Colleagues, Competitors, Creators: City Governance Among Peers and Its Implications for Addressing Climate Change

by

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Table of Contents

Acknowledgements …… ii

List of Figures …….. vii

List of Tables …….. viii

Abstract ……. ix

Chapter 1 – Overview …… 1

1. Introduction …… 1

2. Research Design and Methodology ……... 5

2.1. Area of Study and Cities Considered …….. 5

2.2. Survey #1: Discovering Policy Entrepreneurship in Cities …… 6

2.3. Survey #2: Verifying Policy Entrepreneurship ……... 7

2.4. Survey #3: Follow-Up Survey Concerning Policy Actions ……..... 8

2.5. Qualitative Interviews ……..… 9

3. Summary of Key Findings ……..… 9

3.1. Chapter 2 (Paper #1): "Climate Change Adaptation in Cities and Intercity Competition: A race to the top?" …….……..… 10

3.2. Chapter 3 (Paper #2): "The Emergence of Climate Change Policy Entrepreneurs in Urban Areas" ……..... 11

3.3. Chapter 4 (Paper #3): "The Pressure to Innovate and the Diffusion of Climate Change Policy Efforts Across Cities" ……..…….. 13

4. References …….……... 15

Chapter 2 – Paper #1: Climate Change Adaptation in Cities and Intercity Competition: A race to the top? ……. 21

1. Introduction …….. 21

2. Intercity Competition as a Driver of Fiscal Pragmatism and Efficiency ……. 24

2.1. Implications for urban climate change adaptation …… 25

3. Intercity Competition as a Driver of Niche Development through City Branding ….. 27

3.1. Implications for climate change adaptation …….. 28

4. Intercity Competition as a Driver of Cooperative Arrangements for Service Production …….. 29

4.1. Implications for urban adaptation ……. 30

5. Intercity Competition as a Driver of Cooperative Networks for Enhancing Influence ……. 32

5.1. Implications for quantity and quality of adaptation …….……. 33

6. Competition, Intercity Relationships, and Races to the Top ……..…. 34

7. References …… 38

Chapter 3 – Paper #2: The Emergence of Climate Change Policy Entrepreneurs in Urban Areas …… 45

1. Introduction …….. 45

2. Public Policy Entrepreneurs and Innovation in Urban Areas …….. 46

3. Methods …… 48

3.1. Data Collection Survey #1: Discovering Policy Entrepreneurs …… 48

3.2. Data Collection Survey #2: Verifying Policy Entrepreneurship ……... 50

3.3. Modeling the Presence of Climate Change Policy Entrepreneurs in Cities .. 53

3.4. Factors Underlying the Emergence of Policy Entrepreneurs……. 52

4. Results …….. 55

5. Discussion/Conclusion ……. 57

6. References …… 61

Chapter 4 – Paper #3: The Pressure to Innovate and the Diffusion of Climate Change Policy Efforts Across Cities …… 66

1. Introduction …….……. 66

2. The Emergence and Diffusion of Climate Change Policies ……...……. 68

3. Pursuing a Broader Understanding of the Diffusion of Climate Change Policy Efforts ……. 70

3.1. Determining Climate Change Efforts ……... 71

3.2. Interview Selection ……..….. 72

3.3. Interviews …….…. 75

4. Financial and Economic Development Considerations ……... 76

5. Considerations about Intercity Relationships …….. 79

6. Diffusion and the Emergence of Climate Change Interventions ……. 81

7. Conclusion ……... 83

8. References …… 84

Chapter 5 – Conclusion …… 89

1. Summary …….……...…….. 89

2. Limitations ……... 93

3. Recommendations …… 94

4. References …… 96

List of Figures

Figure 1.1. Selection Criteria for Interviews with Number of Cities from the Database …… 13
Figure 2.1. Diagram Summarizing Intercity Relationships Driven by Resource Competition ... 35
Figure 3.1. Summary of Polycentricity and Entrepreneurship …… 59
Figure 4.1. Selection Criteria for Interviews with Number of Cities from the Database …… 73
Figure 4.2. Adopter Categorization on the Basis of Innovativeness …… 83

List of Tables

Table 1.1. 16 Policies Offered in Survey 8
Table 3.1. Population and Sample Means Comparison 49
Table 3.2. Follow-Up Survey Results 50
Table 3.3. Summary Table of Independent Variables Used in Models 53
Table 3.4. Models I, II, and III Results 55
Table 3.5. Models IV, V, and VI Results 56
Table 4.1. 16 Policies Offered in Survey 71
Table 4.2. Summary of Survey Results: Number of Policies Undertaken in Cities and Associated Issues 72
Table 4.3. Summary of Cities Where Interviews Were Conducted 74
Table 4.4. Summary of Interview Coding for Financial and Economic Development Challenges 77
Table 4.5. Summary of Interview Coding Factors Related to Intercity Relationships 79

Abstract

Since the 1990s, cities have emerged as the vanguard in the cultivation of policy responses to climate change. Many cities throughout the world have offered supportive niches for the development and testing of efforts to address climate change mitigation and adaptation while international efforts failed to provide clear and comprehensive leadership. However, this focus on cities as niches for exceptional efforts in policy innovation risks limiting the discussion about urban climate change policy to cities with exemplary resources, connections, and profiles. With the tide of international negotiations turning towards real mitigation commitments after the 2015 Paris Agreement and the need for adaptation becoming more evident each year, the pursuit of policies to address climate change in all cities will almost inevitably move from the exception to the consensus in the years ahead.

What forces will shape this transition and what will it mean for those interested in climate change policy? To help answer these questions, this dissertation sheds light on how local governments influence one another and what the implications of that influence are for the emergence of climate change policies in cities. Over the course of three papers, the dissertation makes the case that not only can the influence that local governments have on one another shape whether or not climate change interventions emerge in cities, but that these intercity relationships represent significant sources of latent capacity for the rapid scaling up of the development and expansion of these interventions. This dissertation argues that cities' impetus to "keep up" with their peers leads to patterns of policy adoption of climate change interventions that are non-linear – slow to emerge, but potentially quick to proliferate across contexts once they are established. Understanding the influence of local governments on one another's actions can offer a critical link between analyzing local processes driving local action and understanding the impact that such activities can ultimately have at larger geographic scales.

Chapter 1
Overview

1. Introduction

As international efforts to develop policy responses to address climate change floundered in the wake of the Kyoto Protocol in 1997, cities quickly emerged as leading figures in the global effort to reduce emissions and develop adaptation strategies (Bulkeley 2010, Hoffmann 2011). With climate change policy being an uncertain and potentially risky endeavor, cities became critical niches that could offer safe spaces for interventions to emerge and be refined at more manageable scales in relatively supportive political climates (Bulkeley 2010, Broto and Bulkeley 2013, Bulkeley and Broto 2013). A number of scholars embraced this "bottom-up" approach to international climate governance (Victor et al. 2005, Bulkeley 2005, Byrne et al. 2007, Biermann and Pattberg 2008), and research emerged around the development of urban climate change policy "experiments" (Broto and Bulkeley 2013, Bulkeley and Broto 2013). These experiments encompassed cities' efforts to test out approaches to innovate, learn, or gain experience about social and technical aspects of their response to climate change (Broto and Bulkeley 2013, Bulkeley and Broto 2013).

Policy experimentation has been an outlet for those seeking to take action on climate whether due to a desire to realize economic gains, reduce potential dangers, expand authority or resource claims, or express an ideological position on climate change across governing scales (i.e. local, national, international) (Hoffmann 2011, p.70-71). Such experiments not only emerge in response to the global policy process, they also feed back into it through "friction" and "smoothing:" friction because experiments create bottom-up pressure for international action and smoothing because they create knowledge and institutional capacity to support it (Hoffmann 2011, p.154). In an effort to both more successfully draw on and contribute to global exchanges of authority, resources, and information related to climate change, cities have even voluntarily joined transnational municipal networks committed to encouraging climate change policy

interventions like the C40, ICLEI's Cities for Climate Protection, and the Rockefeller Foundation's 100 Resilient Cities (Kern and Bulkeley 2009, Busch 2015). Such networks play a number of roles for cities including offering *platforms* for the exchange and demonstration of climate change expertise, serving as *consultants* that provide information and other support such as tools, acting as *commitment brokers* that formalize goals and hold voluntary members accountable, and being *city advocates* who lobby on behalf of members to higher levels of government (Busch 2015).

While these studies have contributed a great deal to our understanding of how cities might contribute to global efforts to address climate change, this geopolitical discussion has left many unanswered questions about the governance of climate change in these cities (Bulkeley 2010, Bulkeley and Broto 2013). Research specifically addressing the emergence of climate change policy in cities has consistently detailed that they pursue climate change policies because such work helps them fulfill their own internal goals or reduce perceived threats (Bassett and Shandas 2010, Anguelovski and Carmin 2011). The prevalence of identifying co-benefits, where the pursuit of climate change goals is explicitly connected with achieving other goals at the same time (Metz et al. 2001), is a consistent theme. The ability to reframe climate change in a manner that strategically bundles these policy goals together with other prevailing municipal concerns has become a significant factor behind the success of climate change initiatives (Koehn 2008, Heinrichs et al. 2013, Aggarwal 2013). More broadly, taking the initiative to act on climate change has provided a way for some cities to positively differentiate themselves as leaders (Carmin et al. 2012, Anguelovski and Carmin 2011). However, the most prevalent and prominent form of co-benefit is to tie together climate goals with financial or economic development ones (e.g. Lambright et al. 1996, Betsill 2000, Kousky and Schneider 2003, Bulkeley and Kern 2006, Jeffers 2013, Cashmore and Wejs 2014). Such internal goals often represent straightforward economic win-wins – whether they reduce expenses (Sippel and Jenssen 2009, Kousky and Schneider 2003) or support economic development initiatives (Betsill and Bulkeley 2004, Anguelovski and Carmin 2011). Bringing economic development interests into the pursuit of climate change is an effective way of expanding potential coalitions in support of policies and sustaining interest (Lambright et al. 1996).

Other research on the emergence of climate change mitigation efforts in cities has connected policy interventions with the availability of particular resources such as membership

in the aforementioned transnational municipal networks (Kern and Bulkeley 2009, Lee and van de Meene 2012, Hakelberg 2014) and the presence of socioeconomic resources like an educated population and wealth (Krause 2011, Krause 2012). However, a resource that has played a particularly crucial role is the presence of politically skillful local advocates (Lambright et al. 1996, Collier and Lofstedt 1997, Betsill 2000, Otto Næss et al. 2005, Bulkeley and Kern 2006, Mukheibir and Ziervogel 2007, Roberts 2008, Schreurs 2008, Kern and Bulkeley 2009, Burch 2010, Feiock and Bae 2011, Carmin et al. 2012, Krause 2012, Wejs 2014). Such advocates have often been characterized as "policy entrepreneurs" who see an opportunity in the prevailing policy context and seek to fill it through a combination of their own political savvy, technical expertise, and persistence (Kingdon 1984, Schneider et al. 1995).

Therefore, robust discussions in the literature on urban climate change policy have developed around the local conditions that encourage interventions in individual cities as well as the impact that local efforts have on global governance. However, there has been a lack of attention to how local governments influence one another's actions. The goal of this dissertation is to shed light on the question of how local governments influence one another and what the implications of this influence are for the emergence of climate change policies in cities.

Closing this research gap offers a number of major contributions to the existing literature on urban climate change policy. First, understanding influence can shed light on the local political economy of urban climate change governance – an area of research that currently needs further development (Bulkeley 2010, Bulkeley and Broto 2013). Influence is an aspect of understanding cities' decisionmaking as cities have always defined themselves through their relationships with other cities and responded strategically based on the actions of others (Kavaratzis and Ashworth 2008). Fortunately, a great deal of research across urban studies, political science, economics, and public administration has already focused on how cities act in relation to each other and other local governments. This dissertation integrates the insights from these fields about city behavior developed over a half century into existing considerations about urban climate change policy development. In particular, this dissertation connects existing discussions of cities' strategic pursuit of climate change policy (Bassett and Shandas 2010, Anguelovski and Carmin 2011) with established theories in the wider literature concerning fiscal pragmatism and city decisionmaking (e.g. V. Ostrom et al. 1961, Peterson 1981, Feiock 2007)

Cities influence one another through direct competition over mobile residents and capital (Schneider 1989, Basolo and Lowery 2010), efforts to distinguish themselves from both their nearby and global peers (Lucarelli and Olof Berg 2011, Braun 2008), regional cooperative arrangements (V. Ostrom et al. 1961, Feiock 2007), and exchanges in transnational municipal networks (Kern and Bulkeley 2009, Bulkeley 2010). Local decisions are therefore shaped by actions taking place at the regional, national, and even international scales and vice versa through the influence that local governments have on one other. Studying influence therefore offers a bridge between our understanding of the local conditions influencing climate change policy and discussions of the global implications of local efforts. Studies of local climate change policy experiments (Bulkeley and Broto 2013, Broto and Bulkeley 2013, Hoffmann 2011) have not yet addressed questions about the processes through which such experiments transfer between cities. While research on transnational municipal networks has offered some perspective on knowledge transfer (Lee and van de Meene 2012), limiting the scope of climate change policy research to such networks risks reducing climate change governance to the relatively privileged contexts with the size, profile, and connections to participate (Hodson and Marvin 2009), and favors elite interests acting through high profile networks rather than the vast majority of cities in the periphery who likely most need to participate (Bulkeley 2010). Transnational municipal networks have also almost exclusively focused on climate change mitigation, and the ability of such networks to support the "unavoidably local" action of climate change adaption (Agrawal 2008) is in doubt (Fünfgeld 2015). Understanding the spread and effect of urban climate change policy across society will require broader and more inclusive models of influence that can apply outside of these high-profile transnational networks. To that end, this dissertation also distinguishes itself from existing research through its empirical examination of the actions of cities that are unlikely to be recognized as influential players in international discussions about climate change (see Section 2.1 below).

Developing such models may also ultimately offer insights into how climate change policy interventions might rapidly "scale up" widely across cities. If cities' policy efforts are broadly influenced by what others are doing, then policy interventions in one city will affect others' considerations, potentially resulting in cascades of policy interventions across cities if conditions lead cities to progressively drive each other towards further action. For those studying the physical climate system, positive feedback loops in which climate change creates conditions

which accelerate further climate change are a common source of concern (e.g. Watson 2008, Huang et al. 2014, Hansen et al. 2013, Heimann and Reichstein 2008), but positive feedback loops exist in social systems as well. Understanding processes of influence might help researchers and practitioners understand how social feedback loops relate to physical ones, and someday may even lead to effectively fighting physical feedback loops with social ones.

2. Research Design and Methodology

This dissertation uses a mixed method approach to shed light on the influence that local governments have on cities' actions and the implications of this influence for climate change policy. Mixed methods is a type of research that combines qualitative and quantitative elements to produce a broad and deep understanding (Johnson et al. 2007). Mixing methods can be philosophically tied to pragmatism, with the value of combining methods stemming from the extent to which mixing enhances the practical understanding of phenomena (Johnson and Onwuegbuzie 2004). A major way in which mixing can enhance understanding is through combining methods so that they complement each other's' strengths and offset each other's weaknesses (Johnson and Turner 2003). The first paper offers a detailed and cross-disciplinary literature review that helps provide a broader scholarly foundation and perspective for the rest of the dissertation. The second paper of the dissertation features quantitative logistic regression analysis based on a large-n database of a wide range of cities (n = 398). While such an analysis also accounts for many (potentially confounding) variables and includes relatively precise measures of the variables in question, quantitative analysis might not reflect practical understanding and experiences of phenomena, and might ignore critical factors that are not anticipated or easily quantified (Johnson and Onwuegbuzie 2004). The third paper of the dissertation features qualitative interviews with city officials conducted across fifteen case study cities. These interviews were based on open-ended questions, and drawing upon the perspectives of city officials provides an opportunity to reveal aspects of cities' practical experiences that were not addressed in the quantitative analysis.

2.1. Area of Study and Cities Considered

The Great Lakes region of the United States (here defined as the eight US states bordering the Great Lakes: Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, New

York, and Wisconsin) is a particularly fertile area for researching cities' responses to global change. Many of the cities in this region are within America's "Rust Belt" – a once prosperous multi-state industrial region whose manufacturing base eroded during the second half of the 20th century (High 2003). National and global social changes have driven widespread declines in both economic conditions and population throughout the region, imposing a challenging identity crisis for many places there (Longworth 2009, High 2003). At the same time, the region lacks a clear, overwhelming climate-change based threat such as sea-level rise or glacial retreat, meaning that responses to climate change in the Great Lakes region might be more generally applicable to other areas. Relative to climate change impact, the Great Lakes region is projected to become warmer, display shifting patterns of rain and snow and be increasingly exposed to more frequent and severe extreme events (Pryor et al. 2014, Baule et al. 2014). The region will also likely see potential challenges to its efforts to address its water quality challenges, the loss of tourism revenue (especially winter activities), uncertain changes in Great Lake water levels, and the increased destruction of fragile native ecosystems by advancing invasive species (Kalafatis et al. 2015). This study focused on mid-sized cities in this region (defined as those with a population between 5,000 and 500,000) in order to investigate the forces at play in small to medium-size cities that are not often recognized as leading examples of climate change policy efforts.

2.2. Survey #1: Discovering Policy Entrepreneurship in Cities

A first survey was conducted in October 2014 primarily to provide the dependent variables concerning the presence of policy entrepreneurs for Paper #2 (see below). The initial sample included 808 cities which represented all of the cities with a population of 5,000 to 500,000 in the eight states for which there was a functioning email address of a city staff member. City council clerks were the primary targets of this survey because they are charged with objectively documenting the activities within the government and are expected to be aware of policy deliberations (Schneider et al. 1995). To this end, city council clerks were the final contact for 711 cities. However, whenever clerks were not available, other administrators – City Administrators (51 cities), other staff in the administration (38 cities), or City Managers (8 cities) – were contacted instead. These surveys returned results from 398 cities concerning climate change entrepreneurs (response rate: 49%). The key questions in this survey for Paper #1 of the dissertation were the following:

- To the best of your knowledge, has there been any individual in the last five years (inside or outside government) who has advocated for your community to change its approach to economic development?
- To the best of your knowledge, has there been any individual in the last five years (inside or outside government) who has advocated for your community to make changes because they said it would enhance your community's sustainability?
- To the best of your knowledge, has there been any individual in the last five years (inside or outside government) who has advocated for your community to make changes based on concerns about climate change/global warming or its possible impacts on your community?

2.3. Survey #2: Verifying Policy Entrepreneurship

Previous quantitative research identifying policy entrepreneurs (e.g. Schneider et al. 1995, Mintrom 2000) has included efforts to verify that individuals previously identified were indeed acting as policy entrepreneurs. For each of the questions listed above, Survey #1 prompted the respondent to provide names and affiliations for these individuals. Searching these names and affiliations online produced viable email contacts for 280 of the individuals identified across the three issues. A survey was sent to these individuals in June and July 2015 and 111 of them responded (response rate: 40%). The survey included the following question: "how much do you rely on the following strategies in your efforts to address [issue] in this city?" This question was followed by six prompts that are associated with policy entrepreneurship in the literature:

- Identifying and describing connections between [issue] and other issues.
- Seeking support from politicians or political interests in the city
- Developing and refining ways to address [issue]
- Creating and sustaining groups that collaborate to work on [issue]
- Building others' general awareness and understanding about [issue]
- Drawing on experiences and relationships that I have developed from previous work on other issues

Respondents described how much they relied on each of these prompts from "not at all" to "a little" to "a decent amount" to "a great deal." The average respondent reported that they used

these strategies "a decent amount" or "a great deal" on 4.65 out of the 6 strategies and 101 of the respondents (91%) reported this level of engagement on two or more of the strategies.

