Big Spenders: Large-N Measures of Urban Regimes in Japanese Municipalities

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Abstract

Facing hazards and migration from disasters, many cities might benefit from redistributive policies to aid vulnerable residents, requiring changes to 'urban regimes' - the powerbrokers and networks governing local politics. However, to date, changes in urban regimes have been difficult to detect systematically. I introduce a method for Large-N municipality samples, using relative spending over time to measure municipalities' propensities towards each of 4 common urban regime types, including (1) developmental, (2) middle-class, (3) social welfare, and (4) caretaker regimes, developing 3 indices that approximate a municipality's regime type. Using the case of Japan, an industrialized democracy and the 3rd largest economy in the world, I evaluate change in urban regimes over time, using a sample of 1471 Japanese municipalities from 2000 to 2018. Using mapping, visualization, and panel models over time, this study finds that some municipalities' governing coalitions are spending more on redistributive policies than others; these social welfare regimes increased in prevalence by 17% from 2000 to 2018. Controlling for sociodemographic and political factors, models show that social welfare regimes increased much more consistently than alternative regime types, and bridging social capital was closely linked to regime outcomes.

Keywords: urban regime, cities, policy, social welfare, social capital, Japan

1. Introduction

Who governs? As municipalities face increasing threats from climate change-induced disasters, the coalitions and interests of power brokers who govern our municipalities are likely changing. Since Dahl's (1961) case study of New Haven's mayor posed the famous question, "Who Governs?", scholars have puzzled over the governance of municipalities: Much attention has been paid to different types of coalitions (Munoz

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[1]Data Availability: Index data, models, and replication code will be made available on Github [URL BLINDED FOR PEER REVIEW] upon publication.

and Henry, 1986; Stone, 1989; Stoker and Mossberger, 1994; Gilliam, 1996; Davies, 2017; Russo and Scarnato, 2018), mayors (Ramirez-Perez et al., 2008; de Benedictis-Kessner and Warshaw, 2016; Freier and Thomasius, 2016; Einstein and Glick, 2018), and interest groups (Logan and Rabrenovic, 1990; Mossberger and Stoker, 2001; Cooper et al., 2005; Portney and Berry, 2016; Anzia, 2019) that govern local politics.

Urban regime scholars argue that the powerbrokers together constitute an "urban regime" (Stone, 1993), coined in Clarence Stone's (1989) study of Atlanta politics. "Urban regime" refers to elected officials and unelected powerbrokers alike, such as influential firms, NGOs, or citizens groups, who determine what policy actions a municipality can and cannot take (Mossberger and Stoker, 2001). As municipalities experience more disasters, migration, and social change in the face of storms, floods, fires, hurricanes, and other disasters, one would naturally expect these urban regimes to change. But to date, these changes have been difficult to detect systematically, with most work on urban regimes focusing on single city case studies, or multiple different, unaligned medium-N city samples (eg. as pointed out by (Cheek and Chmutina, 2022b)). To date, the largest samples of municipalities systematically classified by urban regime specifically has been De Socio's (2007) 24-city sample and Kilburn's (2004) 14-city sample, using Stone's (1993) 4 regime type classification.

This study aims to fill that gap, introducing a framework for measuring municipalities' propensities towards each of 4 common urban regime types, and evaluating the change in frequencies of urban regimes over time. I employ Stone's (1993) 4-regime classification, which includes (1) developmental, (2) middle-class, (3) social welfare, and (4) caretaker regimes, discussed in the literature review.

These categories raise natural questions in the face of disaster: Given frequent disasters in recent decades, have social welfare regimes become more common, compared to regimes prioritizing business or middle-class interests? Or, have local politics stagnated with a rise in caretaker regimes that simply maintain the status quo? To answer these questions, I apply this framework to a Large-N sample of 1741 Japanese municipalities over 20 years from 2000 to 2018. While urban regime theory originally discussed cities, these 4 urban regime types could plausibly occur in municipalities large or small, as discussed further in the methods. The Japan Statistical Bureau reports considerable annual data for each municipality, allowing scholars to approximate the basic contours of municipalities' urban regimes by a simple, publicly available proxy of each municipality's governance priorities: *spending rates.* While spending cannot tell us specific actors that govern, it can broadly approximate which of Stone's (1993) 4 types of regimes are driving local policy. Generally speaking, a true developmental regime would spend more municipal funds in support of business needs; similarly, a true social welfare regime would spend more in support of social welfare needs. Not to

replace, but to aid qualitative investigations of urban regimes, this study designs a method to make Large-N comparisons among thousands of municipalities at a time. I posit that this study can detect measurable differences among municipalities in terms of their spending rates.

As a preview of my results, I find that even after accounting for population and inflation, municipal spending rates vary substantially over time, with certain urban regimes' spending priorities becoming more common with each passing year while others become less common. In particular, I document the 20-year rise of the social welfare regime as a very common type of urban regime, growing from just 0% of municipalities in 2000 to 17% of municipalities in 2018, and to 73% of municipalities when including social welfare-*related* regimes. I also detect geographic patterns, with coastal areas investing more heavily in social welfare regime priorities over time. These are exciting and heartening findings, because they indicate that while national-level governance on disaster resilience has made progress with starts and stops, municipalities are not unilaterally gridlocked, stuck in caretaker, status quo regimes. Instead, many municipalities are transitioning to social welfare regimes, increasing their spending on social welfare issues like food security, housing, and disaster recovery above the median level nationwide.

2. Literature Review

2.1 Urban Regime Theory

Since Stone's (1989) examination of urban regimes in Atlanta, dozens of case studies have detailed different urban regimes and governance arrangements throughout the world (Stoker and Mossberger, 1994; Mossberger and Stoker, 2001; De Socio, 2007; Camou, 2014; Davies and Blanco, 2017; Rosol et al., 2017; Russo and Scarnato, 2018). Over 30 years since the term's coining, urban regimes received praise (Kilburn, 2004; Davies and Imbroscio, 2009) and criticism (Sites, 1997; Davies, 2003; Imbroscio, 2003, 2004) for how easily it can be applied to understand local politics.

Many regimes once thought to be long-standing have come undone and changed quickly in recent years (Stone, 2015; Stone et al., 2015), making the field awash in related terms like "urban governance" (Pierre, 2014; da Cruz et al., 2019), governance networks (Gissendanner, 2003; Davidson et al., 2019), policy networks (Bulkeley and Betsill, 2013; Hawkins et al., 2016; Wukich, 2022), public-private partnerships (Stoker, 1998; Davies, 2017; Guo and Ho, 2019), and multi-tiered political orders (Stone, 2015; Weaver, 2022), or a just, socially equitable city (Campbell, 1996; Fainstein, 2010). Others extended definitions of urban regimes, applying versions of it to social welfare crisis in the face of mass displacement and other social crises (Lambelet, 2019).

Nomenclature aside, these frameworks all generally aim to explain "who governs," but systematic categorizations of many municipalities at once have been rarer, usually confined to small-to-medium-N analyses (Sellers, 2002; Kilburn, 2004; Stone et al., 2015; Davies and Blanco, 2017). Below, I synthesize a basic typology of urban regimes for measurement from the extended literature, and outline the argument for why it matters 'who governs' municipalities in the face of disasters.

2.2 Redistributive Politics

For the purposes of this study, urban regimes also are an effective, local level tool for thinking about the broader class of politics that disaster resilience initiatives can exemplify: redistributive policies, a familiar, long-standing, and particularly pernicious policy challenge for municipalities (Meltzer and Scott, 1981; Pierson, 1994; Hacker, 2004; Iversen and Soskice, 2006; Mettler, 2011; Rueda and Stegmueller, 2019). National, regional, and municipal governments each work with redistributive policies, aiming to provide en masse specific public goods (ranging from seawalls and flood protection to social welfare aid) that are particularly difficult for residents to obtain individually, especially for vulnerable residents.

Previous literature dealt with electoral (Meltzer & Richards; Iversen & Soskice 2006), institutional (Pierson, 1994; Hacker, 2004; Mettler, 2011), or street-level implementation (Lipsky, 1980; Hupe and Hill, 2007) explanations for the success and continuity of redistributive policies. However, these studies dealt less with the community resources available to municipalities, like partnerships with businesses (Stone, 1989; Mossberger and Stoker, 2001), civil society advocacy groups (Portney and Berry, 2016), neighborhood associations (Logan and Rabrenovic, 1990), and local networks (Aldrich and Meyer, 2015). These often overlooked community resources can play important roles in redistributing resources to residents in need (Aldrich and Kyota, 2017; Klinenberg, 2018).

What kinds of redistributive policies, then, were past scholars writing about? The classic example of redistributive policy is social welfare support for low-income families and unemployment insurance (Pierson, 1994; Hacker, 2004), to abate the health and economic challenges of entrenched poverty (Ahammer and Packham, 2020; Berkowitz and Basu, 2021). In addition to these, governments have tackled many redistributive policy issues in the past. These include, for example:

- Social security policies aimed to eliminate poverty among the elderly, by redistributing the resources of other age groups (Titmus 1965, Conde-Ruiz & Profeta 2007).

- Universal health care, or market solutions, both aim to eliminate loss of life and financial ruin due to medical expenses, by redistributing the costs of health care issues to the entire population (Mettler,

2011).

- Public education sought to remedy lack of access of education and opportunity in working class families by publicly funding education through the taxbase (Mettler et al., 2005).

- Highway systems (Congleton and Bennett, 1995; Zhu and Brown, 2013), electrification (Baker and Phillips, 2019; Breetz et al., 2018), and public transportation (Hood, 2006) seek to connect citizens and expand economic development, important to everyone, but are challenging for any one municipality or company to pay for (Boarnet and Haughwout, 2000).

These redistributive programs frequently develop policy constituencies if the group benefitting from them is sizable enough (Meltzer and Richard, 1981; Campbell, 2012); in some states, these programs' continuation is conditional, becoming political currency for pork-barrel politics (Fukui and Fukai, 1996; Catalinac et al., 2020), while in others, they become permanent fixtures in national policy (Pierson, 1994).

