, Cooperation,* edited by Richard Feiock, 2005. Washington D.C.: Georgetown University Press.

Joss, Simon. *Sustainable cities: Governing for urban innovation*. Palgrave Macmillan, 2015.

Keohane, Nathaniel O., Richard L. Revesz, and Robert N. Stavins. "Choice of Regulatory Instruments in Environmental Policy, The." *Harv. Envtl. L. Rev.* 22 (1998): 313.

Krause, Rachel M. "Policy innovation, intergovernmental relations, and the adoption of climate protection initiatives by US cities." *Journal of urban affairs* 33.1 (2011a): 45-60.

--- "Symbolic or substantive policy? Measuring the extent of local commitment to climate protection." *Environment and Planning C: Government and Policy* 29.1 (2011b): 46-62.

--- "The motivations behind municipal climate engagement: An empirical assessment of how local objectives shape the production of a public good." *Cityscape* (2013): 125-141.

Matisoff, Daniel C. "The adoption of state climate change policies and renewable portfolio standards: regional diffusion or internal determinants?." *Review of Policy Research* 25.6 (2008): 527-546.

Molotch, Harvey. "The city as a growth machine: Toward a political economy of place." *American journal of sociology* (1976): 309-332.

Osgood, Jeffery L., Susan M. Opp, and R. Lorraine Bernotsky. "Yesterday's gains versus today's realties: Lessons from 10 years of economic development practice." *Economic Development Quarterly* 26 (2012): 334-350.

Osgood, Jeffery L., Susan M. Opp, and Megan Demasters. "Exploring the Intersection of Local Economic Development and Environmental Policy." *Journal of Urban Affairs* (2016). doi:10.1111/juaf.12316.

Peterson, Paul E. *City limits*. University of Chicago Press, 1981.

Portney, Kent E. *Taking sustainable cities seriously: Economic development, the environment, and quality of life in American cities*. MIT Press, 2013.

Portney, Kent E., and Jeffrey M. Berry. "The Impact of Local Environmental Advocacy Groups on City Sustainability Policies and Programs." *Policy Studies Journal* (2015).

Ramirez de la Cruz, Edgar. "Local Political Institutions and Smart Growth: An empirical study of the politics of compact development. *Urban Affairs Review*. 45 (2009): 218-339.

Richards, Kenneth R. "Framing environmental policy instrument choice." *Duke Envtl. L. & Pol'y F.* 10 (1999): 221.

Rogge, Karoline S., and Kristin Reichardt. "Policy mixes for sustainability transitions: An extended concept and framework for analysis." *Research Policy* 45,8 (2016): 1620-1635.

Salamon, Lester M., and Odus V. Elliott. *The tools of government: A guide to the new governance*. Oxford University Press, 2002.

Schneider, Anne, and Helen Ingram. "Behavioral assumptions of policy tools." *The Journal of Politics* 52.02 (1990): 510-529.

---. "Social construction of target populations: Implications for politics and policy." *American political science review* 87.02 (1993): 334-347.

--. 1997. Policy Design for Democracy. Lawrence, KS: University Press of Kansas.

Soss, Joe, et al. "Setting the terms of relief: Explaining state policy choices in the devolution revolution." *American Journal of Political Science* (2001): 378-395.

Tiebout, Charles M. "A pure theory of local expenditures." *The journal of political economy* (1956): 416-424.

Vedung, Evert, M. L. Bemelmans-Videc, and R. C. Rist. "Policy instruments: typologies and theories." *Carrots, sticks, and sermons: Policy instruments and their evaluation* 5 (1998): 21-58.

Wang, XiaoHu, Christopher V. Hawkins, Nick Lebredo, and Evan M. Berman. "Capacity to sustain sustainability: A study of US cities." *Public Administration Review* 72, no. 6 (2012): 841-853.

Weimer, David L., and Aidan R. Vining. *Policy analysis: Concepts and practice*. Routledge, 2011.

Yi, Hongtao, and Richard C. Feiock. "Policy tool interactions and the adoption of state renewable portfolio standards." *Review of Policy Research* 29.2 (2012): 193-206.

Zahran, Sammy, et al. "Risk, stress, and capacity explaining metropolitan commitment to climate protection." *Urban affairs review* 43.4 (2008): 447-474.