2.4. Survey #3: Follow-Up Survey Concerning Policy Actions

In order to better understand the actual policy activities undertaken in these cities and whether or not climate change mitigation and/or adaptation factor into these activities, a follow-up survey was sent to those cities who had responded to the first survey. This survey included a question that listed 16 policies that cities could be undertaking that they could potentially be associating with environmental or climate change efforts derived from both a survey the Great Lakes Adaptation Assessment for Cities (GLAA-C) had previously used to assess the extent of urban climate change policy work in the region as well as Bulkeley and Broto's (2013) list of potential areas for climate change policy experimentation in cities. Table 1.1 to the right provides a list of the 16 policies.

Table 1.1. 16 Policies Offered in Survey

Policies
Increase Development Density
Promote Reuse of Brownfields
Increase Pedestrian Transportation
Enhance Public Transportation Options
Alter Building Codes
Enhance Parks
Develop Alternative Energy Options
Develop Alternative Energy on Buildings
Alter Stormwater Management
Altered Wastewater Management
Increase Efficiency of Buildings
Enhance Tree Canopy
Reduce Energy Use
Change Fleet Vehicles
Alter Emergency Management
Develop Water Recycling/Reuse

Respondents first had the option to choose whether or not a city had been "involved in any of the following actions." They had four options for this answer: yes, no, don't know, or N/A. For each of these policies, the respondents were also asked "what issues influenced these efforts" and could choose up to four options: economic development, sustainability, climate change mitigation, and climate change adaptation. The survey question included a definition of climate change mitigation and climate change adaptation: "CC mitigation refers to an effort to reduce emissions associated with climate change and CC adaptation refers to an effort to prepare for potential impacts associated with climate change." 289 cities provided completed responses to this survey (response rate 36% out of the initial 808 cities). These responses provided the basis for whether or not cities were associating their policy efforts with climate change ("CC yes") or not ("CC no") in Paper #3 (see below).

2.5. Qualitative Interviews

Finally, 32 interviews with city officials conducted between April 2016 and June 2016 provided qualitative empirical data supporting Paper #3. These officials were affiliated with 15 cities that were selected based on criteria described in Section 3.3 below. At least one interview with an elected official and at least one interview with a staff member was sought in each city to get a more balanced perspective on the city's experience. The 32 interviewees included 4 mayors, 12 councilmembers, 8 City Managers or City Administrators, 6 Economic Development or Community Development Directors, and 2 City Planners. Each interview was semi-structured, around a half-hour, and included the following prompts that were coded and used in Paper #3:

- What are the most important challenges currently facing your city concerning the city's budget and finances?
- What are the most important challenges currently facing your city concerning growth and economic development?
- How do other cities influence policies undertaken in your own city? Can you give me any specific examples?
- Why is it important for you to understand the work that is going on in other cities?
- What other cities do you think about when making decisions about your own work? Where are they located?
- How do you learn about what these other cities are doing?

These questions were deliberately open-ended to support the development of a narrative understanding about financial and economic development considerations and intercity relationships, as well as give participants an opportunity to reveal their most prominent concerns first.

3. Summary of Key Findings

This dissertation is presented as three papers bookended by this introduction and a conclusion that provide context and synthesis for the three papers. The critical finding for research and practice that spans the three papers is that not only can the influence of other local governments play a significant role in shaping efforts in individual cities to address climate change mitigation and/or adaptation, these relationships possess the potential to rapidly scale up interventions. Assessments of current levels of climate change policy efforts (IPCC 2014,

Bierbaum et al. 2013, Woodruff and Stults 2016) report that action is too slow to emerge, but this dissertation provides evidence that climate change policy interventions in cities might develop non-linearly – be slow to emerge, but quick to proliferate across contexts once they become sufficiently established. The basis of this claim emerges over the course of the three papers that will make up the next three chapters of the dissertation.

3.1. Chapter 2 (Paper #1): "Climate Change Adaptation in Cities and Intercity Competition: A race to the top?"

Chapter 2 is a literature review spanning fields such as urban studies, economics, and public administration that provides context and greater detail about the influence that local governments have on one another and its implications for the emergence and development of climate change adaption actions in cities. The paper traces cities' efforts to respond to the competitive pressure that they experience to differentiate themselves from other cities as attractive places for people to live and invest. The literature review finds four common themes concerning city's responses to this competitive pressure: fiscal pragmatism and efficiency, niche development through city branding, cooperative arrangements for service production, and cooperative networks for enhancing influence. It then provides discussions of implications for how each of these responses relate to climate change adaptation research.

Often the discussion about intercity competition has focused on concerns that cities will engage in "races to the bottom" and attempt to attract business development through continuously lowering their tax rates and regulatory standards for industries below those in other cities (Goetz et al. 2011). On the other hand, there are now a number of studies that describe that competition might actually enhance local environmental efforts and produce "races to the top" (Holzinger and Sommerer 2011, Millimet and List 2003, Fischel 2001). This paper argues that climate change adaptation is an area of policy that could result in such "races to the top" if successful adaptation interventions confer a greater and greater competitive advantage for cities over time as the impact of climate change intensifies. To that end, the literature review details how each of the four responses to competitive pressure described represent processes that can produce adaptation policy "races to the top." Furthermore, each of these responses are interrelated, meaning that each city that successfully pursues adaptation will increase pressure on

other cities to do the same, potentially offering the conditions for adaptation interventions to quickly "scale-up" across cities.

The article includes a number of suggestions related to these observations for research on climate change adaption in cities. Two of these include that cities should not be viewed in isolation from one another and that data tracing changes over time in cities will be necessary to identify and understand feedback loops that affect the development of climate change in cities. However, the most pressing of these from the perspective of the dissertation is that while a positive feedback loop around adaptation might be welcomed by those concerned about an adaptation deficit (Bierbaum et al. 2013, Woodruff and Stults 2016), if adaptation can emerge and proliferate quickly, then so can maladaptation. Adaptation scholars have already begun drawing attention to the need to ensure that adaptation serves the needs of society, especially the needs of the most vulnerable, and does not simply result in deepening social and economic inequalities (Shi et al. 2016).

3.2. Chapter 3 (Paper #2): "The Emergence of Climate Change Policy Entrepreneurs in Urban Areas"

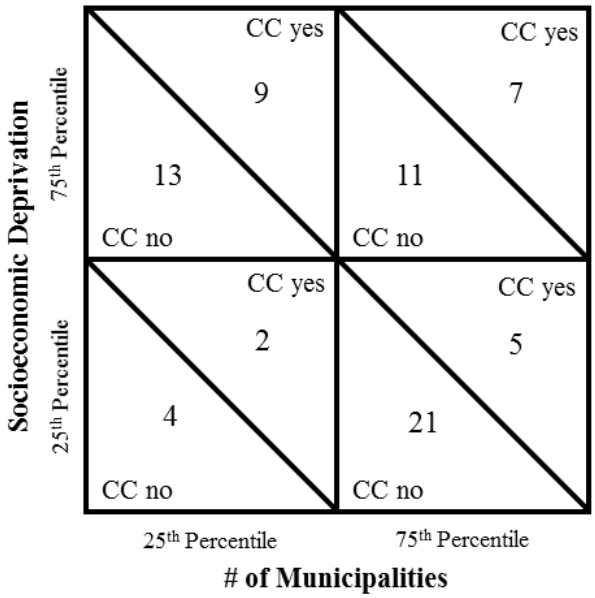
Chapter 3 assesses what conditions support the emergence of a particularly important local resource that has consistently played an important role in the development of climate change policies in cities: the climate change policy entrepreneur. As previously mentioned, many studies have highlighted that such dedicated individuals are major drivers of climate change interventions in cities (Carmin et al. 2012, Anguelovski and Carmin 2011, Feiock and Bae 2011). However, these studies have not addressed what influences their emergence in the first place. This paper draws on a sample of 398 cities that responded to the first survey of the dissertation to present a series of 6 logistic regression models assessing factors underlying the presence of climate change entrepreneurs generally and alongside economic development and sustainability policy entrepreneurship. Three factors were generally associated with a higher likelihood of the emergence of climate change policy entrepreneurs: a higher number of other municipalities in a city's metropolitan or micropolitan area, more individual council districts in the city that directly elect council members, and a lower percentage of total revenue coming from higher levels of government.

The article contends that the connection between these three factors is that they are all related to the level of polycentricity in the urban system. Polycentricity as originally detailed by Polanyi (1951) and V. Ostrom et al. (1961) is a property of social systems that describes the proliferation of independent, but interconnected decisionmakers within the system. Scientists in a field pursuing "objective truth" (Polanyi 1951) or cities in a metropolitan area attempting to be "attractive" places for residents and investment (V. Ostrom et al. 1961) each make independent decisions about how to best fulfill these abstract goals. However, these individual decisions are all influenced by the decisions that the other participants in the polycentric system are making. The more polycentric a system is (the more independent decisionmakers participate in it), the more independent approaches to meet abstract goals are developed, put into competition with one another, and transferred throughout the system (Aligică 2014).

Meanwhile scholars focusing on "urban scaling" have recently connected the population size of metropolitan areas with an increasing capacity to produce "social quantities" such as innovations in the form of patents (Bettencourt et al. 2007, Bettencourt et al. 2010). They attribute this increasing capacity to the increasing density of social connections that come with expanding populations (Bettencourt 2013, Batty 2013, Schläpfer et al. 2014), but also emphasize that the ability to replicate, transfer, and coherently integrate a proliferation of similar, but differentiated activities across multiple scales – having a fractal quality – contributes to enhancements in innovation capacity. Importantly, this paper controls for the population size of the city's metropolitan/micropolitan area (as well as city population), meaning that the proliferation of decisionmaking entities explained more of the variation in the emergence of climate change policy entrepreneurship than just the size of the urban area. At the same time, the paper maintains that climate change policy entrepreneurship in urban areas may have a similarly fractal quality as the association between polycentricity and entrepreneurship was found at different scales of the system: within the city (the number of council member districts) and within the metropolitan/micropolitan area (the total number of municipalities).

3.3. Chapter 4 (Paper #3): "The Pressure to Innovate and the Diffusion of Climate Change Policy Efforts Across Cities"

Figure 1.1. Selection Criteria for Interviews with Number of Cities from the Database



Chapter 4 is a qualitative study based off of interviews with 32 officials in 15 cities in the Great Lakes region that provides empirical support for the discussion in Chapter 3 concerning the influence of competitive pressure to "keep up" and intercity relationships as well as the implications of that pressure for the emergence of climate change policy action in cities. It then extends the discussion in Chapter 3 based off of the findings from the interviews. The fifteen cities were selected based on three selection criteria that were applied to the 289 cities that responded to both the first survey and the follow-up survey concerning policy actions. Each of the three selection criteria featured two categories, resulting in a total of eight different combinations of characteristics that cities in the sample could be placed in. The three selection criteria were:

1) Cities falling in the 75th (high) and 25th (low) quartiles based on the number of other municipalities in their metropolitan or micropolitan area.
2) Cities falling in the 75th (high) and 25th (low) quartiles based on their level of unemployment.
3) Cities that were associating at least one policy they were undertaking with climate change mitigation or adaptation ("CC yes" versus "CC no").

The first two were included to provide a range of cities – ones that were in major metropolitan areas versus ones that were more rural and ones that were experiencing high levels of deprivation (here measured through unemployment) which might affect how the city approaches economic development and financial considerations. The third was the key criteria that would allow for comparisons between cities addressing climate change and those that were not. Figure 1.1 above helps summarize these criteria and displays the number of cities from the

sample of 289 that fit into each combination of criteria. The first finding from this study was that those experiencing economic deprivation appeared to be more likely to be associating climate change mitigation and/or adaptation with their policy efforts (16/24 versus 7/25).

The interviews conducted with 15 of these cities covered at least one city from each of the 8 combinations laid out in the diagram. The key findings from the interviews were that those cities associating climate change mitigation and/or adaptation with their policy efforts were:

- more focused on challenges related to expenditures than revenue,
- more likely to be altering their approach to economic development in response to changing conditions,
- devoting more attention to investigating the policy actions of other cities, as well as investigating the activities of cities in a wider geographic range (e.g. metropolitan region versus national),
- and more likely to be able to describe successfully applying what they learned about the policy activities of other cities were doing in their own city.

These findings follow Chapter 2's characterization of the influence that the experience of competitive pressure might have on cities' decisions to take on climate change policies or not – that taking on climate change is a pragmatic response informed by a desire to "keep up" with one's peers. However, these findings also add additional layers to Chapter 3's discussion. The interviews highlight the variability of the extent to which cities are influenced by other cities as well as variability in how they respond to this influence. Variability in how potential adopters of climate change policy efforts relate to each other and new practices is a key feature underlying the diffusion of innovation adoption process laid out by Rogers (2003). Diffusion is often conflated with spread or dissemination, but social science research often characterizes diffusion as a social process in which adoption by one participant affects other participants' considerations about adoption (Elkins and Simmons 2005). The importance of this discussion of diffusion for the dissertation is that, because adoption can elicit a positive feedback in a social system, it is a non-linear process. Adoption begins slowly and tentatively among only the most innovative participants, but over time as more and more participants follow this behavior, adoption can quickly become the norm. Uptake of an innovative behavior can therefore rapidly increase following a gradual beginning as this norm generates intensifying peer and economic pressure on potential adopters (Rogers 2003). The follow-up survey of cities found that 39% of cities were

associating climate change mitigation with at least one policy effort and 38% were doing the same for adaptation. These percentages imply that, even if taking some action to address these issues is not yet the norm, it may be beginning to become established as a social norm and a rapid expansion of uptake might be beginning.

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Chapter 2

Paper #1: Climate Change Adaptation in Cities and Intercity Competition: A race to the top?

1. Introduction

What drives climate change adaptation in cities? What will lead to more widespread adoption of urban adaptation efforts? With each passing year, answering these questions becomes more and more critical. The global population and economy is becoming increasingly urban – 66% of the population will reside in cities by 2050 (United Nations 2014) and 600 cities alone represent 60% of global GDP (Dobbs et al. 2011). At the same time the current and future impacts of climate change on urban areas are likely to increase in intensity (Revi et al. 2014). Consequently, cities have not only emerged as important locations for adaptation to climate change, but as critical testing grounds for policies that will help society effectively adapt to climate change more broadly (Revi et al. 2014, Bulkeley and Broto 2013).

Understanding and supporting urban climate change adaptation requires the ability to explain when, where, and how adaptation will emerge and what factors will shape the form that it takes. Cultivating this understanding demands applying and testing models of the decision making of urban governing bodies in the context of climate change adaptation. A growing body of excellent case study research has steadily contributed to our understanding of urban adaptation throughout the world (e,g, Wolf et al. 2010, Tanner et al. 2009). However, there has been less focus on developing theories that can explain the emergence of adaptation and its development. As a result, we still know relatively little about the local political and governing processes through which climate change adaptation in cities arises and spreads (Bulkeley 2010, Bulkeley and Broto 2013), and specifically the political and economic factors that shape the decisions made by city governments about adaptation.

The politics of urban climate change adaptation intersect with the decisions city governments make about public services such as transportation, water supplies, energy supplies,

and waste management. The IPCC Fifth Assessment Report's review of urban climate change adaptation has explicitly made this link, concluding that not only do city governments play a central role in urban adaptation, their decisions about infrastructure and the quality of public services they offer residents will help determine cities' adaptive capacity (Revi et al. 2014). The report also recommends that cities incorporate, or "mainstream," climate change into ongoing decisions about infrastructure and services. From this perspective, climate change adaptation can be viewed as a city's continuous efforts to strategically alter, protect, or enhance the public services they provide based on the existing or anticipated impacts of climate change.

Despite the importance of this connection between municipal public services and urban (or perhaps even global) climate change adaptation, very little research has examined how the political economy of municipal service delivery decisions is likely to shape urban adaptation outcomes. Scholarship on municipal service delivery has consistently demonstrated that the decisions city governments make are heavily influenced by their relationships with other cities. We therefore propose that intercity relationships are central to the politics of urban climate change adaptation.

Cities have long defined themselves through their relationships with other cities, differentiating themselves as attractive places for living and investing (Kavaratzis and Ashworth 2008). Globalization and advances in telecommunications have dramatically enhanced the mobility of capital, labor, and residents in the last half century, increasing the competitive pressure that cities face to retain and attract resources that might locate elsewhere (Douglass 2002, Savitch and Kantor 2003). Cities are generally thought to respond to these competitive conditions through growth-based strategies that might enhance their attractiveness (Savitch and Kantor 2003, Peterson 1981), such as offering incentives, amenities, and a lifestyle brand (Anttiroiko 2015). While the notion that competition and interaction with other local governments drives city-level policy decisions has a long history in the US (e.g. Tiebout 1956, V. Ostrom et al. 1961, Schneider 1989), competitive pressure has recently been shown to underlie place marketing and city branding in Europe (Lucarelli and Olof Berg 2011), and rapid urbanization and changes in global investment have heightened competitive pressure in developing contexts as well (Douglass 2002).

However, growth based strategies are no longer the only way that cities are responding to competitive pressures. Competitive pressure between cities may actually sow the seeds of

cooperation amongst local governments as they seek ways to maintain and enhance services in a complex environment. In some cases, cities respond to competitive pressures by forming partnerships that spread out the burden of service production (V. Ostrom et al. 1961, Feiock 2002, Feiock 2007) and sharing information and other resources with each other through formal and informal networks (Dawes et al. 2012). Some of these inter-city networks have become so prominent that they are viewed as critical venues for action on climate change (Bulkeley and Broto 2013, Hoffmann 2011).

In this review, we explore the range of competitive pressures that have been found to shape city decisions[1], and relate these findings to the emergence and development of urban climate change adaptation. We organize our review around four responses to this pressure that have been identified by previous research: fiscal pragmatism, city branding, cooperative arrangements, and intercity networks. We then identify the implications for climate change adaptation outcomes that each type of response might produce. There is potential for competitive pressures to lead to policymaking that favors economic development and cost savings over environmental outcomes, leading to concerns about a "race to the bottom." For example, cities may compete with one another for investment by iteratively sacrificing more and more tax revenue and other community interests (Goetz et al. 2011). By continuously setting places dedicated to "smokestack chasing" in competition against one another, businesses could extract highly favorable packages for themselves while localities drove each other's quality of life downwards (Goetz et al. 2011). However, there is little empirical verification of competition leading to "races to the bottom" in terms of environmental considerations (Carruthers and Lamoreaux 2016). Some studies even find indications of "races to the top" in which competitive economic development efforts are associated with enhanced local environmental efforts (Holzinger and Sommerer 2011, Millimet and List 2003, Fischel 2001).