However, moving beyond these federal- or state-level examples, in fact, municipalities have been tackling redistributive issues for generations (Peterson, 1981; Saiz, 1999; Tonkiss, 2020). Municipalities use redistributive policies to remedy unequal access to employment in neighborhoods by funding public transit for all (Frankena, 1973; Asensio et al., 2003; Glaeser et al., 2009; Fearnley and Aarhaug, 2019; Wiesel and Liu, 2021). They may support local businesses that might struggle to secure consistent customers by providing public venues or markets (Tangires, 1997). Municipalities may use public funds to free up real estate and housing available in various neighborhoods (Detter and Folster, 2017), or, in the shameful history of many municipalities, local governments can be complicit in redlining and illegally restricting access to housing (Rothstein, 2017). Lately, municipalities' efforts at improving health equity are especially visible, as municipalities conduct and manage public health campaigns, like current local efforts to rollout testing and vaccination during the COVID-19 pandemic (Berkowitz and Basu, 2021). Some national governments lean on local governments to provide services that legitimize their state (Wallace, 2013). And in many countries, municipalities play a key role in the disbursement and coordination of social welfare distribution (Katz and Allen, 2001; Weir and King, 2021), and must secure the necessary funding for these projects (Payson, 2022).

Many disaster resilience initiatives, on the other hand, act as a new form of redistributive policy. These initiatives extend critical benefits to society, but often struggle to achieve electoral support because their benefits are diffuse, except to the most vulnerable in society who need them. However, not all types of urban regimes prioritize redistributive policies like social welfare support; indeed, three out of the four regime types discussed below specifically prioritize other needs. Social welfare's relevance to disaster resilience makes it

especially important to identify whether social welfare-oriented regimes are increasing or declining.

2.3 Types of Urban Regimes

As discussed above, Clarence Stone (1993) and later comparative studies (Kilburn, 2004; De Socio, 2007) primarily relied on 4 main types of urban regimes, including (1) developmental, (2) middle-class, (3) social welfare regimes, and (4) caretaker regimes. Over 30 years, scholars have created numerous other types of urban regimes, sometimes conflicting or concept stretching, as some have argued (Mossberger and Stoker, 2001); however, these original 4 regime types are still arguably the main types at play today. I outline in **Table 1** a basic typology.

Table 1: Typology of Urban Regimes

Regime	Definition	Examples	Related	Japanese Examples
Caretaker	maintains status quo, traditional municipal service provision	New Orleans (Whelan et al. 1994)	Maintenance/Status Quo (Stone 1989) Bystander (Portz 1990) Austerity (Davies & Blanco 2017)	-
Developmental	promotes economic growth while preventing economic decline	Atlanta (Stone 1989)	Entrepreneurial Regimes (Euchner 1993) Public-Private Partnerships (Davies 2017) Player (Portz 1990) Castle Towns (Funabashi 2006; Hill & Fujita 1993)	Tokyo (Saito 2003; Tsukamoto 2012; Sorensen et al. 2010) Kitakyushu (Yeum 2002) Minamata (Funabashi 2006) Kobe Post-1995 (Edgington 2010)
Middle-Class	promotes egalitarian policies in education, health, environment, and city planning	Santa Cruz (Gendron & Domhoff 2018)	Progressive (Stone 1989) 'Anti-Regime' (DeLeon 1992)	Mitaka (Takao 2006) Kyoto (Sugiyama & Takeuchi 2008) Iida (Fraser et al. 2020)
Social Welfare	improves conditions for working class, expands social safety net	Early Toronto (Mahon 2007)	Opportunist (Stone 1989) Activist (Clark 2001) Stewardship Regimes (Nissen 1995)	Yokohama (Hayashi 2013) Mikura Ward, Kobe (Yasui 2007)

The first type is (1) *developmental regimes.* These regimes prioritize economic development and business interests, while preventing economic decline (Stone, 1989; Austrian and Rosentraub, 2002; De Socio, 2007). A robust literature has covered these, starting with archetypes like Stone's (1989) Atlanta. Scholars have proposed several subtypes over the years that group well under developmental regimes, including entrepreneurial regimes, describing regimes' enticement with sports industries (Euchner, 1993), tourism-focused regimes (Russo and Scarnato, 2018), public private partnerships (Davies, 2017), and player cities, describing those which advocate intensely to bring in or keep industry (Portz, 1990). A related concept in the Japanese literature is "castle towns," referring to municipalities where the entire local government and economy is closely structured around one industry (Hill and Fujita, 1993). Famous examples include Minamata, which suffered considerable environmental pollution due to the Chisso corporation in the 1950s (Funabashi, 2006); more recent examples of castle towns are nuclear power plant host communities, such as Onagawa or Satsumasendai (Aldrich and Fraser, 2017).

Developmental regimes and related types have received considerable attention in Japan, with studies emphasizing the neoliberal, developmental priorities of property development in post-Bubble Tokyo (Saito, 2003; Tsukamoto, 2012; Sorensen et al., 2010), developmental priorities in reconstruction plans from the Kobe Earthquake (Edgington, 2010), and early efforts to reduce air pollution in industrial cities like Kitakyushu (Yeum, 2002).

The second common type is (2) *middle-class regimes* (a.k.a. progressive regimes^[Usually called progressive regimes, I term these 'middle-class' regimes to avoid confusion with the next type, which support progressive, redistributive policies.]). These regimes support middle-class, progressive interests like environmentalism, health care, education, and quality city planning (DeLeon, 1992; Gendron and Domhoff, 2018; Rosdil, 2016). Past examples include politically left-wing city politics in Santa Cruz, San Francisco, and Seattle, among others (Gendron and Domhoff, 2018). These regimes focus on a specific type of progressivism, namely egalitarian ideals, such as environmental conservation and sustainability (Rosol et al., 2017), but these regimes tend to support middle-class interests, rather than working class interests (Kilburn, 2004).

Famous Japanese examples include Mitaka City, a Tokyo suburb known for progressive environmental policy, quality of life, and citizen engagement (Takao, 2006). Similarly, large cities like Kyoto (Sugiyama and Takeuchi) and smaller municipalities like Iida in Nagano Prefecture (Fraser et al., 2020) have both received attention for their municipalities' emphasis and leadership on environmentalism.

The third type refers to (3) *social welfare regimes* (a.k.a. opportunist regimes^[*Sometimes called "opportunist" regimes, referring to aims to expand the social safety net, this study re-terms this category 'social*

*welfare regimes', to more respectfully characterize these policies.])**. These regimes prioritize social welfare support for the working class and related redistributive policies, such as unemployment insurance, public housing, and financial support for families in need, eg. after crisis (Stone, 1993; Thompson III, 2005; Camou, 2014; Lai and Chui, 2014; Arbaci, 2019).Related monikers include 'opportunist regimes,' as in those aiming to expand the social safety net (Stone, 1989), activist regimes (Clark), which use neighborhood coalitions and activist groups to push for social equity (Thompson III, 2005), labor coalitions (Camou, 2014), and stewardship regimes (Nissen, 1995), which negotiate with businesses for fair treatment of workers. While the shape of social welfare policy varies by city and country, Canadian and UK municipalities are particularly known for efforts to expand social safety nets (Saraceno, 2002), like Toronto's early work expanding childcare (Mahon, 2007), although Toronto has shifted over time to a developmental/progressive regime. Japanese urban studies research has highlighted Yokohama for its particularly expansive support for the homeless (Hayashi, 2013), as well as specific city wards like the working class neighborhood of Mikura in Kobe for its robust advocacy for social equity in the reconstruction process after the 1995 Kobe Earthquake (Yasui, 2007).

Finally, the fourth type is (4) *caretaker regimes*. In these municipalities, the incumbent regime seeks to maintain a municipality's status quo (Turner, 1992; Whelan et al., 1994). The municipality provides basic services, but avoids expanding. Past studies labeled the city of Kalamazoo, MI (Sanders, 1987) and pre-Katrina New Orleans, LA (Whelan et al., 1994), as potential caretaker regimes (although New Orleans has changed significantly over time). Other terms capture the same approximate meaning, including maintenance regimes (Stone, 1989) or bystander regimes (Portz, 1990), which refer to regimes that played no major role when industrial firms closed shop in the US rustbelt. Relatedly, some municipalities have also organized under austerity regimes, focused on cutting expenses, rather than expanding policies; this subtype lies somewhere between caretaker regimes and developmental regimes, as they usually cut expenditures on social welfare or progressive causes, but not necessarily economic interests (Davies and Blanco, 2017). To the author's knowledge, few studies have tracked caretaker regimes in Japan; this study aims to help remedy that.

2.4 Correlates of Urban Regimes

Given how useful social welfare regimes can be in an era of increasingly frequent disasters, what kinds of municipalities develop social welfare regimes, and which do not? While little literature directly tackles this question, past studies summarized below suggest several likely correlates.

2.4.1 Demographic and Financial Correlates of Urban Regimes

Second, I expect some municipalities are predisposed towards certain types of urban regimes. Highly populated municipalities, municipalities with higher income per capita, municipalities with more revenue per capita, and municipalities with better balanced budgets have more funds and other resources to spend on advancing a social welfare regime (or a developmental or middle-class regime, for that matter). But municipalities who receive a larger share of their annual budget from the national or prefectural government may face more pressure to conform with national or prefectural objectives, which often come in the shape of economic development policy. Such municipalities might invest *less* in social welfare.

2.4.2 Partisanship and Urban Regimes

Third, party interests may push some municipalities towards or against social welfare spending. The Liberal Democratic Party is, despite its name, Japan's long-time conservative party, and traditionally promotes business interests and economic development. While LDP social welfare advocates do exist, they are not typically at the center of power. Instead, past studies explain that when the LDP accepts social welfare policies, it usually does so to counter any competitive advantage that policy gives left-leaning opposition parties prior to elections (Estévez-Abe, 2020). This has especially been the case since electoral reform in 1994 pushed the LDP to use more universal policies to cater to swing districts (Shinada, 2018); examples include universal health care in the 1990s (Peng, 2002), elder care under Prime Minister (PM) Hashimoto (Estévez-Abe, 2020), child care under PM Koizumi (Nishioka, 2018), and paid parental leave under PM Abe (Dalton, 2017). Municipalities where the Liberal Democratic Party performed well in recently elections thus likely have little incentive to adopt social welfare policies; their local officials and prefectural party machine are more likely to push for developmental policies.

2.4.3 Timing and Path Dependence

First, timing matters. First, social welfare regimes (and spending in general) is notoriously path dependent, where once governments institutionalize certain spending programs, they tend to stick around. Second, regimes may shift according to the social constraints of the time. After the 2011 triple disaster, a surge of disaster recovery spending occurred in the Tohoku region (Mochizuki; Aldrich, 2019; Noy et al., 2023). One might expect this disaster pushed some municipalities towards social welfare regimes in order to provide better for vulnerable families and elders in the aftermath. Conversely, some municipalities rebuild primarily according to central government instructions, spending primarily on infrastructure while neglecting community spending (Cheek, 2020; Aldrich, 2019; Fraser et al., 2021a). As a result, the impact of the

disaster on social welfare regime evolution is currently unclear.

Similarly, local and national rhetoric on spending has changed over time (Catalinac, 2018; Estévez-Abe, 2020); concepts like the 1980s' Washington Consensus, the 1992 economic bubble burst in Japan, the 1994 electoral reforms (Shinada, 2018), the 1995 Kobe Earthquake (Edgington, 2011), the 2008 Great Recession, and the 2011 disaster each greatly shifted the conversation on spending (Cheek, 2020). For example, after electoral reform in the 1990s, Kyoto switched from being a stronghold for the Japanese Communist Party to being a center-right governed city, then eventually went bankrupt (Sugiyama and Takeuchi, 2008). Some governments post-recession advocated austerity, while the 2011 disaster highlighted great need and vulnerability of residents to crisis, both in Tohoku and elsewhere, leading to the 2015 Sendai Framework, which advocated a need for investment in local communities to 'build back better' after crisis so as not to leave communities vulnerable again (Maly and Suppasri, 2020; Cheek and Chmutina, 2022a). Each of these influences could propel or hinder the growth of social welfare regimes. Given this, which direction have Japanese municipalities moved over time?

2.4.4 Social Capital and Urban Regimes

However, municipalities with greater collective action potential might be more likely to adopt social welfare regimes, if local residents have strong social capital. Past literature highlights that social capital, the social ties that bind residents (Putnam, 2000; Woolcock, 2010), come in three different forms with distinct impacts on public participation and policymaking: bonding, bridging, and linking social capital (Aldrich and Meyer, 2015).

Bonding Social Capital. Bonding social capital refers to strong in-group ties between members of the same social strata (eg. race, ethnicity, age, gender, income) (McPherson et al., 2001; Mouw, 2006). One might expect bonding social ties to help residents petition for more middle class interests, which benefit a broad swath of residents, but fail to organize broad, cross-community coalitions to support social welfare (Tsai, 2007; Cox and Perry, 2011; Alcorta et al., 2020).

Bridging Social Capital. In contrast, bridging social capital refers to strong inter-group ties connecting members of different social strata (eg. members of different racial, ethnic, age, gender, or income backgrounds) (Putnam, 2000; Aldrich, 2019). A vast literature suggests that stronger bridging social ties help residents organize to improve access to public goods for the *entire* community, because they build strong inter-group trust and reciprocity that encourages folks to mobilize, vote, and participate in civil society.

Linking Social Capital. Finally, linking social capital refers to vertical ties connecting residents to local officials (Woolcock, 2010; Aldrich, 2019). One might expect that municipalities with stronger linking social capital are less likely to be caretaker regimes, but could result in greater social welfare, developmental, or middle class regimes, depending on residents' interests. In addition to the concepts discussed above, municipalities with higher levels of education and lower levels of population turnover also tend to build stronger social ties. To date however, despite the strong likelihood of a connection between social capital and urban regimes, no study to the author's knowledge has yet investigated these two concepts together.

2.6 Hypotheses

In summary, these four types capture a wide range of urban regime literature, each with distinct priorities that would lead to *more* or *less* spending in specific areas. I formalize these expectations with 3 hypotheses:

- **H1**: First, I hypothesize that these urban regimes are not evenly distributed throughout the country, but rather that some types of urban regimes are increasing over time.
- **H2**: Second, I hypothesize that social welfare regimes, compared to other types, have increased over the last two decades of climatic hazards, opening up new communities to new changes in the social safety net.
- **H3**: Third, I hypothesize that municipalities with greater collective action potential, particularly those with greater bridging social capital, were more likely to develop social welfare regimes.

Below, I outline set of methods to measure each municipality's propensity towards these four regimes.

3. Data

This study aims to describe and characterize the urban regimes of a large-N sample of municipalities over time, to determine how and under what conditions these municipalities' regimes have changed. I examine the case of Japan, tracking the full universe of municipalities (cities, towns, villages, and Tokyo's special wards) that govern their own budgetary and administrative affairs, as each is capable of producing an urban regime that shapes local governance and spending.

3.1 Why Japan?

While the urban regime framework was originally developed in a US context (Stone, 1989), it has been applied widely throughout the world, with strong followings in the US (Kilburn, 2004), UK (Bassett, 1996;

Davies, 2017), Europe (Stoker and Mossberger, 1994; Arbaci, 2019), Japan (Child Hill and Fujita, 2000; Saito, 2003; Sorensen et al., 2010; Tsukamoto, 2012), China, Hong Kong (Lai and Chui, 2014), South Korea (Shin et al., 2015), and comparative settings (Mossberger and Stoker, 2001; Ramirez-Perez et al., 2008). Japan is a useful test case as an industrialized democracy and the 3rd largest economy in the world, a useful comparison case for many Global North states like the US, UK, France, Germany, South Korea, and Taiwan, among others. Further, Japan faces frequent floods, typhoons, and earthquakes, with more severe outcomes compared to peer economies; between 2010 and 2020, Japan ranked 10th worldwide in highest deaths per capita and 4th in highest injuries per capita (Ritchie and Roser, 2021). Consequently, Japan's experience gives us a glimpse of what kind of urban regime transition one might expect in future years due to climate change-induced disasters in the municipalities of similar industrialized democracies.

3.2 Unit of Observation

I track the full universe of 1739 municipalities for which spending data was available between 2000 and 2018, over 19 years. The final sample narrows into 1738 unique municipalities, which varied over time due to mergers and new divisions, from 1428 municipalities in 2000 to 1727 municipalities in 2018, dubbed 'municipalities' below, totaling 31,493 municipality-year observations. To ensure a comparable sample, this omits 12 outlier municipalities at times.[2] My sample includes urban and rural municipalities alike, for two reasons. First, Japanese municipalities, rural *and* urban alike, tend to have much higher population density than American or European counterparts. Second, while urban regime theory originally discussed cities, the 4 urban regime types (developmental, middle-class, social welfare, and caretaker regimes) I investigate here are not especially population-size dependent at all; these regimes and the policy decisions they affect could conceivably appear in municipalities large or small. Several examples of Japanese municipalities large (Tokyo, Kyoto, Kobe) and small (Minamata, Iida, Onagawa, Satsumasendai) relevant to urban regime concepts are referenced in the literature review above.

3.3 Urban Regime Indices

To represent urban regimes, this study developed new indices. Clarence Stone and likeminded scholars sorted cities into 4 types of urban regimes, including caretaker (status quo), developmental (pro-business), middle-class (egalitarian), and social-welfare (working-class) governing coalitions (Stone, 1989; Stoker and

[2] I omitted 11 municipalities in the Fukushima Exclusion Zone from 2011 onwards, plus Yubari, Hokkaido for the full period, totaling 12 municipalities (n = 107 municipality-years). I omit these because these extremely depopulated municipalities face dire social and economic conditions quite different from the rest of Japan.

Mossberger, 1994; Mossberger and Stoker, 2001; Kilburn, 2004; De Socio, 2007). Over time, Stone himself advocated for attention to change over time in urban regimes, arguing that "there is little reason to expect a stable and cohesive governing coalition in today's cities" (Stone et al., 2015). For this reason, one might now expect considerable variation in urban regimes among municipalities, especially over time. Though the inner-workings of governing coalitions in Japan's municipalities are black boxes, unobservable without detailed qualitative study of each, these coalitions can be generally sorted based on *how strongly each municipality's spending reflects the interests of a specific urban regime.* This matches Stone's original conception of urban regimes, about which he wrote: "If a governing coalition is to be viable, it must be able to mobilize resources commensurate with its main policy agenda" (Stone, 1993).

To represent these 4 urban regimes, this study presents 3 new indices, based on 15 spending indicators, depicting how much a municipality prioritizes spending types expected in a **social welfare** (SW), **middle class** (MC), or **developmental** (D) regime respectively, where low scores among all 3 depicting a **caretaker** regime (C). Each regime index reflects the average (mean) of municipalities' logged spending rates on priorities that regime typically champions (described further below). I trimmed all logged rates to the 99% most common values to protect against outlier bias, clipping any municipality-years above the 99.5th percentile or below the 0.5th percentile at those limits.[3]

3.3.1 Indicators

Annual spending indicators are logged municipal spending rates, measured in 1000s of yen per capita to account for population, log-transformed to account for right-skew common in rates, and inflation-adjusted to the year 2020. I transformed each indicator into a mean-centered z-scores, to account for different ranges, and averaged related indicators together into the 3 indices. To demonstrate their internal validity below, I introduce each indicator and report their correlation with their respective index below, using the Pearson's r correlation coefficient (where -1 shows negative trends, +1 shows positive trends, and 0 shows neither). Each indicator captures a different aspect of that urban regime; no regime must invest equally in, for example, each social welfare indicator to count as such a social welfare regime, so maximal correlations are unlikely, but positive correlations are a good sign of internal validity.