We believe that climate change adaptation could become a policy area for competitive pressures to support a race to the top to emerge among cities. As defined in this paper, climate change adaptation policies would help city governments continue offering vital services and amenities in the face of climate change. If this is the case, successful adaptation policies might provide cities with opportunities to gain a competitive advantage over others, especially if the potential danger of local impacts of climate change become increasingly visible over time. The

[1] Drawn from economics, political science, urban studies, and public administration scholarship.

potential for adaptation to provide competitive advantages could lead cities to rapidly pursue adaptation interventions in order to best protect public and private assets from the effects of climate change. There may therefore be great potential for intercity competitive pressures to generate races to the top around urban adaptation in the years ahead, and we provide suggestions for related future research.

2. Intercity Competition as a Driver of Fiscal Pragmatism and Efficiency

Public choice theory as applied to metropolitan areas (hereafter referred to as "metropolitan public choice") presents one approach to predicting how intercity competitive pressures shapes city decision making. Metropolitan public choice assumes that city governments seek to attract and retain residents and financial investments in essential resources for city growth and development. These residents and investments are also mobile resources that locate and relocate based on the ability of any given city government to fulfill their public service and investment needs, putting cities in competition with each other (V. Ostrom et al. 1961, Schneider 1989, Basolo and Lowery 2010). Cities can provide hard services like infrastructure and soft services such as libraries and parks to attract residents and investment. However, raising the revenue needed to pay for these services, through taxes and user fees, might ultimately make them less attractive than their neighbors. Therefore, metropolitan public choice posits that cities respond to intercity competition by acting as fiscal pragmatists who make decisions based on the imperative to provide desirable services and amenities at the lowest possible cost to the public.

This "fiscal imperative" (Wolman and Spitzley 1996) hypothesized to underlie city policy decisions leads policy makers to favor efforts that strengthen the city's economic position and revenue over policies that might address other aspects of social welfare (Peterson 1981). Metropolitan public choice theorists argue that economic development is a relatively uncontroversial means to ensure quality of life improvements, because development generates additional revenue and investment for the city, potentially allowing the city to then invest in public services (Peterson 1981, Stein 1990). These considerations were originally developed in the context of US metropolitan regions, and the bulk of research testing this model of behavior has focused on the US. Research has shown that cities in the US perceive themselves to be in competition with other cities for development opportunities (Schneider 1989, Gordon 2007), city

policymakers assess policies based on their budget impact (Schneider 1989), cities almost exclusively focus on policies that will break even or potentially enhance revenue (Gordon 2007), and competition between local governments enhances public service efficiency (Foster 1997). Globalization has intensified intercity competition for investment and resources for countries outside of the US as well (Douglass 2002 Savitch and Kantor 2003).

2.1. Implications for urban climate change adaptation

The notion that intercity competition leads to fiscal pragmatism in city decision making implies that cities will pursue adaptation strategies that align with their desire to provide the most attractive set of services possible while keeping taxes and fees as low as possible. We might therefore expect that adaptation will be framed and developed as policies that will have a positive impact on city budgets and are directly tied to the quality of municipal services. It may even be that cities will prioritize adaptation that is tied to the services demanded by the most mobile residents. Indeed, some initial experiences with urban climate change adaptation exhibit this pattern. In many cases when cities have taken early action on climate change adaptation, advocates have explicitly tied adaptation to protecting existing assets or economic development (e.g. Lambright et al. 1996, Anguelovski and Carmin 2011). For example, in 2008 former mayor Bloomberg convened the New York City Climate Change Adaptation Task Force to "identify climate change risks and opportunities for the city's critical infrastructure and to develop coordinated adaptation strategies to address these risks" (Rosenzweig and Solecki 2010). Cities that have successfully pursued climate change policies have often done so as a means to reduce spending and/or meet other economic development goals as a "co-benefit" (Metz et al. 2001) or an elusive "triple-win" that simultaneously allows the city to address mitigation, adaptation, and development (Denton et al. 2014). In New York City, the initial planning document that led to the creation of the Climate Change Adaptation Task Force, "PlaNYC", recognizes the economic benefits of early action. In Durban, South Africa, gaining acceptance for adaptation amongst many working in the city required emphasizing adaptation as a way to help realize goals outlined in the city's Integrated Development Plan (Carmin et al. 2012).

Tying climate change adaptation to the city's economic development and service provision priorities implies that adaptation may take place on a much less visible, ad hoc, basis in individual departments and planning documents when and where it is fiscally appropriate and

can serve bureaucratic needs to meet mandates and balance budgets. In this case, adaptation agendas may be more likely to target projects with the greatest cost-saving potential or most closely aligned with existing agency missions. For example, city governments may be likely to prioritize projects with short pay back times and less likely to invest in long term projects with long pay back times. They may favor infrastructure repairs rather than large capital investments in necessary new infrastructure. Furthermore, fiscal pragmatism implies that adaptation inevitably takes place alongside many other considerations and will have to justify itself as financially viable. Waiting for adaptation to become a fiscally pragmatic activity is an inherently reactionary approach and may ensure that adaptation fails to happen in time.

While these considerations imply that the emergence of adaptation efforts in cities might be initially constrained by economic considerations, they also contain the potential for adaptation efforts to develop and proliferate quickly once adaptation becomes a pragmatic response. However, even if cities quickly embrace adaptation efforts, these efforts won't necessarily be equitable. Metropolitan public choice theorists argue that due to intercity competition city governments are poorly positioned financially and politically to take on redistributive policies that transfer wealth (Peterson 1981). This would make it unlikely that climate change adaptation decisions by city governments will adequately address the unequal level of climate change impact that marginalized and highly vulnerable residents will bear without policy intervention from higher levels of government (Hughes 2013). Instead, we may expect to see the development of an elite-serving agenda for adaptation that improves economic competitiveness and protects infrastructure and assets. Such an agenda may be likely to prioritize the protection of economically important infrastructures such as bridges, core business districts, and waterfronts. Prioritizing projects such as these may also serve to capture influential voters and business groups. However, a potentially significant outcome may be that highly visible climate change policies will serve narrow interests and do little to address actual concerns about climate change (Hodson and Marvin 2009, Bulkeley 2010). Such an adaptive race to the top amongst wealthier jurisdictions might also exacerbate existing inequalities between cities, and neglect collective responses that would benefit a broader swath of society.

3. Intercity Competition as a Driver of Niche Development through City Branding

An alternative response to intercity competition in cities is to actively cultivate a reputation as a place that has the cultural, technological, and knowledge resources (rather than just the lowest prices) that are attractive to mobile residents and investment (Lucarelli and Olof Berg 2011). In a globalized economy featuring advanced telecommunications, urban development no longer centers on developing and exchanging goods, but in developing and exchanging knowledge and innovation (Florida 2002, Hospers 2003). This emphasis on the primacy of knowledge and innovation in the contemporary economy has helped drive "creative city" (Hospers 2003) and "creative class" (Florida 2002) efforts throughout the world. Adherents of these perspectives argue that cities will distinguish themselves by their reputation as culturally vibrant, diverse, open-minded, educated, and innovative places (Florida 2002). Indeed, cities have in many cases responded to competitive pressures by trying to cultivate reputations as the kind of dynamic places that can draw in and take advantage of the circulation of global capital and residents (Anttiroiko 2015).

Interest in city branding has grown exponentially since the late 1980s, particularly in Europe (Lucarelli and Olof Berg 2011), even resulting in consulting services and city branding rankings such as *Anholt-Gfk Roper City Brands Index* and the *City Rep Trak Report*. Despite efforts to develop a clear process and guidelines for city branding (Braun 2008), the uniqueness of local conditions means that there can be no true one size fits all approach (Kavaratzis and Hatch 2013). City branding is not simply an application of corporate branding (Braun 2008), and places more emphasis on urban planning such as participation and stakeholder inclusion (Kavaratzis 2012). Indeed, research on participatory city branding posits that a city brand is more a process than a result, and that brand development is a dialogue that continuously defines and redefines a place's collective identity (Kavaratzis and Hatch 2013). To be successful, this identity dialogue must balance internal and external perceptions with residents' perceptions of their culture; it must also leave an impression on outsiders, and outsiders' perceptions must be used to stimulate self-reflection within the city that informs city culture and a city brand that effectively mirrors expectations (Kavaratzis and Hatch 2013).

Approaching city branding as a dialogue about identity taking place between those living inside the city and outside (Kavaratzis and Hatch 2013) emphasizes that a city's reputation is based on its relationship to other cities and its ability to establish a distinctive niche that allows it

to stand out from other places. However, sometimes these relationships with others become a fundamental part of the brand itself (e.g., sister cities). In order to enhance the global reach of their own brand and generate their own competitive advantage, some cities participate in interterritorial branding alliances (Zenker and Jacobsen 2015). Participation in cross-jurisdictional branding activities contributes to policy learning across jurisdictions that reshapes participants' shared understanding of issues, such as climate change adaptation and economic development (Pasquinelli 2015).

3.1. Implications for climate change adaptation

There is evidence that urban adaptation policies are being framed in ways that align with the notion of the progressive, competitive city. Policy innovation and "experimentation" to address climate change in cities helps brand cities as centers for progressive innovations in climate change policy (Tanner et al. 2009, Anguelovski and Carmin 2011). Climate change has offered an opportunity for at least some cities to strategically differentiate themselves as leaders on a world stage (Anguelovski and Carmin 2011). For example, Hangzhou in China has aggressively adopted climate change interventions as part of its ecological civilization green branding strategy as a people-centered place that balances innovation and high quality of life (Delman 2014). The City of Copenhagen used its hosting of the 2009 UN COP15 Climate Summit to aggressively draw attention to its initiatives to make itself a world leader as a modern green city (Ooi 2011), and Philadelphia in the US has touted the adaptation aspects of its Green City, Clean Waters initiative which has invested $1.68 billion to green infrastructure (Kessler 2011).

An urban adaptation race to the top could occur if climate change adaptation is a means by which cities establish competitive advantage relative to one another. Such reactive adaptation may emerge quickly if it becomes clear that climate change is significantly affecting the quality of life in cities (rather than just the bottom line) in ways that matter to mobile residents and investment. Cities may outcompete their neighbors (or their competitors on the other side of the world) based on their superior ability to protect public and private assets (including cultural and natural amenities) from the effects of climate change through more and more effective adaptation work.

If intercity competition does produce progressive entrepreneurial outcomes, cities may prioritize climate change adaptation measures that help them carve out a competitive niche rather than those that are informed by robust climate models and public conversation. Further, if cities and regions that are already more globally visible and competitive are also simply more capable of developing, implementing, and promoting their climate change adaptations, then existing socioeconomic gaps will deepen. Particular attention will be needed in this case to support adaptation in cities that are already struggling on the global stage.

4. Intercity Competition as a Driver of Cooperative Arrangements for Service Production

An important dimension of municipal services is the production of these services (V. Ostrom et al. 1961, Rosenzweig and Solecki 2010, Parks and Oakerson 1989); for example, not just how water is moved within the city in pipes, but where that water comes from and how the source is maintained. Cities make choices about the production of particular services within broader local public economies composed of both public and private actors (Parks and Oakerson 1989). As a result, cities typically have a variety of options available for producing services, which introduces another critical layer of options that cities have to achieve efficiency and attain a competitive advantage (V. Ostrom et al. 1961). In theory, cities will seek and participate in cooperative arrangements that allow them to find the best balance between economies-of-scale (the efficiency benefits associated with scaling up service production) and minimization of spillover effects (the costs and/or benefits associated with a service extending beyond the jurisdiction managing them) (E. Ostrom 1972). One response to intercity competition, therefore, is for cities to enter into service production collaborations with one another to help them achieve their commonly held goals concerning public services (Lombard and Morris 2010).

The Institutional Collective Action Framework (ICA) offers a useful model of the considerations that cities make when assessing the costs and benefits associated with such intercity collaborations, and highlights the potential for cooperation to serve as a pragmatic and efficient response to competition (Feiock 2002, Feiock 2007). The ICA still views cities as "unitary actors seeking to maximize economic and status interests" (Feiock 2002), but also acknowledges that decisions take place in dynamic systems that feature collective action opportunities shaped by the actions of other cities (Feiock 2007). Therefore, decisions about collaboration are context-specific and include considerations about the nature of the public

service itself, existing political institutions, and existing relationships with potential collaborators (Feiock 2007). Benefits from collaboration are greater when the underlying service challenge is greater (Feiock 2007), when working with others puts service expectations and costs more in line with resident expectations (Feiock 2007), when cooperation helps capture externalities associated with the actions of other cities (Feiock 2007), and when local officials see gains from attracting wider attention (Feiock 2007). The costs associated with collaboration are reduced when services are clearly defined and investments are transferable for other uses, communities have relatively homogenous demographics and are relatively close to one another, political contexts are relatively homogeneous, higher levels of government support or require collaborations, and trust and reciprocity exists in the intergovernmental network through bridging ties across groups and a proliferation of close, long-standing relationships between potential participants (Feiock 2007).

Although research applying this rational choice-based framework to intercity cooperation have again focused in the US (Bel and Warner 2015), these approaches have been applied successfully in in many other countries such as: Argentina (Mazzalay 2011), Brazil (De Mello and Lago-Peñas 2013), Canada (Spicer 2015), France (Di Porto 2013), Germany (Blaeschke 2014), Italy (Garrone and Marzano 2015), Mexico (Rodríguez-Oreggia et al. 2006), Norway (Andersen and Pierre 2010), Portugal (Tavares and Camões 2007), South Korea (Park 2012), Spain (De Mello and Lago-Peñas 2013), and Sweden (Sundell et al. 2009). It has also performed well across a number of different policy issues including: economic development (Lee 2016), emergency management (Krueger and Bernick 2010), public safety (Andrew 2010), regional planning (Gerber et al. 2013), and water resources (Berardo and Scholz 2010).

4.1. Implications for urban adaptation

The primary implication for urban adaptation of cooperative arrangements in service production is that the institutional context in which city governments are making decisions about adapting services – or if they are even in a position to make a decision about adapting a particular service or infrastructure system – can vary significantly from place to place and even from service to service. Cities may choose to outsource service production, shifting the adaptation decision to other jurisdictions or other sectors. There may be spillover effects between jurisdictions, and cities may have to work through partnerships and negotiation rather than more

direct intervention. A consequence of the diversity of urban service production institutions is a lack of easily definable, one-size-fits-all, climate change adaptation strategies for cities. Rather, we should expect that cities' adaptation policies and programs will be tailored to the institutional environment they already operate within. Indeed, the importance of governing through relationships with other governmental and nongovernmental entities is reflected in cities' growing reliance on inducements and coalitions in climate change governance (Bulkeley and Kern 2006). The increasing dependence on cooperative governance across jurisdictions and sectors demands attention to whether adaptation efforts reflect the best interests of urban residents rather than the interests of other, often non-local, entities (Bulkeley 2010).

The adaptation decisions of any particular city will therefore be influenced by their service and infrastructure connections with other jurisdictions as well as private and non-profit actors, both at the same scale (e.g. other cities) and other scales (e.g. neighborhood groups, multinational entities, and state/provincial governments). For example, if water supply service production has been delegated to a regional special purpose governing body, adapting to changes in precipitation patterns may require a set of coherent and coordinated decisions to be made by multiple actors accountable to a range of interests. Such an arrangement would also mean that adaptation decisions can become highly centralized and quickly impact many interconnected cities at the same time. For example, many cities in the western U.S. purchase water from large water wholesalers, which then serve as the critical decision makers for adapting the management of the region's urban water supplies to changing conditions (Hughes et al. 2013). To this end, urban climate change adaptation scholars have already begun considering the implications of multi-layered governance arrangements and the need for coordination across scales to realize the necessary changes in cities (i.e. local, state/province, and national governments) (e.g. Betsill and Bulkeley 2006, Romero Lankao et al. 2013). Urban adaptation scholarship must also account for the fact that in the process of providing a wide range of services, cities can experience an equally wide variety of governing arrangements that might incorporate different levels for different services at the same time.

Urban climate change adaptation could also provide a compelling subject for research using the ICA framework examining whether adaptation itself was undertaken cooperatively. Adaptation presents conflicting expectations as cooperation might enhance benefits for cities by reducing externalities associated with adaptation work. However, climate change adaptation

remains somewhat undefined and amorphous, which may heighten the potential costs of cooperation.

5. Intercity Competition as a Driver of Cooperative Networks for Enhancing Influence

The fourth and final implication of intercity competition we find is the potential for intercity cooperative networks. Information networks have emerged as a response to competition and the integrated, complex, and evolving nature of public administration challenges (Dawes et al. 2012). Governments enter into enduring non-hierarchical information exchange relationships that help them acquire and integrate a diverse array of knowledge and other resources associated with issues (Dawes et al. 2012). The work of climate change mitigation policy scholars has already provided significant contributions to this literature (e.g. Kern and Bulkeley 2009, Bulkeley 2010, Hoffmann 2011, Bulkeley and Broto 2013) as transnational urban climate change networks such as the C40, ICLEI CCP, and the Compact of Mayors have proliferated in recent years.

Busch (2015) identified four functions associated with these networks: *platforms* for the horizontal exchange and demonstration of climate change expertise amongst cities, *consultants* that provide information and other support such as tools, *commitment brokers* that formalize goals and hold voluntary members accountable, and *city advocates* who lobby on behalf of members to higher levels of government. Cities can use network participation to identify best practices (Lee and van de Meene 2012) and networks such as the C40 explicitly offer cities a high profile platform through which to demonstrate leadership on an international stage (Bouteligier 2013). While such platforms could offer attractive settings for enhancing city brands, the transferal of best practices might actually conflict with branding goals (Busch and Anderberg 2015). City branding encourages cities to emphasize their distinctiveness from one another, but the exchange and even enforcement of best practices through commitment brokering in climate change networks drives participating cities towards standardized policy responses (Busch and Anderberg 2015). Cooperative network efforts might therefore undermine immediate branding goals in individual cities, but ultimately serve a larger collective political purpose (Busch and Anderberg 2015) that enhances each participating city's policy influence.

Research on city networks and climate change mitigation has highlighted the advocacy role that such networks play in international governance (Busch and Anderberg 2015). Cities'

participation in climate change networks heightens their global reputation and even gives them greater collective influence on higher levels of government (Bulkeley 2010, Hoffmann 2011). In the wake of the failure to realize a successful international effort to address climate change through the Kyoto Protocol, many cities joined these initiatives as a means to steer the development of climate change efforts both in their respective nations and globally (Gore and Robinson 2009). In this sense, cities have responded to global intercity competitive pressure by organizing themselves to more effectively influence geopolitics in their favor (Hodson and Marvin 2009).

5.1. Implications for quantity and quality of adaptation

Transnational networks of cities have already established themselves as major players in the existing global policy response to climate change. In such networks "of pioneers for pioneers" (Bulkeley and Kern 2009) political interests, intercity competition for global leadership credentials, and the desire to collectively influence global politics have driven cities to commit to taking action to address climate change (Hodson and Marvin 2009, Hoffmann 2011, p.105). These initiatives not only attract attention to urban climate policy, but can provide a great deal of funding as well. For example, the Rockefeller Foundation has committed $100 million to help build urban resilience in cities across the world through its 100 Resilient Cities Centennial Challenge. However, while some networks have begun to address adaptation, research has not yet examined this turn (Busch and Anderberg 2015).