Each indicator shows positive correlations with their overall index. This is a great sign, indicating that an increase in any of the three indices does generally correspond to a strong increase in its indicators. Additionally, spending rates produced better internal consistency than percentages of the budget, likely

[3] I use the mean, rather than median, to give each spending priority equal weight; the mean better captures variation particularly when one of these priorities (eg. social assistance vs. unemployment) exceeds or lags behind others.

because each municipality's share of spending on different issues varies depending on external factors.

- The **Social Welfare regime** index combines 6 types of spending on working-class interests, which are highly correlated with the final index, according to their Pearson's r correlation coefficient. These including (1) social welfare assistance for low income residents (r = 0.65), (2) assistance for children (0.45), (3) assistance for elders (0.66), (4) labor expenditures including unemployment relief and vocational training (0.3), (5) emergency services like fire departments (0.58), and (6) public housing (0.32). Correlations vary somewhat, since some social welfare regimes focus more on unemployment while others focus more on social welfare for elders and children, for example, and so my average takes this variation into account.

- The **Middle Class regime** index combines spending on 5 middle-class interests, which are highly correlated with the final index. These include (7) education (r = 0.5), (8) social education (including lifelong learning and cultural facilities) (0.42), (9) health care and public health services (0.59), environmental interests like (10) waste and recycling (0.42), and (11) city planning (0.17). (Planning has a weaker, but clearly positive linear relationship with middle class regimes, and it is an important aspect of municipalities focused on quality of life.)

- The **Developmental regime** index combines spending rates on 4 economic development interests, which correlate well with the final index. These include (12) agriculture, forestry, and fisheries (r = 0.64), (13) commerce and manufacturing (0.49), large infrastructure like (14) roads and bridges (0.69), as well as (15) ordinary construction works (0.62).

Each index is mean-centered, where 0 represents the average level of spending nationwide over time on a certain regime's issue areas, and higher/lower values denote more/less spending rates on that regime's issue areas, on average. -1 represents one standard deviation lower spending than average, and +1 represents one standard deviation higher than average. Their distributions are highlighted in **Figure A1**.

How well do my indices approximate their indicators? In **Figure 1**, I visualize the average normalized spending rate (Z-scores) over time for each index (thick line) and their corresponding indicators (thin lines). This figure shows how closely each set of indicators match the rise and fall of their index. Additionally, using the full sample of 40,062 municipality-years available for indices, I generated simple multivariate linear models to how well my indicators predict the overall index. If they closely match, this indicates strong internal validity. The percentage of variation explained (R^2) and average error (σ) for each simple model are presented in each panel. These show that my indicators predict the index extremely well, explaining

between 99.3-99.9% of the variation in index scores over time, with an average error of at max 0.045 standard deviations from the mean.[4]

3.3.2 Index Limitations

One limitation of this measurement strategy is that it does not *directly* measure caretaker regimes (C) through their spending, but rather through how they *do not* spend as much per capita on social welfare, middle class, or developmental regimes interests. There *could* be additional variation in the remaining fraction of municipal spending for these caretaker-designated regimes. Future scholars are encouraged to investigate and measure these caretaker-designated regimes in further granularity. But for this study's purposes, a municipality that does not *not* deeply invest in one of these core 3 spending areas (social welfare, middle class, or developmental interests) would be maintaining the status quo *in these 3 core areas*; for this reason, I dub these lower-spending regimes 'caretaker' regime at least in this context.

Fortunately, even if these 'caretaker'-designated regimes are further subdivided in future studies, the analyses below should remain broadly unaffected. First, my classification analysis in Figure \ref{fig-area} and Figure \ref{fig-map} discussed below would simply see their caretaker regime categories further subdivided into separate chunks; the social welfare trend I describe should not be impacted. Second, my statistical analyses of correlates of regime indices rely on my 3 indices for social welfare, middle class, and developmental regime indices, and so are not directly impacted by caretaker regime measurement, and these models explain extremely high percentages of variation. Any future index development, I expect, would only further refine estimates' effect size.

Finally, these indices were built by each taking the *average* of logged spending rates. I used averages for *clarity*, to provide clear indexes that are easier for decision-makers to understand and utilize. There are many alternative strategies for building indices, including factor analysis and principal component analysis, which are used to identify latent trends in a series of indicators. Factor analysis usually distills several indicators that may trend together (eg. social welfare spending for elders vs. for children) into one or more factors; a municipality that invests heavily in both would no longer receive equal weight for both when combining factors further. However, I used simple averages here specifically so that each indicator is *equally weighted*. This means that a city which, for example, spends a moderate rate on unemployment relief but larger rates on social welfare for elders than peer municipalities would see their social welfare regime index rise somewhat, because investment in *any* of these indicators would demonstrate greater commitment to

[4] Details available in the replication code.

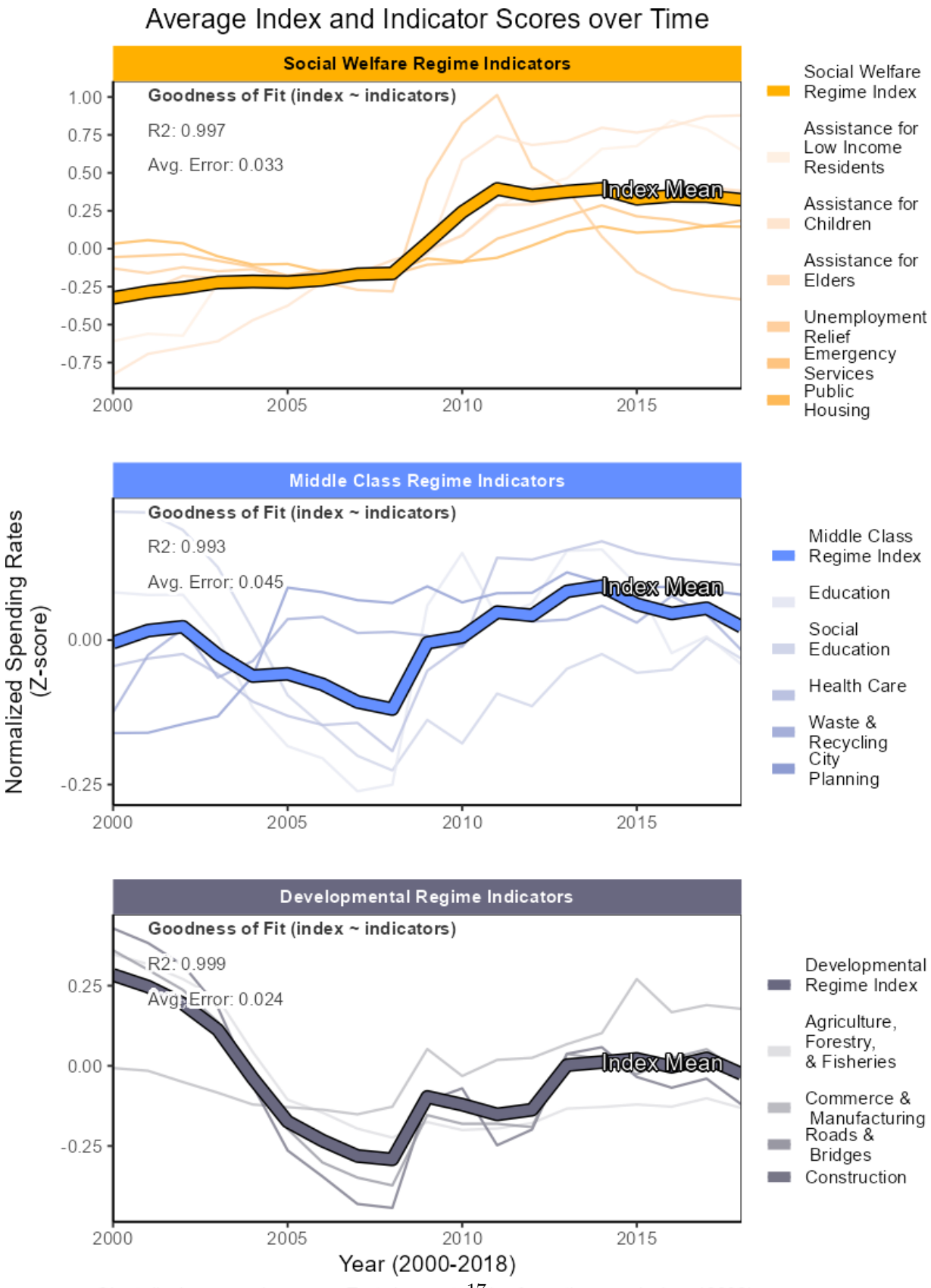


Figure 1: Indices closely follow Indicator Trends

social welfare regime priorities. Likewise, greater investment in *all* of these indicators would increase the index even more. Future studies are encouraged to apply factor analyses where helpful, particularly in investigating caretaker regimes.

3.3.2 Classifying Municipalities by Regime Type

Table 2: Regime Classifications

Name	Code	Index Scores[1]			Percentage of Cases by Threshold[2]	
		Social Welfare	Middle Class	Developmental	Median	Mean
Classic Regimes						
Social Welfare	SW	High	Low	Low	8.1	8.5
Middle Class	MC	Low	High	Low	7.8	6.4
Developmental	D	Low	High	Low	5.9	6.9
Caretaker	C	Low	Low	Low	28.6	33.4
Hybrid Regimes						
Social Welfare Hybrid (1)	SW-MC	High	High	Low	5.6	4.4
Social Welfare Hybrid (2)	SW-D	High	Low	Low	7.4	8.3
Hybrid	SW-MC-D	High	High	High	29.0	25.3
Middle Class Hybrid	MC-D	Low	High	High	7.7	6.9

[1] City-years classified based on three regime scores being above (High) or below (Low) threshold.
[2] % of cases, when using median as threshold; robustness check uses mean as threshold.

Next, I use these indices to empirically classify municipalities into urban regime types, using my 3 indices' medians to demarcate 8 classifications, to represent the general range of regimes a municipality can occupy, including my 4 primary urban regimes and 4 hybrids. **Table 2** lists each combination. If just 1 index ranked above the median, I classified a municipality as that type of regime, including Social Welfare (SW = 8.1%), Middle Class (MC = 7.8%), and Developmental regimes (D = 5.9%). If all 3 indices ranked below the median, I classified that as a Caretaker regime (C = 28.6%). **Hybrids** describe municipalities prioritizes interests of 2 or more regimes. If 2 indices ranked above the median, I classified that as either a Social Welfare Hybrid Regime (SW-MC = 5.6%, SW-D = 7.4%) or a Middle Class Hybrid Regime (MC-D = 7.7%). 3 indices above the median translate to a full hybrid regime (SW-MC-D = 29%). The more common hybrids tend to involve Social Welfare traits (and follow the same increase over time as social welfare regimes). (I repeated this process using the mean as my cutpoint, showing similar proportions of cases in each group.)

3.4 Change over Time

But are these urban regimes fixed, or fluid? Do municipalities transition between regime types to accomplish their aims? I examined this with continuous and categorical analyses below. First, in Figure 2, I

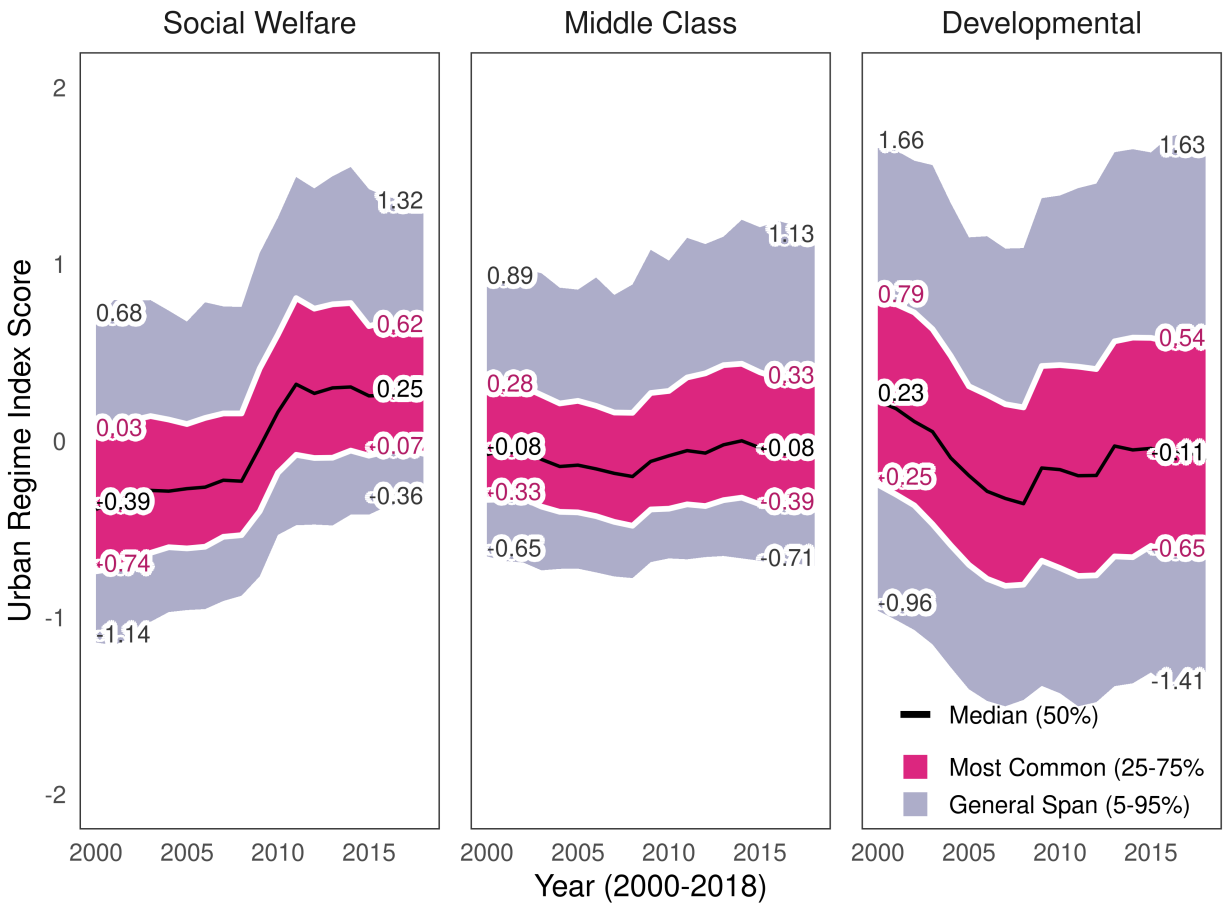


Figure 2: Urban Regime Indices Change Over Time

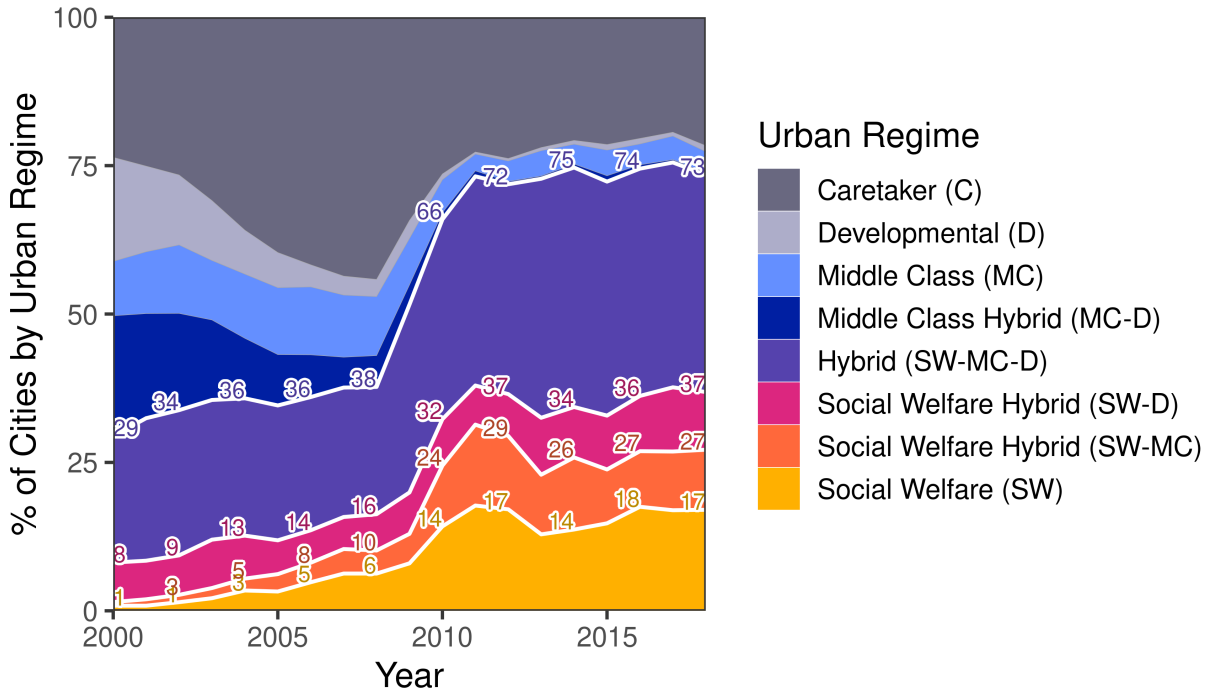


Figure 3: Change in Regime Types by Percentage over Time

examined the changing median score (**black** line) over time for my 3 urban regime indices. Surrounding the median, red bands show the most common 50% of scores, represented by the interquartile range (25-75th percentiles), and grey bands show the most commonly occurring 90% scores among municipalities (5-95% percentiles). This chart shows that while municipalities' status as developmental and middle class regimes (based on their spending) did not change especially, the share of municipalities spending more on social welfare issues sharply increased in the years leading up to and after 2011.

Second, to contextualize this, I measured the changing annual percentages of regimes based on their urban regime classifications from **Table 2**; I stack the 4 types of regimes where social welfare regime indices were above the median. This highlights the sizable increase in social welfare spending. Social welfare regimes (yellow) increased from >1% in 2000 to 13% in 2018, with a max of 14% in 2012. Including social welfare hybrid regimes that also focused on middle class (orange) or developmental spending (red), these increased from 5% in 2000 to 32% in 2018, surging 18% between 2008 to 2012 to 31% in 2012. When I include hybrid regimes that spent above the median on social welfare, middle class, and developmental interests (purple), the total share spikes considerably. This combined total represents all municipalities that spent above the median on social welfare, regardless of their other regime scores. Starting at 23% in 2000, the share of municipalities that spent above the median on social welfare share increased considerably between 2008