Policy making through or by transnational city networks carries several risks including: reducing the process of governing climate change to a set of relatively privileged "exemplars" with the size, profile, and connections to participate (Hodson and Marvin 2009), supporting elite interests rather than democratic ones (Bulkeley 2010), glossing over critical distinctions amongst cities (Bulkeley and Broto 2013), and locking the vast majority of cities in the "periphery" who might most need to be at the heart of climate change adaptation efforts out of the discussion (Robinson 2006, p.99).

Previous research has also provided some evidence that transnational networks either have no impact, or a small one compared to other local conditions, on the likelihood that cities will engage in climate change mitigation policy work (Krause 2012). It is likely that local conditions are even more primary for adaptation, as adaptation is "inevitably and unavoidably

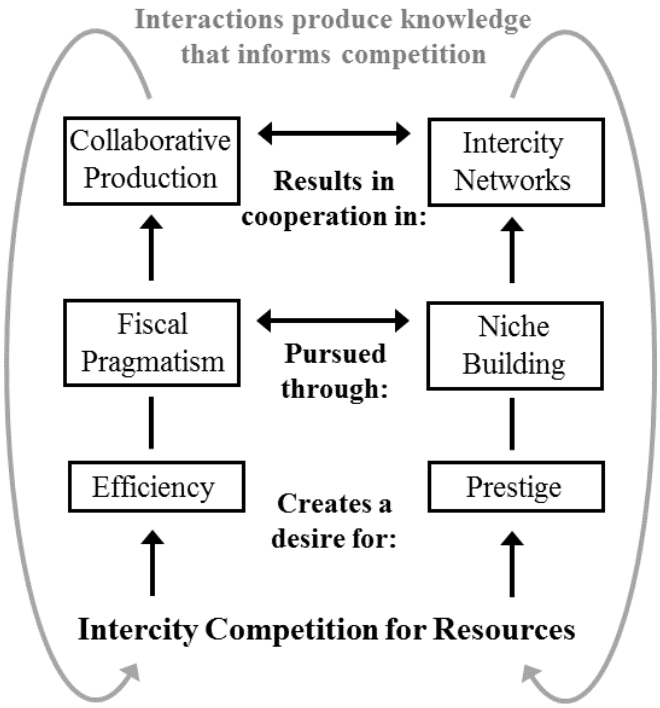
local" because local institutions affect residents' vulnerability, mediate the individual and collective feedbacks underlying adaptation interventions, and shape access to potential resources (Agrawal 2008). The implication may be that intercity networks will be the most influential when they are local or regional scale entities. For example, the cultivation of a regional climate change policy support network helped sustain Toledo, Ohio's climate change adaptation work through a disruptive period of staff turnover (Kalafatis et al. 2015a). However, this does not necessarily mean that it impossible for adaption interventions to scale-up beyond local areas. Interactions between more local and larger-scale networks can offer iterative learning exchanges through which ideas about effective adaptation interventions can be supported, tested, refined, altered, and diffused across scales as local practitioners translate general recommendations into practice (Kalafatis et al. 2015b). The localized quality of climate change adaptation might also shield adaptation networks from the tension experienced in mitigation networks between distinctive branding goals and standardized policies. Local responses will necessarily retain distinctive qualities due to tailoring to unique local conditions even while larger scale networks stimulate and support adaptation (Kalafatis et al. 2015b).

6. Competition, Intercity Relationships, and Races to the Top

We have presented four potential responses to intercity competition and discussed their implications for the decisions that cities will make regarding climate change adaptation. Figure 2.1 on the next page provides a visualization to help synthesize this discussion. The notion of a competitive need for investment and residents persists even as a driver of cooperation between cities, so intercity competition for resources acts as a foundational driver. Competition produces a desire for both efficiency and a positive, influential reputation – here referred to as prestige. Cities can pursue efficiency through fiscal pragmatism and prestige through establishing and cultivating a productive niche for themselves. However, in reality these two activities are intertwined as a city's niche as defined by their city brand can include fiscal pragmatism and cities can view niche building as a means to fulfill fiscally pragmatic goals. Cities can view cooperative relationships – in the form of collaborative production of public services or intercity networks – as opportunities to more effectively meet their efficiency and prestige goals. Collaborations for service production can drive down costs while collective intercity networks can increase individual cities' abilities to establish a productive position for themselves within

larger global economic and political systems. Again, collaborative production and intercity networks are interrelated activities that can inform and shape one another. Collaborative service production is in many ways a highly formalized network and intercity networks can influence how cities' approach their participation in their collaborative production networks. Finally, cities are continuously evaluating and updating their perceptions of intercity competition and response strategies, and their interactions with other cities in the course of cooperation will produce new knowledge and experiences that will affect these perceptions over time.

Figure 2.1. Diagram Summarizing Intercity Relationships Driven by Resource Competition



Embedded within this model of relationships are a number of ways in which cities might ultimately push one another towards competitive races to the top around climate change adaptation policies. If cities perceive that climate change adaptation policies offer a comparative advantage over other cities – either in terms of their fiscal capacities or prestige – they will integrate adaptation into their work. Their efforts could scale up to their broader region if adaptation affects resources associated with their cooperative relationships with other cities. Likewise, if adaptation policies become established as sources of prestige that a city can tout as a part of a brand that helps them establish a productive niche, other cities in their networks will be driven to emulate these strategies as a means to "keep up" and not look like they are falling behind. In either case, adaptation policies could rapidly become a positive-reinforcing norm due the constant pressure cities face to stay more "innovative" and responsive to the needs of investors and citizens than other places. Cities learn about these opportunities and shifting norms in the course of their interactions with other cities, so they will pursue adaptation policies if these interactions convince them that doing so will help them achieve their efficiency and

prestige goals. The interactions presented in the figure imply that each factor represents a leverage point through which races to the top around adaptation policies could be initiated and sustained.

While those concerned with the current rate of climate change adaptation work taking place might applaud positive feedback loops emerging around urban adaptation policy interventions, we would urge caution associated with such developments. It is necessary to ensure that climate change policy work meets the needs of citizens and does not simply exacerbate social and economic inequalities (Hodson and Marvin 2009, Bulkeley 2010). If adaptation can emerge and proliferate quickly, then so can maladaptation. What the most advantageous adaptation from a city government's perspective of supplying particular services and amenities in the face of climate change might be different than what adaptation will best support segments of the population within the city or broader adaptation efforts beyond the city. An important remaining question is whether cities are likely to not just do more adaptation work, but do the kind of adaptation work that will address the needs of the most vulnerable? We have highlighted the potential for competition to produce short-term adaptation steps and to under-prioritize highly vulnerable populations. Indeed, the effects of adaptation interventions on social justice is already an emerging topic of concern (Shi et al. 2016).

In the pursuit of not just more, but also "better" adaptation that meets the needs of society and contributes to broader questions in urban studies, we highlight the following set of research questions based on this review.

First, how do present and future local budget considerations shape attention to climate change the development of climate change adaptation? Cities may respond to the competitive pressure that they experience from other cities by acting as fiscal pragmatists who view issues and policies to address in terms of their effect on the budget. While this might constrain adaptation in the short term, as the effects of climate change on assets become more pronounced, cities might gain competitive advantage based on their ability to adapt. Future research should examine the extent to which such competitive advantage exists and may be driving decision making in city governments.

Second, what effect does the extent and nature of local governing arrangements have on the development and propagation of climate change adaptation both in a particular city and across regions? Cities often pursue collaborations with one another in their efforts to find ways

of supplying services in the most efficient ways. Further investigation into how such collaborations enhance or limit adaptation efforts is needed. However, we would expect that adaptation choices will reflect a city's institutional context, and there will be no single optimal approach to urban adaptation efforts as cities pursue a mix of strategies to address the peculiarities of their context. Future research should test this expectation in cities in a range of contexts to determine if there are underlying patterns in institutional context that shape choices about urban adaptation strategies.

Third, does a city's drive for prestige increase or decrease the likelihood of climate change adaptation? Cities don't just respond to competitive pressure with other cities by acting as fiscal pragmatists, they also actively work to promote themselves to potential residents and investors. Such self-promotion already includes environmental and climate change considerations, and we expect this trend will continue as the impacts of climate change are increasingly felt. Adaptation scholars should examine the extent to which such promotion-driven adaptation marginalizes the needs of the city's most vulnerable residents.

Fourth, what role do city networks play in the process of developing, refining, and diffusing adaptation work across cities? Cities have formed networks to increase their capacity to effectively adapt, and to cultivate a collective voice that will help them compete with other regions and bend national and global politics in their favor. While international networks of cities have received much attention from climate change mitigation policy scholars, we contend that cities' existing local and regional networks will play a large role in their adaptation efforts that has not yet been explored.

In order to more robustly understand the processes that affect climate change adaptation in cities, adaptation scholars need to pay careful attention to how cities interact with one another. Cities everywhere are interacting with rapidly expanding and interconnected networks of neighbors, competitors, and partners. There are a number of ways that such relationships can and will influence the adaptation choices and strategies pursued by urban actors, and we will not be able to fully understand these choices if we view cities as isolated from one another. Further research is needed that explicitly investigates intercity relationships either through larger-sample quantitative studies or qualitative case studies that investigate in-depth the effect of intercity relationships on local decision making. Snowball sampling, in which the sample of cities is developed iteratively through the suggestions of those already participating, could be one means

of conducting these efforts. Over time, such work can help delineate the many different ways cities relate to one another, and shed light on which types of relationships most influence adaptation. Data that traces changes over time will also be essential for identifying the development of feedback loops, understanding how these relationships evolve over time, and how evolving relationships affect adaptation choices.

Finally, underlying each of the potential outcomes of intercity competition we have discussed is the need to examine them comparatively across contexts, and particularly in developing countries. While examples exist from developing countries that have been cited in this review, the vast bulk of the research is based on cities in North America and Europe. This lack of balance is likely to distort the conclusions drawn and potentially the advice given to cities in developing countries that are rapidly emerging as potentially vulnerable global centers of population and commerce. Cities increasingly engage across borders to stake their claim in an increasingly interconnected world, and systematic urban climate adaptation research will need to follow their lead if we are to support an adaptation race to the top that best addresses the challenges society will face in a changing climate.

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Chapter 3

Paper #2: The Emergence of Climate Change Policy Entrepreneurs in Urban Areas

1. Introduction

Why do cities pioneer strategies to address potentially contentious policy issues like climate change? How will action in one city spread through networks and proliferate into others? Work on economic development and "urban scaling" has highlighted that the capacity of interconnected urban regions to generate social innovations rises with population size (Bettencourt et al. 2007, Bettencourt et al. 2010, Bettencourt 2013, Batty 2013, Schläpfer et al. 2014) and that the increasing density of social networks within urban regions is associated with economic innovations (Batty 2013). Despite the attention these findings have received, there has been little research exploring their implications for the emergence of public policy innovations related to climate change within urban systems.

Climate change offers a particularly rich subject for analyzing the emergence of new forms of policy intervention in cities. Policy experimentation around climate action has grown rapidly in the last ten years (Bulkeley and Broto 2013, Krause 2012a) despite continued political-economic debate – particularly in the US (Marquart-Pyatt et al. 2014). Climate change cuts across sectors, institutions, and other policy goals (Revi et al. 2014); and linking climate change with innovative policy efforts associated with other issues such as economic development and sustainability is a critical factor behind the success of climate change interventions (e.g. Carmin et al. 2012, Heinrichs et al. 2013, Aggarwal 2013, Anguelovski and Carmin 2011). "Mainstreaming" urban climate change policy work alongside other potentially-related existing policy goals increases the political viability of interventions, reduces conflicts (Denton et al. 2014, Measham et al. 2011), and reveals co-benefits across policy goals (Fenton et al. 2014, Huq et al. 2005, Kok et al. 2008).

To date, the preponderance of research on the emergence of local climate change policies has focused on case studies of early adopters rather than systematic analysis of the political and

economic conditions underlying action either alone (but see Krause 2012a, Krause 2013) or alongside other potentially related issues. Still, one factor that many studies (Krause 2012a, Carmin et al. 2012, Lambright et al. 1996, Roberts 2008, Wejs 2014, Krause 2012b) emphasize is that the presence of key individuals advocating for climate change policies and supporting their development (i.e. policy entrepreneurs) is a critical driver underlying climate change work. However, these studies have not yet explored what factors affect the emergence of climate change policy entrepreneurship in the first place. Entrepreneurship is "a social role, embedded in a social context" (Aldrich and Zimmer 1986) and potential policy entrepreneurs monitor their governing context closely, deciding to become active when they perceive that conditions are favorable for success (Schneider et al. 1995). Therefore, investigating factors that are associated with these influential individuals emerging can help shed light on how local governing conditions such as political structures or financial considerations affect the perception that a novel and potentially contentious issue like climate change policy can emerge in a new location.

In this article, we advance understanding of the conditions that predict climate change policy entrepreneurship in US cities based on empirical evidence from 398 cities in the US Great Lakes region. Many of these are within America's "Rust Belt" – a once prosperous multi-state industrial region whose manufacturing base eroded during the second half of the 20th century, leading to widespread decline in both economic conditions and population (High 2003). This region's history of economic setbacks and pressure to discover innovative policy strategies to stimulate urban revitalization (High 2003) make it a particularly fertile area for investigating forces underlying the emergence of policy innovation both generally and in relation to other ongoing efforts. We focus on mid-sized cities (population 5,000 – 500,000) to shed light on common or ordinary forces in cities not already recognized as leading examples of climate policy innovation. We chose a region that lacks a specific climate-change based threat such as sea-level rise or glacial retreat so that these findings about political or economic conditions might be generally applicable across climatic contexts.

2. Public Policy Entrepreneurs and Innovation in Urban Areas

Empirical and theoretical research on public policy innovations in cities has highlighted the influence of individuals who recognize a potential unrealized opportunity in these public policy systems and work to fulfill it (Schneider and Teske 1992, Schneider et al. 1995). These

"policy entrepreneurs" combine experience, connections, and persistence to bring their chosen issue to broader attention (Kingdon 1984). Like private sector entrepreneurs, entrepreneurs working in the public sector can take two forms (Klein et al. 2010). Kirzernian entrepreneurs find opportunities to leverage resources to more efficiently meet existing public objectives while Schumpeterian entrepreneurs disrupt existing public objectives and patterns of resource allocation in order to bring them into closer alignment with their own interests (Klein et al. 2010). In the course of their work, policy entrepreneurs communicate with others who affect policy to build awareness about their issue of interest, craft strategies and locate resources to address it, identify connections between their issue and other issues people care about, and engage with the political environment to identify political opportunities (Kingdon 1984). Entrepreneurs also build teams (Mintrom and Norman 2009, Mintrom 2000, Roberts and King 1996) as well as leverage experiences and relationships previously developed around other issues (Mintrom and Vergari 1996, True and Mintrom 2001) to support their efforts.

Empirical work has widely verified the influence of such entrepreneurs on policy action (Mintrom 2000, Mintrom and Vergari 1996, Mintrom 1997). Many case studies on urban climate change policy in particular have described that the presence of such engaged advocates plays a crucial role in the emergence and development of these policies (e.g. Lambright et al. 1996, Collier and Löfstedt 1997, Bulkeley and Kern 2006, Mukheibir and Ziervogel 2007, Roberts 2008, Burch 2010, Carmin et al. 2010, Wejs 2014) and quantitative studies on urban mitigation have also found that their presence is the most or one of the most important factors tested (Krause 2012a, Krause 2012b). However, despite policy entrepreneurs' broadly accepted significance, there has been far less attention to the factors that actually affect the emergence of policy entrepreneurship not only around climate change, but any other issue as well (Mintrom and Norman 2009).

Schneider et al.'s (1995) study on the emergence of entrepreneurs around economic development in cities represents an important exception in that they use *public choice* concepts and theories derived from economics to predict entrepreneur emergence. Public choice scholars argue that cities compete with other nearby cities to attract desired residents and investment (Tiebout 1956, V. Ostrom et al. 1961). Cities and those working within them operate as pragmatic entities with a "fiscal imperative" (Wolman and Spitzley 1996) to discover the most cost-effective balance between providing attractive services and limiting their own level of

taxation. Schneider et al. (1995) argue that policy entrepreneurs are similarly pragmatic and will tend to emerge when conditions are favorable: excess discretionary funds are available, positions exist through which they can easily influence collective action, a social disruption is occurring that they can help address, and significant opposition is unlikely to emerge.

Meanwhile, urban theorists and economic development scholars have considered what conditions give rise to social innovations. They have paid particular attention to cities' potential to allow a multitude of perspectives to cross-pollinate and produce innovative ideas that generate economic development (Jacobs 1969, Jacobs 1984, Glaeser et al. 1992, Florida 2002). Urban scaling research has directed some of this attention towards regional interconnected networks of cities such as metropolitan or micropolitan areas, finding that per capita rates of "social quantities" like innovations in the form of patents rise as the population size of an urban region rises (Bettencourt et al. 2007, Bettencourt et al. 2010). Consistent with urban economic development scholarship, attempts to develop a theoretical explanation for this scaling describe urban regions as webs of social connections where the density of these connections grows with city size, resulting in increasing rates of socioeconomic outputs (Bettencourt 2013, Batty 2013, Schläpfer et al. 2014). A central component of urban areas' dynamic scaling potential is their fractal nature – their ability to replicate, transfer, and coherently integrate a proliferation of similar but differentiated activities across multiple scales (Batty and Longley 1994, Salingaros 2004). Despite these theoretical advances, we are not aware of any efforts to connect these recent insights about socioeconomic innovations to public policy innovations or climate action.

3. Methods

3.1. Data Collection Survey #1: Discovering Policy Entrepreneurs

Our analysis included three dependent variables:

- Presence of a climate change entrepreneur (Models I and IV): Cities where a climate change entrepreneur was present (1) versus those where they were not (0)
- Presence of a climate change entrepreneur alongside an economic development entrepreneur (Models II and V): Cities where climate change entrepreneurs coexist with economic development entrepreneurs (1) versus those where one is present without the other (0)

- Presence of a climate change entrepreneur alongside both an economic development entrepreneur and a sustainability entrepreneur (Models III and VI): Cities with both sustainability and economic development entrepreneurs where climate change entrepreneurs were also present (1) versus those where both economic development and sustainability entrepreneurs were present, but a climate change entrepreneur was not (0).

The source of these dependent variables is an online survey we distributed to a staff member in 808 cities in the eight Great Lakes states in October 2014 (including Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin). This encompassed all the cities in these states with a population between 5,000 and 500,000 for which we could find a functioning email address of a city staff member to contact.

Table 3.1. Population and Sample Means Comparison

	Population Mean	Sample Mean
Population	26,320	22,711
Household income	50,470	50,720
Bachelor's Attainment	26.45	25.54
Manufacturing Employment	16.08	16.72
Population Change	7.61	7.81
Population n = 808		
Climate Change Model Sample n = 398 (49%)		

City council clerks were the primary targets of this survey because they are charged with objectively documenting the activities within the government and are expected to be aware of policy deliberations (Schneider et al. 1995). To this end, city council clerks were the final contact for 711 cities. However, whenever clerks were not available, other administrators – City Administrators (51 cities), other staff in the administration (38 cities), or City Managers (8 cities) – were contacted instead. These surveys returned results from 398 cities concerning climate change entrepreneurs (response rate: 49%). Table 3.1 above provides comparisons between the cities in our population across the eight Great Lakes states and our sample of these cities for five demographic factors. We found no statistically significant differences between the cities in our population and the cities in our sample based on z-tests comparing these means.