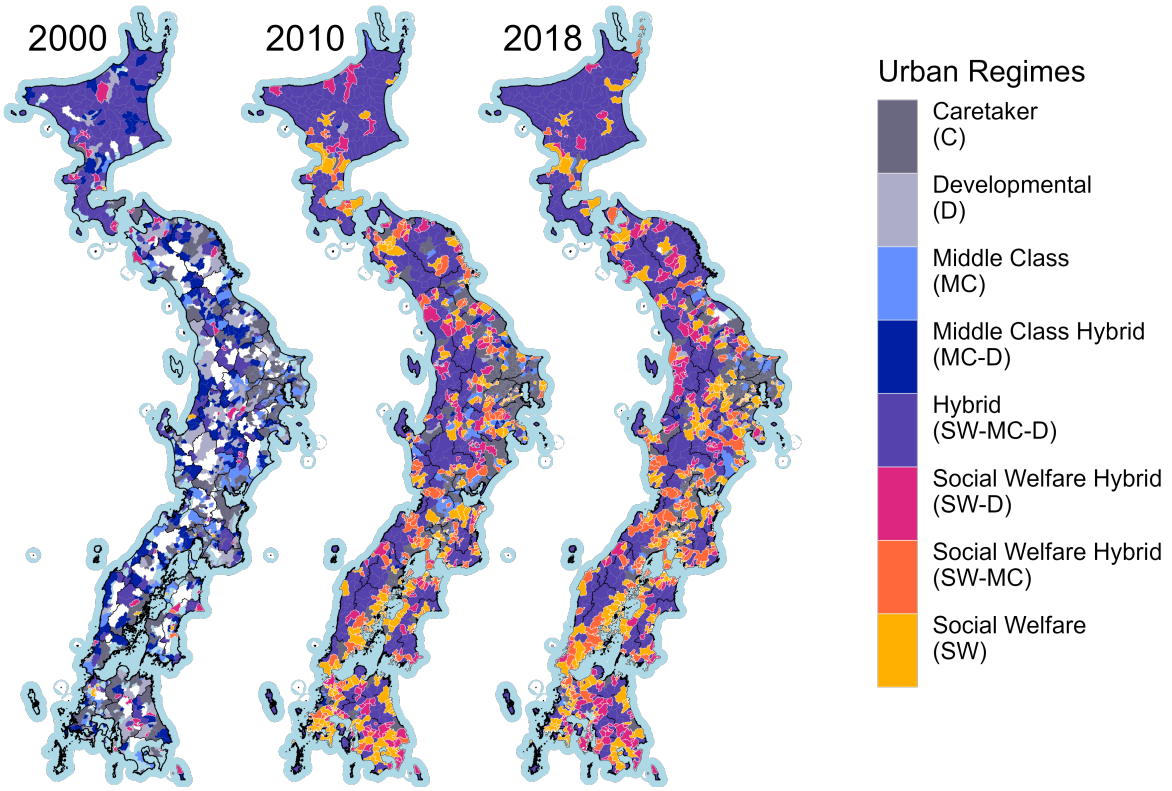


Figure 4: The Spread of Social Welfare Regimes Over Time

and 2012, jumping 33% from 35% to 68%, ending in 2018 at 70% of the whole sample. During the same period, the frequency of solely middle class or developmental regimes declined greatly, from above 10% each to below 5% each, while caretaker regimes surged, then declined, starting and ending at about a quarter of municipalities.

The spread of social welfare regimes is especially evident in Figure 4, which uses an Azthumal Equidistant Projection, titled for readability (North is on the right), to map *when* and *where* these social welfare-inclined regimes emerged. East, northeast, and southeast Japan transitioned from caretaker regimes in 2000 to many new social welfare-related regimes by 2018. While the 2011 tsunami likely impacted this, the change appears to have preceded the 2011 tsunami, with many social welfare regimes emerging already by 2010. (Among others, one contributing factor could be the Democratic Party of Japan's brief stint in power from 2008 to 2011.) By 2018, a full 20.9% of municipalities in Kyushu had become pure Social Welfare regimes, with similar results in Shikoku (18.9%) and Chugoku (15.9%). After including social welfare hybrids (SW-M & SW-D), social welfare-related regimes are even more common in Shikoku (47.4%), Kyushu (46.5%),

Kansai (39.6%), and Chugoku (36.4%). And after including pure hybrids (SW-MC-D), this covers almost all municipalities in some regions, especially frequent in Hokkaido (97.8% of municipalities), Shikoku (91.6%), Kyushu (87.2%), Chugoku (84.2%), and Tohoku (84.2%). These tallies represent a major change from 2000, when pure social welfare regimes were most common in Kyushu (2.4%). (Some places do, however, seem to host more hybrid regimes over time; hybrid appear very common in rural regimes in Hokkaido both in 2000 (72.4%) and in 2018 (97.8%), characterized by high per-capita spending on all three types of spending priorities.)

To summarize, these descriptive investigations show that municipalities do transition between regime types, and that social welfare regimes have become considerably more common over time. But perhaps these increases are merely artifacts of other demographic or political economic changes; to ensure a more accurate picture, I turn to statistical methods with controls below.

4. Methods

Next, I turn to statistical models to discern clearer estimates of the effect of time on urban regimes and of key correlates. Using the social welfare regime index as my dependent variable, I applied ordinary least squares models with annual fixed effects, the appropriate technique for a normally distributed outcome. Annual fixed effects account for temporal heterogeneity, the appropriate technique for capturing distinct effects each year. I generated 8 models (see **Table 2**), each with successively more statistical or design-based controls, to ensure my results are robust to model specification. (Then, for further validation, I repeated these models, predicting as my dependent variable the middle class regime index, in **Table 3**, and then the developmental regime index, in **Table 4**).

4.1 Basic Covariates

I employ 23 statistical controls with annual and prefectural fixed effects to predict social welfare regime scores. In Model 1, I predicted social welfare regime scores using annual fixed effects plus basic demographic controls, including (1) population, (2) inhabitable area in hectares to account for municipality size, (3) the percentage of residents over age 65, to account for aging and policy preferences from elders vs. working-age adults, and (4) income per capita in 1000s of yen, to account for wealth. Further, I applied basic revenue controls: To represent municipalities' spending capacity, I controlled for (5) revenue per capita in 1000s of yen; (6) the percentage of revenue coming from national or prefectural government funding, to account for financial autonomy or lack thereof; and (7) each municipality's real term budget balance, so as not to overvalue the strength of a regime whose spending exceeds its means.

In Model 2, I added 5 disaster controls. To account for disaster conditions, I controlled for (8) disaster deaths and (9) buildings damaged, each per 100,000 residents, as well as (10) whether each town was hit by the 2011 tsunami or not (1/0). Further, I controlled for disaster spending rates per 1,000 residents on (11) recovery, meaning in this context physical reconstruction, and (12) disaster relief. None of my urban regime indicators overlap with disaster spending, although one might expect that social welfare and developmental priorities might overlap with recovery and relief efforts, so they are important covariates.

Next, in Model 3, I added controls for the other 2 regime indices not being predicted; when predicting social welfare, I controlled for (13) middle class and (14) developmental regime scores, to disentangle their effects.

Then, in Model 4, I added partisanship and collective action, alongside necessary controls. To represent support for political parties, I controlled for the percentage of voters who voted for the winning LDP candidate (or its coalition partner Komeito, which competes in separate jurisdiction). This helps account for pork-barrel politics, common among LDP candidates, where winning candidates reward supporting constituents with public works funding and construction contracts. I controlled for this two ways, using votes (15) in the most recent Lower House Election and (16) in the most recent prefectural election, to account for the more diverse politics of local elections. These are distinct concepts, with weak correlations ($r = 0.12$). These are better controls than, say, mayoral partisanship, because Japanese mayors often run as nonpartisan and *must* collaborate across party lines to govern.

In addition to political ties, I also controlled for (17) bonding, (18) bridging, and (19) linking social capital, using Fraser's annual social capital indices (2000-2017), which measure each type of social capital from 0 to 1 by averaging indicators from publicly available proxies. These indices demonstrated strong internal and external validity in their validation study (Fraser, 2021), predicting known correlates in public policy on environment, disasters, and health in 9 studies to date (eg. Fraser et al., 2020; Fraser and Aldrich, 2021; Fraser et al., 2021b, 2022). The ***bonding index*** averages 7 proxies of in-group ties that capture how much residents in a community hail from the *same* social strata using fractionalization metrics, in terms of (17.1) nationality, (17.2) religion, (17.3) education, (17.4) employment status, (17.5) employment by gender, (17.6) communication capacity, and (17.7) age. These homophily measures (not sheer demographics) capture the density of potential in-group social ties between members of the same social strata (see Fraser (2021) for extended literature). The ***bridging index*** averages 8 measures of civil society participation, which tend to facilitate encounters and social ties between members of *different* social strata (Putnam, 2000). These include population-normalized rates of (18.1) nonprofits, (18.2) religious groups, (18.3) unions, (18.4)

community centers, (18.5) libraries, (18.6) volunteerism, and (18.7) voter turnout in prefecture and (18.8) lower house elections. (I simplified the bridging index into equally sized quartiles to avoid collinearity with regime indicators, while still capturing a 4-point gradation from low to high.) Finally, the ***linking index*** averages 6 rates of access and connection to government officials, including rates per capita of (19.1) local officials, (19.2) prefectural officials, (19.3) police, (19.4) prefectural assembly members, and voteshare won by the winning party in (19.5) prefectural and (19.6) lower house elections. For additional information, please see the validation study (Fraser, 2021).[5]

Last, I added to Model 4 controls for (20) education, using the share of college educated adults, (21) the share of unemployed adults in the labor force, and (21) the total migration rate, reflecting the sum of any in- or out-migration, which might negatively impact social cohesion and is an important control.

4.2 Robustness Checks

Next, I added several further adjustments to ensure robust estimation. In Model 5, I added prefectural fixed effects, with Hokkaido as the baseline and modal category, to account for geographic heterogeneity. Then, in Model 6, I controlled for path dependence using a 1-year lagged dependent variable; for social welfare, this means controlling for the preceding year's social welfare score. Then, in Model 7, to guard against endogeneity bias, I lagged by 1 year all other predictors (aside from annual and prefectural fixed effects), to predict the *next* year's urban regime score using the preceding year's data. Lags constrains the sample in Models 6 onwards to 29755 cases (2001-2018), but ensures conservative estimates.

Finally, in Model 8, I add a series of standard log, logit, and root transformations to my predictors to better match their distributions and capture clear nonlinear trends, adding a small constant where necessary. Area, income, and migration were logged. Revenue used the square root; the 10th root was used for Population (to avoid colinearity with spending), disaster deaths, damages,recovery spending, and relief spending (since the distributions have frequent, meaningful zeros). Age, voteshares, social capital, education, and unemployment were logit transformed, since they are bounded at 0 and 1; the bridging index was left in quartiles to avoid collinearity with regime indicators. Descriptive statistics and exact transformation for all predictors are shown in **Table 1**.

These transformations made statistically significant improvements in log-likelihood compared to Model 7 ($p < 0.001$); similarly, the change in deviance statistic shows statistically significant reductions in the residual

[5]Winning party support is different from my controls for partisanship, which only captures the LDP/Komeito, excluding the Democratic Party of Japan, which was in power from 2009 to 2012). Social capital indices are distinct from partisanship controls; Lower House partisanship is only weakly correlated with bonding (r = -0.12), bridging (r = ~0), and linking (r = 0.34); prefectural partisanship is only weakly correlated with bonding (r = -0.09), bridging (r = -0.05), and linking (r = 0.06).

sum of squares after adding new variables to each model, indicating that Model 8 fit best. F Statistics shows that each model fits better than an intercept model. No problematic collinearity was observed, with all variance inflation factor scores below 10, the threshold for problematic collinearity. Multiple imputation (i = 5) was used to fill in missing data, representing less than 1% of data points (0.3%).[6]

Compared to my first model, my final, fully specified, transformed model explains 92% of the variance in social welfare regimes, an extremely high amount. Further, the sigma statistic (residual standard error) in **Table 2** shows that my final model predicts each municipality-year's social welfare regime score with an average error of just 0.18 points, and within a 95% confidence interval of 0.35 points. These are extremely favorable accuracy levels, considering that my outcome has a range of 5.12.

Then, I applied the same analyses to middle class and developmental indices, repeating Models 1-8 from **Table 2** as developmental models 9-16 in **Table 3** and middle-class regime Models 17-24 in **Tables A4**, as alternative perspectives. However, my main analysis focuses on social welfare regimes, to distinguish the drivers behind the rise of this regime over time. My best models (Models 8, 16, and 24) explain extremely high shares of variation in social welfare (R2 = 92%, **Table 2**), developmental (R2 = 93%, **Table 3**), and middle class regime scores (R2 = 83%, **Table 4**).

4.3 Hypothesis Testing

Finally, having applied a large set of controls to account for alternative explanations, I formally test my hypotheses on my models using the following strategies. To test my first and second hypotheses, that (**H1**) regimes scores are changing over time and that (**H2**) social welfare regimes are changing more than other regimes, I used linear hypothesis tests in **Table 3**. Linear hypothesis tests (Hothorn et al., 2008; Bretz et al., 2016) can compare two model coefficients within the same model to evaluate whether one coefficient is greater than the other, as well as whether that difference is *statistically significant*.

Using the annual fixed effects from the fully specified models for each index (Models 8, 16, & 24), I evaluated whether, for example, the effect of 2002 was significantly different from the benchmark compared to the benchmark year of 2001 (ie. whether the coefficient was significantly different from zero). Then, I evaluated average annual effect across all years *before* the 2011 disaster (2002-2010), and the average annual effect *after* the 2011 disaster (2011-2018). This allowed me to compute the average treatment effect of the post-disaster period compared to the pre-disaster period. Should these effects be significant, it would indicate that urban regimes have, on average, changed greatly over time, even accounting for all other model

[6] Variables with missing data included prefectural votes (n = 1299, <0.172%), lower house votes (n = 521, <0.069%), income (n = 269, <0.036%), and college (n = 46, <0.006%), revenue-derived varaibles (n = 14, <0.002%).

covariates. Then, to test my second hypothesis, I compare average treatment effects across different regime types, also in **Table 3**. If social welfare regimes saw a significant average treatment effect, but developmental and middle class regimes did not, this would indicate social welfare regimes were disproportionately impacted by this sea-change in urban regimes.

Finally, to test my third hypothesis, that collective action potential is associated with municipalities' transition to social welfare regimes, I investigated the effects bonding, bridging, and linking social capital on each regime index, by interpreting the beta coefficients from my fully specified models (Models 8, 16, & 24).

5. Results

This study set out to examine (**H1**) *whether* urban regimes in Japanese have changed measurably in terms of spending priorities over the last 20 years, (**H2**) whether social welfare regime in particular have grown more common, after accounting for alternative explanations with statistical controls, and (**H3**) whether collective action potential is related to the hypothesized rise in social welfare regimes. Below, I outline my findings, focusing especially on my fully specified Model 8.[7]

[7] In Model 8, the median municipality-year evaluated has the following covariate traits: This municipality has a population of 24,750 residents, spans 4,170 hectares of inhabitable land, hosts an income per capita of 1,199,190 yen per capita (~$9,183 USD), with 28% of residents over age 65. The median municipality in Japan during this period also has low rates of adults with some college education (25%), moderately high unemployment (4.6%), and shares of high total migration (6%). It received 503,740 yen per capita in revenue last year, 16% of which came from national or prefectural government, and has a real term budget balance of +4.7. The municipality voted for winning LDP/Komeito candidate in moderate-to-high rates, at 51% in Lower House elections and 32% in prefectural elections. Further, I assume median levels of bonding (0.71), bridging (0.32 ~ 2nd quartile), and linking social capital (0.25).

Table 3: Linear Hypothesis Tests of Temporal Effects

	Social Welfare Regime			Developmental Regime			Middle Class Regime		
Year	Estimate	SE	95% CI	Estimate	SE	95% CI	Estimate	SE	95% CI
Pre-Disaster									
2002	0	0.01		-0.04***	0.01		+0.01	0.01	
2003	-0.02.	0.01		-0.08***	0.01		-0.07***	0.01	
2004	+0.03**	0.01		-0.06***	0.01		-0.02.	0.01	
2005	+0.04***	0.01		-0.07***	0.01		-0.01	0.01	
2006	+0.02*	0.01		-0.09***	0.01		-0.03***	0.01	
2007	+0.03***	0.01		-0.1***	0.01		-0.06***	0.01	
2008	+0.01	0.01		-0.07***	0.01		-0.05***	0.01	
2009	+0.1***	0.01		+0.11***	0.01		+0.07***	0.01	
2010	+0.15***	0.01		-0.04***	0.01		+0.02.	0.01	
Mean Pre	**+0.04*** **	**0.01**		**-0.05*** **	**0.01**		**-0.01.**	**0.01**	
Post-Disaster									
2011	+0.18***	0.01		-0.06***	0.01		+0.04***	0.01	
2012	+0.13***	0.01		-0.06***	0.01		-0.02.	0.01	
2013	+0.16***	0.01		+0.03**	0.01		+0.02.	0.01	
2014	+0.18***	0.01		-0.03**	0.01		+0	0.01	
2015	+0.09***	0.01		-0.02	0.01		-0.04***	0.01	
2016	+0.15***	0.01		-0.09***	0.01		-0.03**	0.01	
2017	+0.13***	0.01		-0.02*	0.01		-0.02	0.01	
2018	+0.12***	0.01		-0.08***	0.01		-0.05***	0.01	
Mean Post	**+0.14*** **	**0.01**		**-0.04*** **	**0.01**		**-0.01**	**0.01**	
Average Treatment Effect									
Post - Pre	**+0.1*** **	**0**		**+0**	**0**		**+0**	**0**	
Net Gain over Time									
2018 - 2002	**+0.12*** **	**0.01**		**-0.04*** **	**0.01**		**-0.06*** **	**0.01**	

Note:
Statistical Significance: *** p < 0.001, ** p < 0.01, * p < 0.05, . p < 0.10. All p-values and asterisks reflect two-tailed hypothesis tests. Based on annual fixed effects from Models 8, 16, & 24 in Tables A2, A3, & A4, respectively.

5.1 Testing Temporal Effects

First, I hypothesized that (**H1**) urban regimes have changed measurably over the last 2 decades. My linear hypothesis tests presented in **Table 3** reveal consistent evidence that urban regime scores changed over time. After controlling for numerous alternative explanations listed in the Methods, time had a positive, statistically significant impact on social welfare scores: the annual impact in 2018 was +0.12 standard deviations greater than in 2002 ($p < 0.01$), and when comparing annual effects post-disaster to annual effects pre-disaster, municipalities saw their social welfare scores rise each year an average of +0.1 standard deviations more post-disaster than they did pre-disaster ($p < 0.001$). Indeed, each consecutive year from 2004 onwards yielded increases in social welfare regime scores. (14 years saw increases significant of at least the $p < 0.05$ level.) These findings also complement the descriptive evidence of considerable changes in social welfare regimes presented in Figures 2 and 4.

Second, I hypothesized that (**H2**) social welfare regimes increased annually *moreso* than did other urban regimes. Indeed, my fully specified models project that, independent of other traits, between 2002 and 2018, a municipality's social welfare regime score was expected to increase +0.12 standard deviations ($p < 0.01$), while their developmental and middle-class regime scores were expected to decrease by -0.04 ($p < 0.01$) and -0.06 ($p < 0.01$) standard deviations, respectively. Further, comparing the pre- and post-disaster periods, an average year post-disaster saw a +0.1 standard deviation increase in their social welfare score ($p < 0.001$), but their developmental and middle-class regime scores saw no substantive or statistically insignificant changes.

5.2 Collective Action Effects

Third, I hypothesized that (**H3**) municipalities with greater collective action potential, as measured by types of social capital, saw greater increases in their social welfare regime scores. Indeed, communities with greater bridging social capital indices saw higher social welfare index scores (+0.01, $p < 0.01$, Model 8, **Table 2**); this positive significant association was shared consistently across all in which models they were included (Models 4 to 8).

Interestingly, social welfare-related spending tended to be negatively related to bonding social capital (-0.07, $p < 0.001$, Model 8) and linking social capital (-0.01, $p < 0.10$, Model 8), contrasting the positive relationship with bridging social capital. This divergence is not unexpected, and speaks towards the Janus-faced nature of social capital, where bonding (in-group) and linking (vertical ties) may help residents accomplish their political goals, but those goals might not be supporting a social welfare agenda (Aldrich, 2012). In contrast, the inter-group trust, reciprocity, and mutual aid that bridging social capital imparts in

a community are extremely compatible with social-welfare policy; bridging social ties could plausibly help neighbors band together to confront equity issues by pressuring city hall or town hall to prioritize more social welfare spending.