Our survey included the following questions to identify the presence of a policy entrepreneur for economic development, sustainability, and climate change respectively:

- To the best of your knowledge, has there been any individual in the last five years (inside or outside government) who has advocated for your community to change its approach to economic development?

- To the best of your knowledge, has there been any individual in the last five years (inside or outside government) who has advocated for your community to make changes because they said it would enhance your community's sustainability?
- To the best of your knowledge, has there been any individual in the last five years (inside or outside government) who has advocated for your community to make changes based on concerns about climate change/global warming or its possible impacts on your community?

3.2. Data Collection Survey #2: Verifying Policy Entrepreneurship

Following Schneider et al. (1995), our first survey was conducted with the premise that if a city staff person generally aware of policy deliberations taking place in city council associated a particular individual with an issue than it was a good indication that the advocate had already achieved a fair amount of visibility around that issue in the city. However, Schneider et al. (1995) and other prominent quantitative research on political entrepreneurs (e.g. Schneider et al. 1995, Mintrom 2000) has featured survey questions to provide some verification that the individuals identified were actually acting as political entrepreneurs. Therefore, if the respondent answered that an advocate was present for an issue, we attempted to follow up with those individuals. The October 2014 survey included a prompt to provide the name and affiliation of the issue advocate. Searching these names and affiliations online produced viable email contacts for 280 of the advocates identified across the three issues.

Table 3.2. Follow-Up Survey Results

Economic Development	
Contacts	137
Responses	60 (44%)
High Engagement	
Average #	5.3 (out of 6)
Respondents with 2+	58 (97%)
Sustainability	
Contacts	113
Responses	40 (35%)
High Engagement	
Average #	3.9 (out of 6)
Respondents with 2+	33 (83%)
Climate Change	
Contacts	30
Responses	11 (37%)
High Engagement	
Average #	3.8 (out of 6)
Respondents with 2+	10 (91%)

We sent a follow-up survey to these individuals in June and July 2015. It included a question asking them "how much do you rely on the following strategies in your efforts to address [issue]

in this city" followed by a series of six activities that have been associated with policy entrepreneurs in the literature:

- Identifying and describing connections between [issue] and other issues.
- Seeking support from politicians or political interests in the city
- Developing and refining ways to address [issue]
- Creating and sustaining groups that collaborate to work on [issue]
- Building others' general awareness and understanding about [issue]
- Drawing on experiences and relationships that I have developed from previous work on other issues

We asked these individuals to rank their reliance on each of these six strategies from "not at all" to "a little" to "a decent amount" to "a great deal." We classified that any individual had "high engagement" on a strategy if they said that they relied on it "a decent amount" or "a great deal." Our survey resulted in 111 responses (response rate: 40%). The average respondent reported such high engagement on 4.65 out of the 6 strategies and 101 of the respondents (91%) reported high engagement on two or more of the strategies. These results are summarized in Table 3.2 above.

3.3. Modeling the Presence of Climate Change Policy Entrepreneurs in Cities

We used logistic regression to assess factors underlying the presence of climate change entrepreneurs in cities both generally and at the same time that there is also entrepreneurship around economic development as well as sustainability (referred here as co-presence). In our models, this presence and co-presence of entrepreneurs was represented through three binary dependent variables: a climate change entrepreneur present (1) or not (0), economic development and climate change entrepreneurship both being present (1) versus there being one present without the other (0), and economic development, sustainability, and climate change entrepreneurship all being present (1) versus economic development and sustainability entrepreneurship being present without climate change entrepreneurship also being present (0).

We ran our logistic regression models predicting these three dependent variables in two sets: Models I, II, and III and Models IV, V, and VI. The first set (Models I, II, and III) tested the relationship between our three dependent variables and ten theoretically and empirically defined independent variables. For the second set of models (Models IV, V, and VI), we re-ran the first

set with an additional six variables included to test the robustness of our findings. If a statistically-significant relationship observed in our initial three models remained after accounting for additional factors, it would enhance our confidence that we were observing a real relationship.

3.4. Factors Underlying the Emergence of Policy Entrepreneurs

Each of the independent variables we used in our models are summarized in Table 3.3 on the next page. The first independent variable was the population of the city itself. Next, due to the politicized nature of climate change in the US (Bettencourt 2013), we included the political partisanship of the city's voting population measured by the relative share of the vote Barack Obama (D) received compared to Mitt Romney (R) in precincts within the city in the 2012 presidential election. We expected that a more Democratic-leaning electorate would make climate change entrepreneurship less politically challenging and; therefore, more likely. The next two variables reflect the number of municipalities and the total population of the city's metropolitan or micropolitan area. Based on the public choice literature, the more municipalities that are in a city's urban region, the more competitive pressure they will experience, making entrepreneurship more likely. Based on the urban scaling literature, the larger the total population of a city's urban region is, the more capacity there is available to produce social quantities such as innovations.

Following Schneider et al. (1995, p. 42), our mayor autonomy and number of council district variables address the ease with which a prospective entrepreneur might influence collective action in the city. The presence of a mayoral position in the city with a high degree of autonomy (characterized here as having the ability to appoint officials without council approval as described in the City Charter) could make successful action more likely, encouraging entrepreneurship. On the other hand, if there are more districts in the city directly electing council members, there are more opportunities for potential entrepreneurs to find a smaller base of support from which to advocate. Based on the public choice literature's focus on cities' fiscal imperative and using each city's financial audits from 2006-2010, we included several measures of the city's preexisting financial condition that we hypothesized might influence considerations about addressing a new policy issue. We hypothesized that the level of budget surplus versus shortfall would be positively associated with the presence of a climate change entrepreneur while

Table 3.3. Summary Table of Independent Variables Used in Models

Name	Description	Source	Mean	SD
Population	City population (in 10,000s)	2010 Decennial Census	2.27	2.90
Politics	Share of vote for Democratic versus Republican candidate for president in 2012 by county	State Secretary of State Databases	4.37	25.77
# of Municipalities	Number of Municipalities in metropolitan or micropolitan CBSA	2012 Census of Governments	102.90	109.51
Metro/Micro Population	Total population of city's metropolitan or micropolitan area (in 10,000s)	2010 Decennial Census	217.60	293.72
Mayor Autonomy	Mayoral power to appoint without council consent (binary)	City websites and charters	0.31	0.46
# of Council Districts	Count of the number of wards/precincts/districts that directly elect councilmembers	City websites	2.89	2.99
Budget Surplus/Shortfall	City's total revenue divided by total expenditures from 2006-2010	State Auditor Databases	1.03	0.09
Debt Service	Percentage of city revenue devoted to servicing existing debt from 2006-2010	State Auditor Databases	8.39	8.47
Intergovernmental Dependence	Percentage of city revenue from intergovernmental transfers from 2006-2010	State Auditor Databases	17.79	8.47
Population Change	Change in city population from 2000 - 2010 (as a percentage of 2000 population)	2000 and 2010 Decennial Census	7.81	23.10
Additional factors (Models IV, V, and VI only)				
Sustainability Network	Membership in a sustainability network (binary)	Network websites	0.06	0.27
Bachelor's Attainment	% of population with at least a bachelor's degree	ACS 2005-2009 5-year estimate	25.54	13.649
Median HH Income	Median household income (in 10,000s)	ACS 2005-2009 5-year estimate	5.072	1.90
Environmental Organizations	Number of environmental organizations in county	2012 Economic Census	7.50	12.281
Manufacturing	Percentage population employed in manufacturing sector	2012 Economic Census	16.72	6.50
Related Disasters	Number of weather-based federal disaster declarations (by county) from 2000-2014 not from winter weather	FEMA disaster declaration database	3.53	2.23

the percentage of revenue spent on debt servicing and dependence on intergovernmental transfers would affect the city's policymaking flexibility and therefore be negatively associated with entrepreneurship. Finally, we included a measure of social disruption particularly relevant to the Rust Belt of the US: the city's change in population between 2000 and 2010. Crises can represent "focusing events" that draw attention to existing challenges and encourage policy

intervention (Kingdon 1984), and have been tied to the emergence of policy entrepreneurship (Measham et al. 2011).

For our second set of models (Models IV, V, and VI), we included six other factors that might also influence the presence of a climate change entrepreneur in a city, and therefore alter the observed effect of our independent variables that we observed in our first set of models. The first was a binary "network" variable describing participation in at least one of three city sustainability networks: a large, multinational one (ICLEI), a regional one (the Great Lakes St. Lawrence Cities Initiative), or a professional one (USDN). Presumably, participation in promotional networks encourages entrepreneurship around climate change both through incentives and sharing of "best practices" -- though the influence of such networks on the existence of actual climate change policy initiatives might be mixed (Krause 2012a, Krause 2011). We then added two measures of potential general population resources that have been shown to have a statistically significant effect on the pursuit of climate change mitigation policies (Krause 2011): the percentage of the city population who had attained at least a bachelor's degree and the median household income. We also included two county-level variables based on the 2012 Economic Census that could reflect potential resources for mobilization both in support of climate change work (the number of environmental organizations in the county) and against it (the percentage of jobs in the manufacturing sector) (Krause 2011). Finally, we considered the influence of natural disasters that could act as "focusing events" encouraging action by including the number of federal disaster declarations made from 2000-2014 (county-level), excluding winter storm events that might be less easily associated with "global warming."

4. Results

Table 3.4. Models I, II, and III Results

	Model I Climate Change			Model II ED + CC			Model III ED and SUS + CC		
	Coefficient		SE	Coefficient		SE	Coefficient		SE
Population (in 10,000s)	-0.0418		(0.054)	-0.0631		(0.063)	-0.0817		(0.071)
Politics	0.0133	.	(0.007)	0.0134		(0.008)	0.0172	.	(0.010)
# of Municipalities	0.0060	*	(0.003)	0.0064	*	(0.003)	0.0084	*	(0.003)
Metro/Micro Population	-0.0012		(0.001)	-0.0007		(0.001)	-0.0009		(0.001)
Mayor Autonomy	-0.6370		(0.404)	-0.3922		(0.450)	-0.1937		(0.513)
# of Council Districts	0.1146	.	(0.060)	0.0938		(0.066)	0.0762		(0.086)
Budget Surplus/Shortfall	2.2787		(2.000)	1.4731		(2.548)	2.8863		(3.037)
Debt Burden	0.0154		(0.023)	-0.0225		(0.030)	-0.0312		(0.040)
Intergovernmental Dependence	-0.0559	*	(0.023)	-0.0522	.	(0.027)	-0.0474		(0.033)
Population Change	-0.0135		(0.011)	-0.0269	.	(0.015)	-0.0234		(0.020)

$^{**}P < 0.01$, $^{*}P < 0.05$, $^{\cdot}P < 0.10$.

Table 3.4 above displays the results of Models I, II, and III. Regarding the presence of climate change entrepreneurship (Model I), the effect associated with the number of municipalities in a city's metropolitan or micropolitan area and the percentage of the city's revenue coming from intergovernmental sources were both statistically significant ($p < 0.05$). Based on the predicted model, while holding all other factors constant at their mean values, the probability that a city with 14 other municipalities in its micropolitan or metropolitan area (25^{th} percentile of the distribution) will have a climate change entrepreneur present is 0.06. This probability rises to 0.12 for a city with 139 other municipalities (75^{th} percentile). The probability that a climate change entrepreneur will be present in a city receiving 23% of its revenue from intergovernmental revenue (75^{th} percentile) is 0.08 while for a city receiving 11% from intergovernmental sources (25^{th} percentile) the probability is 0.14. If the city has 139 other municipalities present and 11% revenue from intergovernmental sources, the probability that a climate change entrepreneur will be present is 0.17.

Regarding the co-presence models (II and III), the number of other municipalities was positively associated with the co-presence of economic development and climate change entrepreneurship as well as the co-presence of economic development, sustainability, and climate

change entrepreneurship at the $p < 0.05$ level. While holding all other factors constant at their mean value, the probability that climate change entrepreneurship will be co-present with economic development entrepreneurship in a city would be 0.06 if the city has 14 other municipalities in its micropolitan or metropolitan areas. If the city has 139 other municipalities, the probability would be 0.13. The probability of climate change entrepreneurship being co-present with both economic development and sustainability entrepreneurship would be 0.07 when a city has 14 other municipalities present and 0.18 if it has 139 other municipalities.

Table 3.5. Models IV, V, and VI Results

	Model IV Climate Change			Model V ED + CC			Model VI ED and SUS + CC		
	Coefficient		SE	Coefficient		SE	Coefficient		SE
Population (in 10,000s)	-0.0932		(0.064)	-0.1169		(0.081)	-0.1677	.	(0.094)
Politics	0.0101		(0.008)	0.0131		(0.009)	0.0151		(0.010)
# of Municipalities	0.0057	*	(0.003)	0.0071	*	(0.003)	0.0085	*	(0.004)
Metro/Micro Population	-0.0009		(0.001)	-0.0006		(0.001)	-0.0011		(0.001)
Mayor Autonomy	-0.4299		(0.456)	-0.2339		(0.517)	0.1459		(0.594)
# of Council Districts	0.1520	*	(0.063)	0.1156	.	(0.069)	0.1149		(0.104)
Budget Surplus/Shortfall	1.9101		(2.140)	1.0159		(2.662)	2.1756		(3.196)
Debt Burden	0.0192		(0.022)	-0.0241		(0.033)	-0.0491		(0.051)
Intergovernmental Dependence	-0.0594	*	(0.024)	-0.0519	.	(0.029)	-0.0505		(0.036)
Population Change	-0.0159		(0.012)	-0.0335	.	(0.018)	-0.0230		(0.023)
Network Membership	0.6414		(0.581)	0.4754		(0.627)	1.0162		(0.838)
Bachelor's Attainment	0.0185		(0.020)	0.0332		(0.023)	0.0528	.	(0.029)
Median HH Income	-0.0849		(0.160)	-0.0632		(0.186)	-0.2193		(0.218)
Environmental Orgs	-0.0182		(0.016)	-0.0200		(0.019)	-0.0052		(0.027)
Manufacturing	-0.0731		(0.039)	-0.0229		(0.046)	-0.0244		(0.054)
Disasters	-0.0521		(0.090)	-0.0078		(0.104)	-0.0945		(0.123)

$^{**}P < 0.01$, $^{*}P < 0.05$, $^{\cdot}P < 0.10$.

Table 3.5 above summarizes the results of our second set of models (IV, V, and VI) that provided a robustness check of the results from our first set of models. The number of municipalities variable was associated with a statistically significant effect at the $p < 0.05$ level in each of the three iterations of this larger model, making it the only variable tested to achieve that standard in every one of our model runs. The percentage of revenue from intergovernmental

sources also reproduced the same result from Model I. The number of council districts variable moved from marginally significant in the first model ($p < 0.10$) to statistically significant at the $p < 0.05$ level after the inclusion of the additional independent variables in this version of the model. Regarding the co-presence models, the statistical significance of politics from the previous version of the economic development, sustainability and climate change model disappeared after the inclusion of the additional independent variables in Model VI. On the other hand, the negative effect of population change (in this case, growth) and intergovernmental revenue dependence on the likelihood of climate change and economic development entrepreneurship being present at the same time remained marginally significant ($p < 0.10$) after the inclusion of the additional independent variables in Model V.

5. Discussion/Conclusion

The most consistent finding was that the presence of other municipalities in a city's interconnected urban region was associated with a greater likelihood of climate change entrepreneurs being present both generally and in combination with economic development and sustainability policy entrepreneurship. We included this 'municipalities' variable as a measure of the competitive pressure, friendly or otherwise, that individual cities experienced within their urban regions. However, other results provide evidence that this finding implies more than just the effect of cities feeling pressure to out-perform one another. The first is that a higher level of dependence on intergovernmental funds was also associated with a lower likelihood of climate change entrepreneurship. Cities with lower dependence on intergovernmental funds can have more decision-making autonomy independent of higher levels of government. Second, that a larger number of council districts in a city was associated with climate change entrepreneurs' presence provides some evidence that more independent decision-making entities within the city government is another supporting factor (though this result was less consistent than the other two factors).

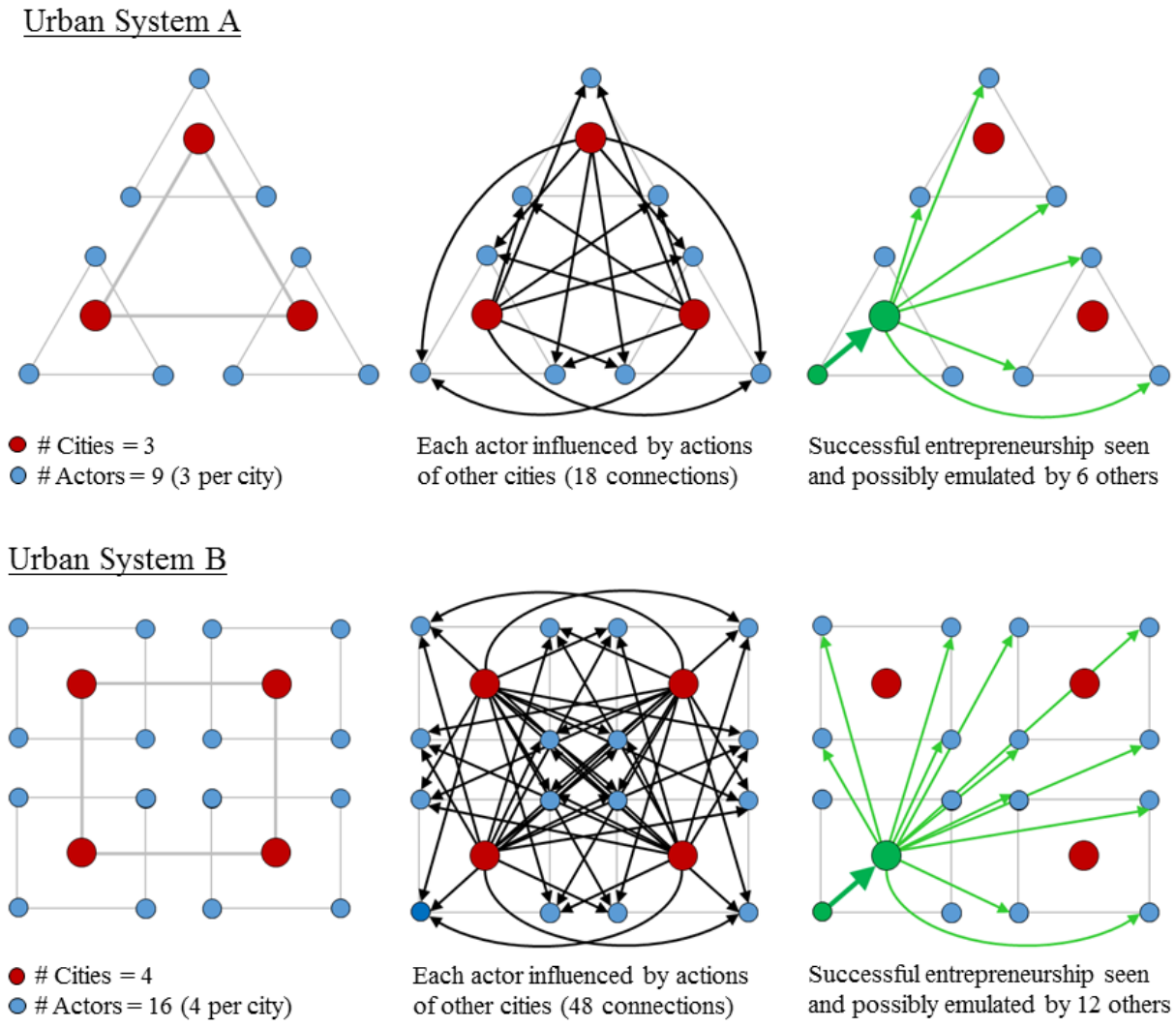
Together, these results suggest that polycentricity underlies the emergence of climate change policy entrepreneurship in cities. As described by Polanyi (1951) and V. Ostrom et al. (1961), polycentricity is a property of a system that describes the proliferation of independent, but interconnected decisionmakers within them. Actors in polycentric systems make independent decisions about how to best address abstract goals, but they adjust their judgements in reference

to the actions of the other participants. Our results produced little indication that immediate financial conditions affected the emergence of climate change policy entrepreneurs – there were no statistically significant effects associated with budget surpluses or debt service. However, this does not necessarily mean that the fiscal imperative has no influence on the emergence of policy entrepreneurship around innovative policy issues like climate change. A city's fiscal imperative appears straightforward, but in reality, determining what makes a community "attractive" and how to realize that vision is a subjective, complex, and ever-changing pursuit (V. Ostrom et al. 1961). Cities remain acutely aware of each other's ongoing efforts to meet the common goal of their individual fiscal imperatives, and adjust their behavior based on other cities' activities (V. Ostrom et al. 1961, Schneider 1989). They therefore experience very strong pressure to not appear to be falling behind in terms of policy innovation.

Figure 3.1 below summarizes this relationship between the decisionmaking polycentricism of an urban system and the enhanced potential for policy entrepreneurs to emerge in cities within that system over time. The example systems exhibit fractal qualities (Batty and Longley 1994, Salingaros 2004) replicating, transferring, and coherently integrating a proliferation of similar but differentiated activities across multiple scales. Nested decisionmaking takes place across two scales –the city level and within the city level. Actors within cities monitor the other cities in their urban system and might respond to what they see by acting as entrepreneurs pushing their own city to emulate others. Urban system B has a higher level of decisionmaking polycentrism than A, and the opportunities and possible connections that might encourage policy entrepreneurship rise quickly with even a small increase in polycentrism. Consciously or unconsciously, the first climate change policy entrepreneur in an urban region can initiate a Schumpeterian creative disruption of ongoing regional policy activity. Their presence creates pressure for other cities to "keep up" with the latest form of policy intervention, opening an opportunity for a climate change policy entrepreneur to emerge in competing cities to resolve this competitive pressure. As policy entrepreneurs emerge in more and more cities, the policy landscape of the urban region bends towards climate change interventions.

Figure 3.1. Summary of Polycentricity and Entrepreneurship

Urban system A has three interconnected cities that each have three actors. Urban system B has greater polycentricity with four interconnected cities that each have four actors. Each actor is influenced by other cities' actions in the system, and the number of connections increases rapidly as polycentricity increases. Due to the increase in connections, if an entrepreneur changes a city's actions in B, there is higher potential for entrepreneurs to emerge in another city than in A, which would then lead to more pressure for further entrepreneurship in B than A.



The superior performance of the number of other municipalities as a predictor compared to the size of the metropolitan or micropolitan population suggests that despite the effectiveness of population size as a predictor of other urban system properties (Bettencourt et al. 2010), the polycentricity of an urban governance system may be the more relevant factor when considering

the development of urban public policy innovations. Even still, in light of urban scaling's claim that the ability of urban systems to produce social outputs arises from the transfer and integration of activities across multiple scales, the potential that the polycentricity of multiple scales within an urban governance system can simultaneously influence entrepreneurship needs further research. For example, a city council is a smaller-scale polycentric system embedded within a larger-scale polycentric urban system. Council members respond to each other's actions but maintain independence from one another with ideas that reflect distinctions between the constituencies of their smaller council districts. While councils respond to actions throughout their regional urban system, council members' decisions will also influence decisions throughout the broader region. Those interested in enhancing and scaling up public policy innovation will need to better understand how exchanges between local and regional scales might facilitate the development and transference of innovations and lessons learned through practice (Kalafatis et al. 2015). In particular, urban climate policy scholars investigating the role of local and regional networks (Woodruff and Stults 2016) can use our findings as empirical starting point, though future research will especially need to look at the interconnections between actors across cities in more detail.

Finally, those considering the development of climate policy at the international scale have already drawn attention to polycentricity (Jordan et al. 2015, Cole 2015), but there have not been empirical studies on the actual impact of polycentricity on the emergence of climate change policy innovation. Our results provide empirical evidence that polycentricity at local scales of urban governance systems might be particularly pertinent for those interested in how cities and complex urban systems act as sources of innovation and experimentation. Complex and unpredictable "wicked problems" like climate change require the capacity to simultaneously attend to multiple related issues (Moser et al. 2012, Rittel and Webber 1973). Polanyi and others have reasoned that the propensity for polycentric systems to produce and diffuse innovative strategies ultimately make them more capable of addressing diffuse, continuous, and unpredictable social challenges than more hierarchical or controlled planning efforts (Polanyi 1951, Polanyi 1941, Jacobs 1999, Aligică and Tarko 2012). "Adaptation" or "resilience" are the kind of open-ended policy goals requiring continuous refinement as conditions change that would particularly require polycentricity to effectively manage. Our ability to unlock the creative potential of society to respond to environmental challenges in the coming decades will depend on

understanding the processes through which cities and the polycentric urban systems that they inhabit sharpen the cutting edge of public policy innovation.

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Chapter 4

Paper #3: The Pressure to Innovate and the Diffusion of Climate Change Policy Efforts Across Cities

1. Introduction

Cities have emerged as significant sources for the design and development of climate change policy in recent years. As international efforts stalled following the Kyoto Protocol in 1997, cities, perhaps more than any other political jurisdiction became critical niches for the development of climate change policies. In the process, they sought to realize potential economic gains, reduce perceived dangers, expand their authority and resource claims, and express ideological positions across governance scales (Bulkeley 2010, Hoffmann 2011 p.70-71). Researchers analyzing the emergence of climate change actions in cities have commonly highlighted the influence of the availability of particular resources in cities such as socioeconomic health (Krause 2011, Krause 2012b, Reckien et al. 2015), dedicated issue advocates such as policy entrepreneurs (Carmin et al. 2012, Anguelovski and Carmin 2011, Feiock and Bae 2011), or access to transnational municipal networks that support and encourage climate change interventions (e.g. Kern and Bulkeley 2009, Lee and van de Meene 2012, Hakelberg 2014).

However, this research has paid less attention to understanding how cities influence each other's behavior and how that influence factors into the emergence of climate change policy in cities. The influence that cities have on each other is important because it will shape how climate change policies transfer (or not) from city to city. The diffusion of such innovations is not simply a static spread, but an evolving social process that encompasses the ways in which actors adjust their considerations about adopting practices based on what other actors are doing (Elkins and Simmons 2005, Rogers 2003, p.5-6). Cities interact with each other in complex, interrelated ways (Kalafatis and Hughes, under review). How do cities influence one another? What forces drive this influence? What are the implications of this influence for the emergence of climate change policies in cities? Without understanding the forces underlying diffusion across cities and

their effects on climate change policy, it is not possible to assess the ultimate impact of urban climate change policy experimentation (Bulkeley and Broto 2013) currently taking place that could potentially reverberate across jurisdictional boundaries in the future. For experiments to have their full impact, lessons learned will have to be transferred and applied across contexts through diffusion.

Studies of transnational municipal networks do already provide one perspective on interrelationships between cities and the implications of these relationships for the emergence of climate change policies (Kern and Bulkeley 2009, Lee and van de Meene 2012, Hakelberg 2014). This focus on transnational partnerships has identified early adopters' efforts in networks "of pioneers for pioneers" (Kern and Bulkeley 2009) and has highlighted an exciting avenue for global action. However, it has left many unanswered questions about governing processes in the cities that participate in them (Bulkeley 2010, Bulkeley and Broto 2013). This represents an especially pressing research need given that it appears climate change policies are intimately tied into the local governing context where they emerge (Bulkeley and Broto 2013, Krause 2012b). Furthermore, it has left out the many cities in the world that lack the resources and access to participate in these networks in the first place (Hodson and Marvin 2009).

Kalafatis and Hughes (under review) have offered another, broader perspective on the ways in which cities influence each other's embrace of climate change efforts. The authors argue that cities' responses to competitive pressure to acquire resources and a positive reputation in relation to other cities can result in a positive feedback loop (a "race to the top") in which the pursuit of successful climate change adaptation will continuously encourage other cities to pursue adaptation. In Kalafatis and Hughes' view of intercity relationships and climate change adaptation policy, cities take on an uncertain and potentially politically-risky issue like climate change adaptation because of a combination of pragmatic economic development and financial considerations and a need to "keep up" with other cities and appear as if they are not being left behind by those they perceive as their peers. The authors ground their discussion around an extensive literature review, and they call on future research to pursue new empirical tests of their characterization of city decisionmaking as it relates to the emergence of climate change policies.

In this paper, I draw on interviews with 32 officials across 15 cities in the Great Lakes region of the United States to empirically examine and extend Kalafatis and Hughes' discussion of how cities influence one another and the implications of this influence for the pursuit of

climate change policies in cities. These 15 cities included 7 that were associating policy efforts in their city with climate change mitigation and/or adaptation, and 8 that were not in order to provide a comparative perspective on the factors underlying the drive to have addressing climate change influence policy work. While Kalafatis and Hughes' discussion focuses on climate change adaptation alone, this selection of cities helps examine the applicability of their discussion to climate change mitigation policy as well as adaptation. The Great Lakes region offers an excellent location for examining these claims due to the challenges that many cities in this region have faced in recent decades concerning the loss of manufacturing jobs and the resulting erosion of socioeconomic resources and cultural identity tied to these industries (Longworth 2009, High 2003). Because of the economic downturn and recent focus on revitalization and new growth, this region of the United States provides a potentially fertile ground for identifying cities with a particular need to discover ways to "keep up" with changes in the global economy through policy innovation.

In the next section, I provide a review the literature on the emergence and diffusion of climate change policy in cities. The third section provides a description of the selection of case study cities and interviews and the fourth provides the results of coding interview responses based on financial and economic development challenges as well as intercity relationships. A discussion of these results in light of the existing literature follows which includes suggestions for future research.

2. The Emergence and Diffusion of Climate Change Policies

A rapidly growing number of studies have addressed the emergence of climate change efforts in cities, though these have focused primarily on mitigation (e.g. Kousky and Schneider 2003, Sippel and Jenssen 2010, Hunt and Watkiss 2011, Krause 2011, Krause 2012b, Hultquist et al. 2015). These studies often highlight the importance of particular resources being present, whether these be related to socioeconomic health (Krause 2011, Krause 2012b), the presence of key advocates (Carmin et al. 2012, Anguelovski and Carmin 2011, Feiock and Bae 2011), or participation in transnational municipal networks that support and encourage climate change interventions (Kern and Bulkeley 2009, Lee and van de Meene 2012, Hakelberg 2014). Cities mobilize such resources to fulfill their own internal goals or reduce perceived threats (Bassett and Shandas 2010, Anguelovski and Carmin 2011). The prevalence of identifying co-benefits,

where the pursuit of climate change goals are explicitly connected with achieving other goals simultaneously (Metz et al. 2001), is a consistent theme in the literature. The ability to reframe climate change in a manner that strategically bundles these policy goals together with other prevailing municipal concerns has become a significant factor behind the success of these initiatives (Heinrichs et al. 2013, Aggarwal 2013).

So far, there has been less attention to processes underlying policy diffusion and the emergence of climate change policy in cities. While diffusion is often conflated with spread or dissemination, social science research on policy adoption often considers diffusion a social *process* in which adoption by one entity affects other entities' considerations about adoption (Elkins and Simmons 2005). Diffusion therefore occurs in social systems in which participants' actions depend on the actions of other participants, but this effect emerges through uncoordinated influence rather than through direct coercion (Elkins and Simmons 2005). Such "uncoordinated interdependence" takes place through a number of processes including imitation, emulation, bandwagoning, mimicry, learning, and economic competition (Elkins and Simmons 2005). As a process of social change (Rogers 2003, p.5-6), diffusion can result in either policy convergence or divergence over time, depending on whether policies become more homogenous or heterogeneous across contexts (Klinger-Vidra and Schleifer 2014). A major aspect of the diffusion process is that policymakers learn from others' actions, and they will adopt, adopt with revisions, or avoid what others have done based on what they observe from others' experiences as well as their own (Elkins and Simmons 2005).

Studies of transnational municipal networks addressing climate change (e.g. Kern and Bulkeley 2009, Lee and van de Meene 2012, Hakelberg 2014, Busch 2015) represent a significant exception to this lack of discussion about how cities influence one another and the implications of this influence for the emergence of climate change policy efforts. Busch (2015) has recently defined such networks as "instituionalised spaces where local governments from different countries come together as equitable partners in an exchange on climate change related issues." Participation in such networks is voluntary (Kern and Bulkeley 2009), and ideally consists of horizontal (non-hierarchical) relationships between cities that can collectively steer adaptive policy development and implementation (Hajer and Wagenaar 2003, Klijn and Skelcher 2007, Hakelberg 2014). Information exchange in voluntary, non-hierarchical networks like these is a process of diffusion (Hakelberg 2014). The persistent critique of this pluralist

characterization of such networks is that, in practice, powerful actors and financial interests can use them to covertly dominant policy efforts (Hajer and Wagenaar 2003, Klijn and Skelcher 2007, Bulkeley 2010). Still, there is some evidence that membership in these networks is associated with more climate change policy action (Hakelberg 2014, Lee and Koski 2014, Reckien et al. 2015) and lower profile members of the C40 use the network to identify best practices pursued by their higher-profile peers (Lee and van de Meene 2012). At the same time, the influence of networks might vary based on the stringency of their requirements (Krause 2012a) and it remains particularly challenging to isolate and accurately measure the actual effect of network participation (Fünfgeld 2015).

Research on transnational municipal climate networks provide some preliminary indication that they can offer a space for cities to push one another to take on climate change policies (Busch 2015). However, these networks have been arenas for the most active cities addressing climate change, and focusing on their activities alone can limit research on climate change in cities to those places with the size, connections, and global profile to actively participate in them (Bansard et al. 2016, Hodson and Marvin 2009). Even many cities in rural areas in the United States, for example, lack the capacity to take advantage of such networks on their own (Homsy and Warner 2013). Furthermore, transnational municipal networks have primarily focused on mitigation (Busch 2015), and their effectiveness in addressing adaptation is in doubt based on the lack of proactive activity needed for adaptation in networks (Fünfgeld 2015) as well as the more localized nature of adaptation than mitigation (Fünfgeld 2015, Kalafatis and Hughes, under review).

3. Pursuing a Broader Understanding of the Diffusion of Climate Change Policy Efforts

Researchers studying local government policy decisions have argued that cities act as pragmatic actors who feel pressure to cultivate themselves as attractive environments for residents and investment relative to other cities through providing services as efficiently as possible and/or enhancing their reputation and influence (V. Ostrom et al. 1961, Schneider 1989, Stein 1990, Feiock 2007, Anttiroiko 2015). Cities respond to this competitive pressure by looking to other local governments to understand how they compare with other places, and to find new strategies for improving their performance and standing (Schneider 1989, Basolo and Lowery 2010). Kalafatis and Hughes (under review) argue that cities will therefore decide to

take on climate change policy based upon a combination of feeling pressure to alter city policies and being influenced by other cities to "keep up" by adding climate change efforts to their policy activities. In order to empirically explore this characterization of climate change policy diffusion, I decided to examine the processes underlying whether or not cities' were taking on climate change policy. To do so, I performed interviews with cities that reported that climate change mitigation and/or adaptation influenced their policy activities and with those that did not in order to compare the financial considerations, economic development concerns, and intercity relationships of these two groups.

3.1. Determining Climate Change Efforts

This study was developed as an extension of a broader effort to understand the political economy of climate change policy in cities throughout the eight Great Lakes states. In the fall of 2014 and the summer of 2015, I distributed two surveys to staff members in 808 cities in these states. This sample represented all of the mid-sized cities in these states – defined as those with a population between 5,000 and 500,000 – for which I could find a functional email address for a staff member. The primary contact for these surveys were city council clerks who would be expected to be generally aware policy activities and debates in the city due to their role in monitoring city council activities (Schneider et al. 1995). City council clerks were the final contact in 711 cities, while City Administrators or City Managers were the final contact in 59 cities and other staff in the administration were the final contact in 38 cities.

Table 4.1. 16 Policies Offered in Survey

Policies
Increase Development Density
Promote Reuse of Brownfields
Increase Pedestrian Transportation
Enhance Public Transportation Options
Alter Building Codes
Enhance Parks
Develop Alternative Energy Options
Develop Alternative Energy on Buildings
Alter Stormwater Management
Altered Wastewater Management
Increase Efficiency of Buildings
Enhance Tree Canopy
Reduce Energy Use
Change Fleet Vehicles
Alter Emergency Management
Develop Water Recycling/Reuse

These surveys included a list of sixteen different policies that cities could be undertaking that they could potentially be associating with environmental or climate change efforts. The list was derived from both Bulkeley and Broto's (2013) list of potential areas for climate change policy experimentation in cities and a survey the Great Lakes Adaptation Assessment for Cities

(GLAA-C) had previously used to assess the extent of urban climate change policy work in the region. Table 4.1 above and to the right provides a list of the sixteen policies. Respondents first had the option to choose whether or not a city had been "involved in any of the following actions." They had four options for this answer: yes, no, don't know, or N/A. For each of these policies, the respondents were also asked "what issues influenced these efforts" and could choose up to four options: economic development, sustainability, climate change mitigation, and climate change adaptation. The survey question included a definition of climate change mitigation and climate change adaptation: "CC mitigation refers to an effort to reduce emissions associated with climate change and CC adaptation refers to an effort to prepare for potential impacts associated with climate change." 289 (response rate: 36%) cities provided completed responses to both of these surveys. Table 4.2 above provides a summary of these responses. In all, 112 cities (39%) had pursued at least one policy that they had associated with climate change mitigation and those 112 cities had associated an average of 6 policies with mitigation. 109 cities (38%) had pursued at least one policy that they had associated with climate change adaptation and those 109 cities had associated an average of 5 policies with adaptation.

Table 4.2. Summary of Survey Results: Number of Policies Undertaken in Cities and Associated Issues

	# of Cities*	Average**
Policies Undertaken	275	8.3
Associated With:		
Economic Development	214	4.3
Sustainability	211	5.1
Climate Change Mitigation	112	6.3
Climate Change Adaptation	109	5.2

* Out of 289

** Average # in cities with at least one

3.2. Interview Selection

In order to examine the effect of economic conditions and intercity relationships on the pursuit of climate change policy in cities, I pursued comparative qualitative interviews in selected cities. In order to assess these affects across a wide range of contexts, I selected cities based on the level of socioeconomic deprivation and the urbanity of the city's interconnected local region. For the level of socioeconomic deprivation, I used the city's unemployment rate. Studies of policy innovation and adoption in local governments have used unemployment as an indicator of local socioeconomic deprivation (Boyne et al. 2005, Damanpour and Schneider 2009, Nelson and Svara 2012) which could stimulate authorities to search for innovative

strategies to match the complexity of their environment and more effectively address the needs of their citizens (Boyne et al. 2005). I chose to use the number of other municipalities in the city's interconnected micropolitan or metropolitan region as a dimension of the typology because it was a measure of urbanity that was also a significant predictor of the presence of policy entrepreneurship around climate change in a related study (Kalafatis and Lemos, under review).

Figure 4.1. Selection Criteria for Interviews with Number of Cities from the Database

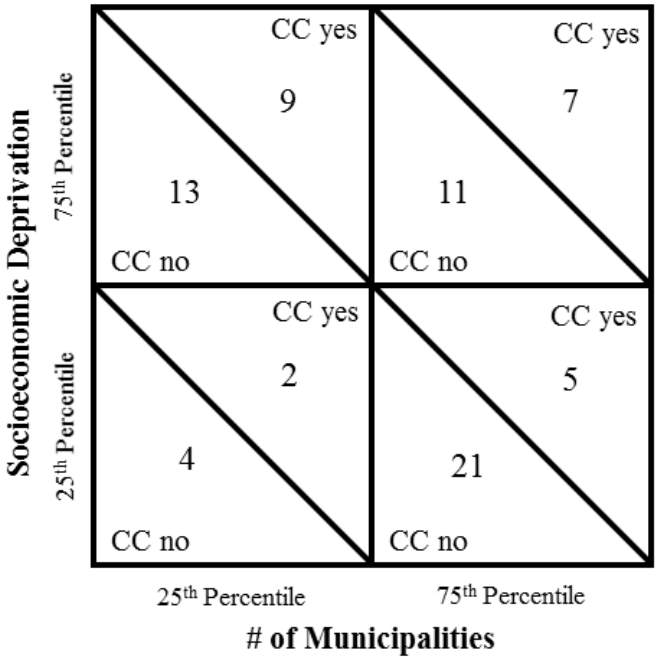


Figure 4.1 to the right summarizes the selection criteria used for the case studies. The figure has the two selection criteria (unemployment rate and the number of municipalities) split into a "high level" and "low level" that correspond to those cities that fall in the 75th percentile or higher of survey respondents for that variable (high) and those who fall in 25th percentile or lower of survey respondents for that variable (low). The 75th percentile and 25th percentile for unemployment rate were 12% and 6.9% respectively and were based off of American Community Survey 2005-2009 five-year estimates in order to allow for time for the city to develop policies in response the unemployment rate. The 75th percentile and 25th percentile for the number of other municipalities in the city's metropolitan or micropolitan region was 109 and 12 respectively and were based off of the 2012 Census of Governments. Finally, Figure 4.1 also includes a third selection criteria based on the results of the author's survey: whether a city said it associated at least one policy it was pursuing with climate change (CC yes) or not (CC no).

As shown in Figure 4.1, these criteria resulted in the following number of potential cities to select for interviews:

- High socioeconomic deprivation/high number of municipalities: 7 "CC yes" and 11 "CC no."

- High socioeconomic deprivation/low number of municipalities: 9 “CC yes” and 13 “CC no.”
- Low socioeconomic deprivation/high number of municipalities: 5 “CC yes” and 21 “CC no.”
- Low socioeconomic deprivation/low number of municipalities: 2 “CC yes” and 4 “CC no.”

Table 4.3. Summary of Cities Where Interviews Were Conducted

City Name	State	# Muni	Deprivation	CC?	Interviews	Partisanship	CM	CA
Crystal	MN	High	Low	X	2	23.00	9	0
Edina	MN	High	Low	X	3	6.72	10	12
Harper Woods	MI	High	High	X	3	56.49	6	1
Ithaca	NY	Low	Low	X	3	72.54	10	9
Ludington	MI	Low	High	X	2	-2.84	8	8
McHenry	IL	High	High	X	2	-6.34	5	4
Monmouth	IL	Low	High	X	2	5.80	2	5
Bryan	OH	Low	High		1	-3.65	0	0
Lake Geneva	WI	Low	High		2	1.46	0	0
Plymouth	MN	High	Low		2	1.94	0	0
Pontiac	MI	High	High		1	77.80	0	0
Saline	MI	Low	Low		2	5.86	0	0
Southfield	MI	High	High		2	79.17	0	0
Springboro	OH	High	Low		2	-40.79	0	0
Whitewater	WI	Low	Low		3	23.57	0	0

Variables:
Interviews: The number of officials interviewed in each city
Partisanship: Difference in share of the vote Barack Obama (Democrat) received versus Mitt Romney (Republican) in the 2012 presidential election in the city
CM: The number of policies the city reported it pursued that it associated with climate change mitigation
CA: The number of policies the city reported it pursued that it associated with climate change adaptation

For the case study interviews, I sought to conduct interviews with those working in two cities falling into each of the eight potential categories. Only one of the two “CC yes” cities with low socioeconomic deprivation and a low number of other municipalities responded to requests for interviews so there is only one city for that combination. In choosing which cities to contact first from each category, I sought to achieve a mix of states as a well a mix of political partisanship measured by the share of the vote the Democratic candidate for president, Barack Obama,

received in the city in the 2012 election compared to the Republican candidate for president, Mitt Romney. Climate change is still a highly politicized issue in the United States (Marquart-Pyatt et al. 2014), so it was important to account for partisanship. However, as shown in the "Partisanship" column in the summary in Table 4.3 above, my sample of 15 cities featured a wide range of political partisanship both amongst "CC yes" and "CC no" cities – President Obama won "CC yes" cities by an average of 22.2 points and "CC no" cities by an average of 18.2 points. For reference, Table 4.3 also includes columns describing how many policies each city had undertaken that were associated with climate change mitigation (CM) and climate change adaptation (CA). As a final note, though this research focuses on other forces influencing diffusion, two cities included in the analysis were members of transnational climate networks. Ithaca, New York is a member of ICLEI and the Compact of Mayors while Edina, MN is a member of ICLEI. No cities in this analysis are members of the C40 or Rockefeller's 100 Resilient Cities.

3.3. Interviews

For each of the cities selected, I attempted to conduct at least two interviews with those working in the city government – at least one with an elected official and at least one with a city staff member in order to get a more balanced perspective on the city's experience. As shown in Table 4.3 above, I conducted 32 interviews across the 15 cities, including interviews with 4 mayors, 12 councilmembers, 8 City Managers or City Administrators, 6 Economic Development or Community Development Directors, and 2 City Planners. Each interview was semi-structured, around a half-hour, and included the following prompts used in this analysis:

- What are the most important challenges currently facing your city concerning the city's budget and finances?
- What are the most important challenges currently facing your city concerning growth and economic development?
- How do other cities influence policies undertaken in your own city? Can you give me any specific examples?
- Why is it important for you to understand the work that is going on in other cities?
- What other cities do you think about when making decisions about your own work? Where are they located?

- How do you learn about what these other cities are doing?

These questions were deliberately open-ended because I wanted to develop a narrative understanding about financial and economic development considerations and intercity relationships, as well as give participants an opportunity to reveal their most prominent concerns first. Following the interviews, I coded the responses based on issues relevant to financial challenges, economic development, and intercity relationships that emerged as consistent themes over the course of the interviews.

4. Financial and Economic Development Considerations

Table 4.4 below provides a summary of the coding related to financial challenges and economic development. The results of these interviews provide support for Kalafatis and Hughes' (under review) characterization of the financial and economic development considerations underlying cities' decisions to take on climate change policies in relation to other cities. The first two variables, revenue and expenditures, represent whether those in the city tended to emphasize revenue-based issues *or* expenditure-based issues when asked an open-ended question about the city's financial challenges. For this reason, only one of the columns is marked for each city. Cities that were associating climate change with their policy interventions expressed more concern about growing expenditures than shrinking revenue. When asked what the most important economic development challenges facing the city were, cities that had associated policies with climate change mitigation or adaptation were more likely to emphasize controlling expenditures rather than acquiring (or losing) revenue (6 of the 7 "CC yes" cities emphasized expenditures while only 1 of the 8 "CC no" cities did). Increasing expenditures is an indication of cities engaging in behaviors consistent with the kind of race to the top, rather than a race to the bottom (Goetz et al. 2011), that Kalafatis and Hughes anticipate being characteristic of cities' pursuing climate change adaptation. Also, if cities are acting in a fiscally pragmatic manner, they will be less likely to engage in potentially risky, novel policy activities like addressing climate change when a lack of revenue already constrains their more traditional efforts.

Table 4.4. Summary of Interview Coding for Financial and Economic Development Challenges

					Financial Challenges		Economic Development	
City Name	State	# Muni	Deprivation	CC?	Revenue	Expend.	Full Development	Change
Crystal	MN	High	Low	X		X	X	X
Edina	MN	High	Low	X		X	X	X
Harper Woods	MI	High	High	X	X		X	X
Ithaca	NY	Low	Low	X		X		X
Ludington	MI	Low	High	X		X	X	X
McHenry	IL	High	High	X		X	X	
Monmouth	IL	Low	High	X		X		X
Bryan	OH	Low	High		X			
Lake Geneva	WI	Low	High			X		
Plymouth	MN	High	Low		X			
Pontiac	MI	High	High		X		X	
Saline	MI	Low	Low		X			
Southfield	MI	High	High		X			
Springboro	OH	High	Low		X		X	
Whitewater	WI	Low	Low		X			

Variables:
Revenue: Marked "X" if the city emphasized revenue-based challenges over expenditure-based challenges
Expend.: Marked "X" if the city emphasized expenditure-based challenges over revenue-based challenges
Full Development: Marked "X" if the city had developed all of its available land and lacked the ability to annex additional areas
Change: Marked "X" if city described a shift in its approach to economic development in response to changing conditions

Regarding economic development, a common theme in the interviews were cities describing the impact on their decisionmaking of "full development" – the development of all remaining open space in the community and the inability to expand further through annexing any surrounding land. As one respondent described while discussing their attention to sustainability, "being completely built-out and boxed-in, the focus now is on redevelopment, making the most out of what we already have." "CC yes" cities were more likely to have already reached "full development" in their community (5 out of 7 "CC yes" communities versus 2 out of 8 "CC no" communities). In general, there was some indication from the interviews that full development encouraged communities to spend less economic development attention on attracting new industries and more attention to enhancing quality of life concerns that can more directly be tied to sustainability or climate change policies. Finally, "CC yes" cities were more likely to describe

that they had shifted their approach to economic development based on changing conditions with 6 out of 7 "CC yes" cities describing such a change and none of the "CC no" cities saying so. This finding is consistent with the notion that cities act pragmatically in response to financial and economic challenges (Peterson 1981, Schneider 1989, Longoria 1994, Wolman and Spitzley 1996), with climate change policies being pursued as a means to help achieve existing economic development goals (Cashmore and Wejs 2014, Kousky and Schneider 2003, Lambright et al. 1996). However, the interviews with cities in this study suggest that climate change interventions might be more likely when those in cities perceive that they need to find innovative economic development strategies to respond to changing conditions. As an illustration, the following responses come from interviews with two rural communities (who also both have a higher-education institution present), the first community is not associating policy efforts with climate change and the second one is:

City 1 (CC no):

Respondent 1: "We have diversified [our economic development efforts] somewhat…but we're not trying to move from column A to column B or anything like that per se – we're not walking away from our manufacturing base."

Respondent 2: "The root problem is that for all the awareness, the community just doesn't grasp the importance [of altering economic development efforts]. We're not very forward thinking."

City 2 (CC yes):

"In most rural places, people look backwards, they want to return to the past… but that doesn't work anymore…In 1998, the predecessor to XXX here closed down. We really got knocked down because we weren't diversified and didn't have a strategy for something like that happening. How do we keep a major company like XXX here? How do we keep the college going and in town? Small colleges in the Midwest are really struggling and sometimes close down or relocate."

5. Considerations about Intercity Relationships

Table 4.5. Summary of Interview Coding for Factors Related to Intercity Relationships

					Intercity Relationships		
City Name	State	# Muni	Deprivation	CC?	Geography	Research	Apply
Crystal	MN	High	Low	X	National/Local	Medium	X
Edina	MN	High	Low	X	National	High	X
Harper Woods	MI	High	High	X	State/National	Medium	X
Ithaca	NY	Low	Low	X	National/International	High	X
Ludington	MI	Low	High	X	State/Local	Medium	X
McHenry	IL	High	High	X	Local/National	Low	
Monmouth	IL	Low	High	X	Midwest/International	High	X
Bryan	OH	Low	High		Local/State	Low	
Lake Geneva	WI	Low	High		Local	Low	
Plymouth	MN	High	Low		Local	Medium	
Pontiac	MI	High	High		Local	Medium	
Saline	MI	Low	Low		Local/State	Medium	X
Southfield	MI	High	High		Local	Low	
Springboro	OH	High	Low		Local	Low	
Whitewater	WI	Low	Low		Local	Low	

Variables:
Geography: Describes the scales at which those in the city typically look to gather information about what policies to undertake and how to undertake them
Research.: A relative scale (low, medium, high) based on those places included in this analysis of the amount of research each city described performing on other cities' policy efforts
Apply: Marked "X" if the city described clear examples of successful application of policies that they learned about from other cities

Table 4.5 below provides a summary of coding results for the interview questions related to intercity relationships. The first factor, "Geography," represents the scale at which the city typically looks to gather information about what policies they should be undertaking and how to undertake them. Cities undertaking policies that they associated with climate change mitigation and adaptation had a broader range of geographic influence – 6 of the 7 "CC yes" described the influence of other cities nationally or internationally on their policy decisions while none of the 8 "CC no" cities did. After a follow-up question, one respondent from a "CC no" city linked this locally-focused perspective to the city's lack of desire to change discussed in the last section: "We don't look much to other states or countries. I think we're missing out. We don't look to

other places as much as I think we should. Why don't we? Our council got old and stale in the past. We got too comfortable as a city and those in the government were too comfortable too." One of the respondents from a "CC yes" city made a similar connection between the scope of search and their city's desire to try new things: "we like being progressive so we look at what other progressive cities all over the country and even world are doing, especially Colorado recently."

These observations are consistent with arguments that cities pursue policies that they believe will help them maintain a favorable reputation relative to other cities (Anttiroiko 2015, Lucarelli and Olof Berg 2011), and that cities' efforts to shape these perceptions will influence their pursuit of climate change policies (Anguelovski and Carmin 2011, Jonas et al. 2011, Delman 2014). However, the interviews also highlighted that variations in cities' own perceptions about what other cities they compare themselves with and what aspects they are interested in cultivating will affect whether they decide to address climate change and how they will do it.

Cities undertaking policies associated with climate change also described higher levels of research effort throughout their city governments concerning other cities' policies. Three of the "CC yes" cities described a relatively high level of research effort, three were medium, and one was low compared with all the other cities interviewed. Three of the "CC no" cities described a medium level of research effort, and five described a relatively low level of research effort compared to the other cities interviewed. In regards to actually describing examples of successful application of what was learned elsewhere in city policies, 6 of the 7 "CC yes" cities offered examples while only 1 of the "CC no" cities did so. Not only were cities where climate change was being associated with policies more likely to look for ideas from a wider range of places, they were doing more in-depth research and were more likely to figure out how to successfully apply what they were seeing as well. The contrast exhibited between these example responses (both from city managers) from a "CC no" and a "CC yes" city are quite similar to those previously mentioned in this section, despite being from a different set of contrasting cities. The respondent from a "CC no" city describes a lack of interest in applying policies from other places in their government: "I personally try to keep an idea about what is going on nationally through ICMA. But XXX people love XXX and they won't look outside so it's really hard to get any traction on anything from outside." The respondent from the "CC yes" city described a very

different attitude about applying ideas from other cities: “plagiarism is a sin in academia, but it is a necessity for those working in cities. We steal each other’s ideas all of the time...You always end up copying from others and adapt their strategies.”

6. Diffusion and the Emergence of Climate Change Interventions

The results of these interviews provide empirical support for the contention that city officials pay close attention to financial conditions, economic development concerns, and intercity relationships and strategically respond to these considerations in their work. Contrasts in responses related to these issues between cities who were associating their policy efforts with climate change mitigation and/or adaption and those that were not provide evidence of how these factors relate to whether or not cities take action to address climate change.

In these interviews, cities who were associating climate change with their policy efforts were likely to also be attempting to alter their approach to economic development in response to changing conditions, while those addressing climate change were not undertaking such changes in their economic development strategy. Regarding the influence of other cities, compared to cities not associating their policy work with climate change, cities that associated climate change with their policy work not only described pursuing more in-depth research on policy efforts in other cities, but paid attention to efforts taking place at broader scales as well. These cities were also more likely to actually describe successfully applying what they learned elsewhere in their own city.

The results of these interviews provide empirical support for Kalafatis and Hughes’ (under review) characterization of the forces underlying the diffusion of climate change policy innovation across cities. The fact that these forces were more prominent in cities that were considering climate change in their work than those that were not also provides support for the notion that this influence can push cities to take efforts to address climate change. However, these findings also provide insights that can help enrich existing models and open up new areas for future study. This research shows that cities can vary greatly in terms of not only how much other places affect what they do, but in who actually influences them. Some places are simply more attuned to what others are doing -- and are tuning in to a wider range of other places as well. This variation will affect the process of climate change policy’s diffusion both as a new

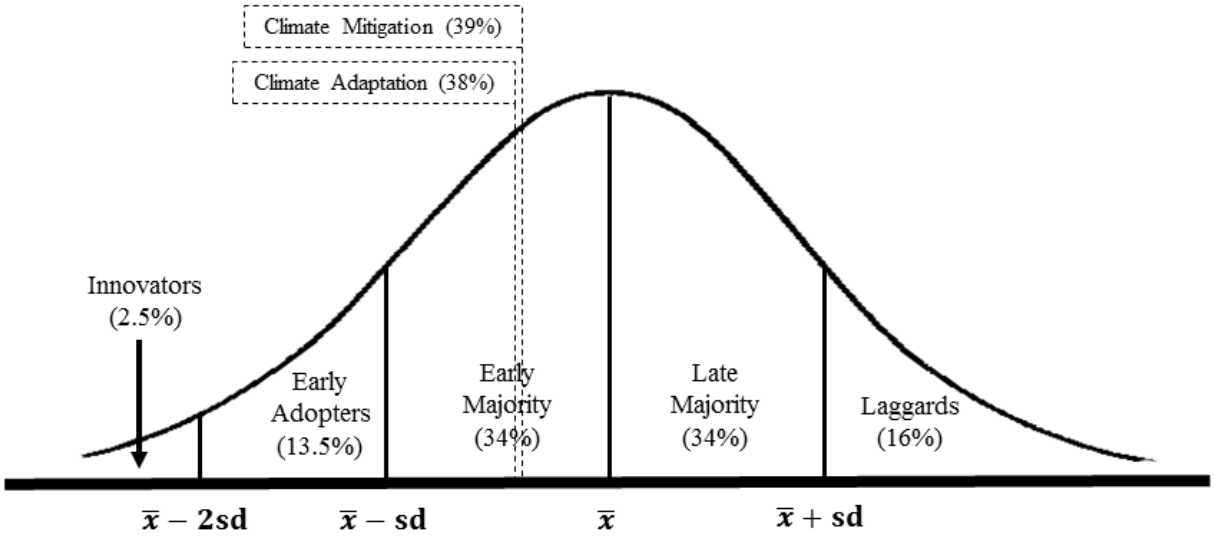
issue to address and, later on, as individual climate change policy interventions traveling from city to city.

Such variation invites speculation and future research about the extent to which the diffusion of climate change efforts follows Rogers (2003) discussion of adopter categories and its implications for the non-linear growth curve of innovation adoption. Rogers (2003, p. 282-285) proposes five ideal types of adopters (in order of innovation adoption: innovators, early adopters, early majority, late majority, and laggards) each of which have different characteristics. Figure 4.2 below reproduces Rogers (2003, p.281) description of the relative size of these adopter categories. The x-axis in the figure represents the time of adoption relative to the average ($\bar{x}$ in the middle), with the area underneath the curve representing all those who will adopt a particular innovation. The larger scale of focus and greater degree of research described by many of those cities that had already begun associating climate change with their policy work reflects Rogers' discussion of how communication behavior predicts early adoption (2003, p. 290-292). While the cities interviewed displayed characteristics consistent with the earlier-stages of the diffusion process (innovators and early adopters), the percentage of cities responding to the survey who were associating climate change mitigation (39%) and adaptation (38%) with at least one policy effort suggests that climate change as an issue might actually have already moved into the early majority group of adopters (assuming all cities will eventually pursue both areas of policy). Rogers suggests that only about 16% of adopters of an innovation are innovators or early adopters, while the remaining first half of adopters comprise the early majority (2003, p.281). For reference, the percentage of cities associating climate change mitigation and adaption with their policy efforts are marked on Figure 4.2.

If taking on climate change policies in these cities is indeed moving into the early majority group, there are significant implications. The early majority tend to represent a large portion of potential adopters (34%) who also represent a large number of social ties bridging between the most innovative and less innovative participants. While early adopters help establish a critical mass that will make diffusion a self-sustaining process, the recruitment of the early majority helps form the bridge between these early adopters and the next largest group of adopters, the late majority (also 34%) (Rogers 2003, p. 283-284). This late majority of adopters are perhaps most pushed into adoption by economic and peer pressure, as they have waited until a majority of their peers have already adopted an innovation and the weight of social or

economic or social forces compel them to change (Rogers 2003, p. 284). It may be true then that, at least amongst the region of cities studied, the forces that underlie cities feeling pressured to undertake climate change policy efforts are currently increasing. Further research will also be needed to understand how the forces of diffusion underlying climate change policy evolve over time.

Figure 4.2. Adopter Categorization on the Basis of Innovativeness*



* Adapted from Rogers (2003, p. 281). For reference, I have added the percentage of cities associating policy efforts with climate change mitigation or adaption based on survey results. The innovativeness dimension is shown as the time at which a participant adopts an innovation with $\bar{x}$ representing the average time of adoption.

7. Conclusion

Researchers have quickly responded to cities becoming essential testing grounds for the development of climate change policies by investigating the conditions that can predict whether cities will take action to address climate change or not. However, there has been less attention to the processes through which cities influence each other to take action on climate change. While research on transnational climate change networks represent an important exception to this research gap (Kern and Bulkeley 2009, Lee and van de Meene 2012, Hakelberg 2014), there is still a need to enhance our understanding of the forces that affect the diffusion of innovations across cities beyond such networks "of pioneers for pioneers" (Kern and Bulkeley 2009). In this paper, I have empirically examined Kalafatis and Hughes' (under review) arguments about the ways in which cities affect each other's adoption of climate change policies. Consistent with

these authors' model of influence, compared to places not associating climate change with their policy efforts, I found that cities associating climate change mitigation or adaptation with their policy efforts are:

- more focused on challenges related to expenditures than revenue,
- more likely to be altering their approach to economic development in response to changing conditions
- investigating the policy actions of cities at a broader scale and greater depth,
- and are more likely to be able to describe successful application of what they learned from this research in their own city.

These findings provide some empirical support for of the notion that cities can be pushed to take on policy innovations based on a combination of fiscal pragmatism and peer pressure to "keep up" with other cities. However, these findings also should push future research on this topic to consider how variation among cities affects the process of climate change policy diffusion. Consistent with Rogers' (2003) influential general discussions of innovation adoption, different cities will act differently based upon their local conditions, what other cities they look to for guidance and inspiration, and how they distinctively respond to each of these pressures. Furthermore, as a dynamic process of social change, the forces underlying the diffusion of climate change policy itself will evolve over time as potential adopters decide to take on climate change efforts (or not), and even adapt these efforts to suit their own needs. Cities are widely heralded as dynamic sources of innovation, but those researching cities' ability to generate adaptive innovations will benefit greatly from also understanding the dynamism underlying how they interact with and influence each other which will potentially have major implications for their overall innovative capacity.

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Chapter 5
Conclusion

1. Summary

The primary goal of this dissertation was shedding light on how local governments influence one another and what the implications of this influence are for the emergence of climate change policies in cities. While previous research on transnational municipal networks have addressed the influence that cities have on each other within these networks, the vast majority of cities lack the resources and access to participate in these efforts. Therefore, it is necessary to develop a more general understanding of the ways in which cities influence each other's policy making decisions and what that might mean for climate change policy in the future. The Great Lakes region of the United States was chosen to address these questions because this region has already been dealing with adjusting to global economic changes for decades and it lacks a particularly distinctive threat from climate change that might make its response less generalizable to other contexts.

This dissertation's primary finding is evidence supporting the notion that cities respond to the influence of other local governments, and that this influence may not only shape whether or not climate change interventions emerge, but also offer the potential conditions for the rapid scaling up of such interventions. Chapters 2, 3, and 4 each emphasized that when the actions of the units of study (in this case, cities) are interrelated with one another, understanding influence is a way in which to understand cascades, or the "scaling up" of behaviors as they proliferate amongst participants.

Chapter 2 set the precedent for the rest of the dissertation through a literature review of the ways in which cities influence one another based on their experience of intercity competitive pressure and discusses the implications of this influence for the development of climate change adaptation in cities. It highlighted four ways in which cities commonly respond to this pressure to be more attractive to potential residents and investors than other cities:

- Fiscal pragmatism and efficiency: cities attempt to provide attractive public services at low levels of taxation, making financial and economic development considerations critical factors shaping their decisionmaking.
- Niche development through city branding: cities also make themselves attractive through cultivating a beneficial reputation. Cities also pursue a positive brand identity in order to stand apart from others as distinctive places to live or develop businesses.
- Cooperative arrangements for service production: cities will often formally collaborate with one another to more efficiently produce services (e.g. many cities in metropolitan areas often share a single water management system). Such decisions are also made pragmatically, with cities considering both the financial gains possible through collaboration as well as social factors such as trust.
- Cooperative networks for enhancing influence: cities have responded to geopolitical changes by forming voluntary knowledge sharing networks with other cities around specific issues such as climate change policy. Such networks have not only provided cities with another means of accessing needed resources, but have allowed cities to enhance their profiles and collective influence on national and international governance.

Chapter 2 described how each of these interrelated responses could provide the conditions for positive feedback loops to form around climate change adaptation policies if such interventions offer a competitive advantage for cities in terms of financial pragmatism or reputation. Cities' influence on one another through collaborative efforts also mean that adaptation actions by one city could quickly encourage other cities to pursue adaptation as well. Therefore, a number of possible ways exist for "races to the top" between cities to drive the pursuit of more and more urban climate change adaptation efforts.

In Chapter 3, a quantitative analysis of 398 cities connected the emergence of an influential local resource behind the development of climate change interventions, the climate change policy entrepreneur, to the presence of other local governments. Such policy entrepreneurs not only have acted as key advocates behind the development of climate change policies in many studies (e.g. Anguelovski and Carmin 2011), they also pragmatically decide to engage when they perceive that conditions are favorable for success (Schneider et al. 1995). Therefore, whether or not entrepreneurs are active can shed light on what factors informed local

actors might associate with favorable conditions for policy innovation. A series of logistic regression models assessed the extent to which a set of ten and then sixteen independent variables predicted the presence of a climate change entrepreneur in a city generally, as well as alongside entrepreneurship around two other potentially related issues: sustainability and economic development. The first ten independent variables assessed factors related to the governing context of the city, the availability of financial resources, as well as those that had been associated with the emergence of policy entrepreneurs in previous research such as a position that concentrated authority, a greater number of council districts, and social change. The additional six variables used in the second set of models were ones that might specifically affect the emergence of climate change action such as natural disasters and city membership in sustainability networks. In this analysis, three variables were better predictors of climate change entrepreneurship than the rest: a greater number of other municipalities in the city's metropolitan or micropolitan region, a greater number of districts that directly elect city councilmembers, and a lower level of dependence on higher levels of government for revenue. These three variables each share a common factor, polycentricity, or a property of social systems that describes the proliferation of independent, but interconnected decisionmakers within the system. Inspired by these findings, the paper proposes that the emergence of climate change policy entrepreneurs in one city might reverberate throughout metropolitan or micropolitan areas, encouraging additional climate change entrepreneurs to emerge in cities throughout an urban region.

Chapter 4 drew on 32 qualitative interviews with officials across 15 cities to explore whether or not differences existed between cities addressing climate change policy and those that weren't regarding their financial considerations and influence from other local governments, and see if practitioners' experiences working in cities reflected the dynamics discussed in Chapters 2 and 3. Those cities associating climate change mitigation and/or adaptation with their policy efforts were: more likely to be altering their approach to economic development in response to changing conditions, investigating the activities of cities in a wider geographic range, giving more attention to investigating the policy actions of other cities, and were more likely to successfully apply what they learned from these investigations in their own city. These findings offer evidence that variability in how cities were influenced by others could help explain whether or not they were addressing climate change policies. Such variability is consistent with existing research on the diffusion of the adoption of innovations (Rogers 2003). While innovation

adoption typically begins slowly amongst a few progressive risk-takers with broad networks, eventually uptake undergoes a rapid increase as it becomes more widespread and becomes a solidifying social norm. Participants begin to race to receive the competitive advantage from this emerging social norm before others do, creating even more pressure for the remaining holdouts to eventually adopt the innovation. Chapter 4 suggests that based on the typical process of innovation adoption and the observation that 39% and 38% of cities were associating climate change mitigation or adaptation with at least one policy effort, considerations about climate change amongst the cities studied might be on the verge of a rapid increase.

These three chapters therefore offer a contrast with assessments that are concerned about the current rates of action to address climate change (IPCC 2014, Bierbaum et al. 2013, Woodruff and Stults 2016) as these chapters instead focus attention on cities' capacities to rapidly scale up interventions. To varying degrees, cities look to each other to "keep up" with their peers and avoid the appearance that they are falling behind. Each city that takes on climate change policy interventions makes it more and more likely that additional cities will do so as well. Such systemic positive feedback loops are consistent with general research on the diffusion of the adoption of innovations (Rogers 2003). This positive feedback process exhibits non-linear dynamics in which long periods of low levels of uptake are followed by rapid expansions of adoption due to solidifying social norms and increasing economic pressure to participate in an emerging consensus.

Viewed from this perspective, the existing concerns over the establishment of climate change policies in cities could simply be the predictable gradual prelude to the rapid development and transference of activity in the years ahead. Researchers have noted that, like other sociotechnical innovations, climate change "policy experiments" in which cities try out policy approaches for addressing climate change have emerged in protective niches where political and social conditions are particularly supportive of action (Bulkeley and Broto 2013, Broto and Bulkeley 2013). The research on the factors associated with the emergence and extent of climate change interventions in cities that highlights the impact of available resources such as policy entrepreneurs (Carmin et al. 2012, Anguelovski and Carmin 2011, Feiock and Bae 2011), access to transnational networks (Kern and Bulkeley 2009, Lee and van de Meene 2012, Hakelberg 2014), and/or socioeconomic resources like wealth and education (Krause 2011, Krause 2012) are also implicitly describing that exceptionally supportive places are providing a

niche for nascent climate change policy efforts to develop. Such findings are consistent with general research on the diffusion of innovations – the very first adopters of innovations are predictability venturesome and have the financial resources to absorb failures, the ability to apply technical knowledge, and a history of looking beyond their local areas to form relationships with other innovators across large geographic distances (Rogers 2003, p.282-283).

At a certain point though, climate change policy efforts in cities will move from the exception to the consensus. If climate change scholars believe that both an international push to reduce emissions and the impact of changing climatic conditions will intensify in the years ahead, then this is an inevitability. What forces will shape this transition? By definition, the cities addressing climate change at that stage cannot simply be ones that are exceptional. The forces behind the diffusion of climate change policy efforts will need to be ones that can eventually apply to all kinds of cities. To that end, this dissertation argues that this diffusion process will be driven not just by the resources, connections, and reputations that cities already have; but by the resources, connections, and reputations that they aspire to have as well. The evolution of social norms amongst governments and competition between them shapes the diffusion of policy innovations across countries (Elkins and Simmons 2005), and this dissertation has provided evidence that these forces also underlie the diffusion of climate change policy interventions in cities. The next section provides recommendations for how this finding should shape research on climate change policy in cities moving forward.

2. Limitations

When interpreting these findings and their suggested implications, it is important to keep in mind three overarching limitations of this study: empirical coverage of only one region in one country, a lack of longitudinal data, and the need to expand and more fully develop the explanatory independent variables used. The results of this study are suggestive, and future research efforts addressing these limitations would offer a more robust empirical testing and verification of this study's conclusions. First, while Chapter 2's literature review draws on research that has taken place in many areas across the world, the empirical basis for Chapters 3 and 4 is restricted to a region of the United States that shares both a similar climate and economic development history. While the findings of this study provide suggestive indications of city behavior regarding climate change policy, until empirical research takes place in other

contexts, there is uncertainty regarding the extent to which these results from the Great Lakes region of the US reflect the efforts of cities elsewhere. This study also did not feature longitudinal data that would follow the actions of the same cities across time. Multiple observations of the same cities across time would help shed light on how city behavior evolves, making longitudinal data a particularly effective means of observing scaling behavior that emerges over time. This study offers indications of city relationships and behavior that could underlie the scaling up of climate change policy action in cities, but collecting longitudinal data would actually offer the opportunity to empirically measure the existence of such scaling or not. Relatedly, future research could more fully develop the independent variables examined over the course of this study. More extensive survey-based measures of how and to what extent cities influence one another could complement longitudinal observations, providing a clearer picture of how influence might translate into scaling behavior across cities (or not).

3. Recommendations

The 2014 US National Climate Assessment recently declared that, "climate change, once considered an issue for a distant future, has moved firmly into the present" (Melillo et al. 2014, p.1). The findings from this dissertation imply that research on climate change policy in cities will similarly need to consider how it will transition from treating climate change policy as an innovation that emerges in exceptional niches, to an activity that will touch all cities as they pragmatically orient themselves in a changing world. Within climate change policy scholarship, there is already consideration about "mainstreaming" climate change interventions so that they are integrated into ongoing policy goals (Viguié and Hallegate 2012, Uittenbroek et al. 2014). However, more attention is needed to understanding how prevailing policy goals that cities have will shape the emergence, development, and diffusion of climate change interventions. Future research will need to expand upon this dissertation's commitment to assessing how cities' pragmatic governing considerations might factor into deeper and more expansive engagements with climate change policy as the global effort to address climate change intensifies in the years ahead.

In particular, there are significant questions that emerged through this research that will need further development. This dissertation has largely not addressed potential differences between the pursuit of climate change mitigation and adaptation policies. For example, Chapter

2's definition of adaptation, "a city's continuous efforts to strategically alter, protect, or enhance the public services they provide based on the existing or anticipated impacts of climate change" presents adaptation as an activity that a city will, *by definition*, see as a pragmatic intervention. Depending on how global efforts to reduce greenhouse gas emissions develop, cities might very well not see participating in emissions reductions as a similarly pragmatic activity.

Recent advances in the development of international commitments (i.e. December 2015's Paris Agreement) perhaps make it more likely that mandates to reduce emissions will mean that cities will almost have to pursue mitigation. While this might make it more likely that cities will pragmatically pursue mitigation (or adaptation for that matter) either to access incentives or avoid penalties, the potential emergence of more robust national and international leadership adds another complication to this dissertation's discussion of city's assessments about climate change interventions.

Some have argued that a fragmented, "bottom-up" approach to global efforts to address climate change will result in a smarter, more robust, and more credible process than a broader "top-down" international agreement would (e.g. Victor et al. 2005, Prins and Rayner 2007, E. Ostrom 2010). Hoffmann (2011) offers a somewhat more restrained assessment, arguing that whatever international process eventually emerges should build off of the structures and lessons of existing local efforts like those taking place in cities. This dissertation has emphasized the capacity of cities to generate vibrant and self-sustaining efforts to address climate change without outside coordination, but Hoffman's interest in an integration of the flexibility and diversity of bottom-up efforts with national and international governance providing complementary coordination is an attractive goal. To that end, the author has previously published research on supporting climate change adaptation at larger scales through iterative exchanges between regional synthesis and a proliferation of local strategies that are free to tailor, test, and refine strategies (Kalafatis et al. 2015). It is now imperative that research on climate change policy discern how emerging national and international efforts can not only avoid discouraging innovation at local levels, but best utilize the dynamic potential of local government responses to inform and improve efforts at larger scales. The latent capacity of forces like intercity competition to stimulate the development and transfer of climate change interventions is a tremendous resource for enhancing national and international efforts that should not be squandered. At the same time, localities' ability to be pragmatic is at least as

important and could offer a critical counterbalance that helps ensure that innovations practically contribute to the well-being of society.

Finally, the potential for the climate change policy responses to scale up quickly presents an impending challenge for the limited number of trained individuals working to provide decision support (Bidwell et al. 2013, Kirchhoff et al. 2013). Understanding how lessons about interventions can be exchanged, altered, and re-applied across scales is particularly critical for those responsible for providing decision support that helps avoid maladaptation. The challenge is to accurately discern and employ lessons learned without falling back on "panaceas" that promise one-size-fits all solutions that will inevitably fall short in a complex world featuring complex challenges (E. Ostrom et al. 2007). This dissertation has testified to the desire and ability of local decisionmakers to not only actively seek out strategies and other information that might help their localities thrive, but to adapt this information in productive and creative ways to best tailor it to their communities' distinctive current and future needs. Local decisionmakers have the ability to not just be the critical actors shaping local decisions, but be allies for understanding and making sense of climate change's impact on society and for devising appropriate ways to deal with it. How successfully society mitigates and adapts to climate change depends upon understanding, trusting, and utilizing the wisdom of its local representatives.

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