Is this association unique to social welfare regimes? In my models of developmental and middle-class regime scores, I find that greater bridging social capital is related to increases in development-related spending priorities (+0.01, $p < 0.001$, Model 16, **Table 3**), as well as middle-class spending priorities (+0.01, Model 24, **Table 4**). Bonding social capital tends to maintain a negative relationship with development (-0.04, $p < 0.01$, Model 16) and middle-class-regime scores as well (-0.03, $p < 0.05$, Model 24). Meanwhile, linking social capital has weaker, positive, but less significant associations ($p > 0.10$) with development and middle-class spending.

In other words, it appears that collective action potential is related to changes in urban regimes, but this impact is limited to bonding and bridging social capital. Bonding social capital appears to be negatively related to these spending indices, implying that strong in-group ties tend to draw municipalities closer to caretaker regimes. In contrast, bridging social capital appears to be positively related to each type of spending change, pushing municipalities further away from caretaker regimes; one possible explanation is that these bridging ties and the collective action they enable help residents push municipal officials in towards whichever style of regime these highly-networked residents support, but further study is needed to confirm these suspicions. What I can conclude from this analysis is that collective action potential, specifically bridging social capital, is positively related to the increase in each of my three archetypal urban regimes.

6. Discussion

This study measured municipalities' proclivities towards each of 4 types of urban regimes, commonly discussed in urban policy in the US or Japan (Stone, 1989; Stoker and Mossberger, 1994; Bassett, 1996; Child Hill and Fujita, 2000; Kilburn, 2004; Ramirez-Perez et al., 2008; Sorensen, 2011). These included regimes that focus on promoting (1) **economic development** in their municipality (helpful for accelerating renewable energy booms, but perhaps not for ensuring equitable development with public support); regimes that focus on promoting (2) **progressive middle class interests** like health care, education, and environmentalism (helpful for renewable energy, but not as common in less prosperous communities); and regimes that focus on increasing (3) **opportunity through social welfare policies**; and regimes that aim to maintain the (4) **status quo** in their municipality (rather undesirable for disaster-prone municipalities where disaster resilience initiatives are deeply needed). Below, I summarize several contributions this study

makes to the literature on urban regimes, to expand scholars' understanding of these 4 regime archetypes.

This study made several contributions to the literature, in terms of (1) evaluating regime change over time in the case of Japan, (2) integrating social capital and urban regime theory, (3) Large-N methods for urban regime analysis, and (4) tools for updating case studies.

6.1 Contributions to the Literature

6.1.1 Evaluating Urban Regime Change in Japan

First, this study extended a diverse literature on urban regimes and governance by formally measuring change over time, using the case of Japan. This builds on two decades of studies that highlight the depth and breath of grassroots activism and politics in Japanese urban policy (eg. LeBlanc, 1999; Sorensen and Funck, 2007; LeBlanc, 2009; Avenell, 2010; Aldrich and Fraser, 2017), but formalizes it in the context of urban regime theory (Stone, 1989). In the cases examined in Japan, municipalities with social-welfare oriented regimes tended to be deeply interested in disaster resilience, where municipal officials were deeply concerned with residents' vulnerability during crisis (Maly and Shiozaki, 2012; Aldrich, 2012; Dimmer and Lindenberg, 2014; Matthews, 2017; Aldrich, 2019; Cheek, 2020; Ji and Imai, 2022; Abeysinghe et al., 2022).

Yet, as I show above in the results of this study, some municipalities' governing coalitions are spending more on redistributive policies than others municipalities. This is critical, considering that my findings show *social welfare regimes* are becoming increasingly common in Japan, and are often mid-size or rural communities, where great changes in social welfare are not generally expected (due to lower tax base and many LDP-dominated legislatures, compared to metropolitan areas).

6.1.2 Integrated Analysis of Urban Regimes and Social Capital

Second, this study integrated two schools of thought, social capital (Putnam, 2000; Woolcock, 2010; Aldrich, 2012; Alcorta et al., 2020; Fraser, 2021) and urban regime theory (Stone, 1993; Stoker and Mossberger, 1994), which, while extremely compatible as networked perspectives on governance, are only rarely examined together (Fraser et al., 2020). Specifically, this study analyzed how much municipalities' urban regimes relate to their social capital indicators after controlling for alternative sociodeomographic indicators.

My models showed that residents' collective action potential, as measured by their bridging social ties, correlates consistently with municipalities' transition away from caretaker regimes and towards their desired alternative regime, while greater bonding, in-group social ties correlates with stagnation as a caretaker regime. This highlights that municipalities, specifically Japanese municipalities, can and do show feature of

specific urban regimes, that these regimes are frequently transitioning towards social welfare policies, and that collective action potential is closely related to municipalities' capacity to change their urban regime.

6.1.3 A Template for Large-N Urban Regime Analysis

This study makes several contributions to the literature. First, it builds on decades of in-depth small-N (Munoz and Henry, 1986; Stone, 1989; Whelan et al., 1994; Yeum, 2002; Gendron and Domhoff, 2018) and medium-N analyses of urban regimes (Kilburn, 2004; Thompson III, 2005; De Socio, 2007) by providing a template for rigorous large-N approximations of urban regimes, meant to expand the scope of comparisons much like recent large-N analyses of mayors (Ramirez-Perez et al., 2008; de Benedictis-Kessner and Warshaw, 2016; Einstein and Glick, 2018; Murphy, 2019).

Naturally, approximating the complexity of an urban regime into a single number is fraught with potential missteps, but by deriving indices from municipalities' spending priorities, this study has aimed to at least begin to fill the existing gap in metrics for approximating urban regime types. Future scholars are encouraged to use, adapt, and improve these metrics, and I hope that spending-based metrics may be helpful for approximating urban regime shift in other industrialized democracies, like the US, Germany, South Korea, and Taiwan, among others.

Table 4: Regime Change in Past Case Studies

			Regime in 2000				Regime in 2018			
Prefecture	Municipality	Literature	Type	SW	MC	D	Type	SW	MC	D
Tokyo	Mitaka	Steiner 1957; Fukushima & Yamaguchi 1997; Ohashi & Phelps 2021	C	25	26	2	C	51	10	2
Fukushima	Fukushima	Otsuki et al. 2016; Abeysinghe et al. 2022	D	8	27	53	C	44	36	35
Miyagi	Sendai	Morris 2012; Tsuji 2017	MC	14	68	48	MC	48	58	33
Miyagi	Ishinomaki	Dimmer & Lindenberg 2014; Matthews 2017; Ji & Imai 2022	MC	4	53	22	SW-MC-D	85	81	87
Hyogo	Kobe	Nunokawa 2007; Funck 2007; Yasui 2007; Edgington 2010; Aldrich 2012; Maly et al. 2012	MC-D	42	74	65	SW-MC	68	49	11
Hokkaido	Muroran	Edgington 2013	SW	54	46	37	SW-MC	70	64	38

[1] SW = Social Welfare. MC = Middle Class. D = Developental. C = Caretaker.
[2] Numbers rank city-year as a percentile (0-100) compared to all other city-years.

6.1.4 A Diagnostic Resource for Updating Case Studies

Further, this study's measures also provide a resource for scholars building new theories of urban politics. After a wealth of investigation of urban politics in Japan over the last 30 years, some case studies may no longer be representative of the current state of their municipality. Until now, the field has lacked a tool for systematically identifying *which* municipalities need re-investigation. **Table 4** demonstrates an example of how scholars can utilize these new indices to evaluate commonly cited case studies whose urban regime type may have since changed.

Table 4 lists several notable municipalities, selected for their relevance to the literature. For each municipality, columns report (1) the citing literature, (2) this study's numeric and categorical regime classifications for each municipality in 2000, compared with (3) their classifications in 2018. Each municipality's index scores are represented as relative percentiles (0-100%), showing *how much* they lean towards that given regime.

On the one hand, these indices also point to the intractability of regimes in some municipalities. For example, several municipalities have retained their classification. Mitaka, an affluent suburb of Tokyo, remains a caretaker regime (Steiner, 1957; Fukuchi and Yamaguchi, 1997; Ohashi and Phelps, 2021), insulated from economic decline in other suburbs. Sendai, the metropolitan hub of the Tohoku region, remains a middle-class, progressive regime, with stable, continuity in leadership even after substantial impacts of the 2011 triple disaster (Morris, 2012; Tsuji, 2017). Finally, the rustbelt city of Muroran (Edgington, 2013) continues to focus strongly on social welfare even after 20 years, albeit with some change towards a hybrid regime.

On the other hand, some municipalities have changed greatly, and may merit renewed investigation from scholars. Fukushima City originally ranked as a developmental regime, but has since transitioned to a caretaker regime, as the city has had to balance competing interests from national government, local families, weakened agriculture, and decontamination efforts (Otsuki, 2016; Abeysinghe et al., 2022), each aiming to stem out-migration through different means (Zhang et al., 2014).

Ishinomaki City, formerly a middle-class regime, has become a hybrid regime, adding considerable spending relative to its peers on social welfare and economic development to attempt to recover after the tsunami devastated its local industry, agriculture, and tourism businesses (Dimmer and Lindenberg, 2014; Matthews, 2017; Ji and Imai, 2022). Such findings raise questions for other Tohoku municipalities investigated after the disaster (Aldrich, 2019; Cheek, 2020).

Similarly, Kobe transitioned from a 2000-era focus on middle-class interests and economic development

(Nunokawa, 2007; Sorensen and Funck, 2007) to a new focus on social welfare and middle-class interests; much has written about Kobe's less-than-ideal recovery policies from the 1994 disaster, where developers gentrified many low-income neighborhoods and displaced families from housing (Yasui, 2007; Edgington, 2010; Aldrich, 2012; Maly and Shiozaki, 2012). This shift away from developmental-approaches raises exciting questions about what has changed in Kobe since their early-recovery period. The author hopes that this table might provide a spotlight for municipalities in need of further study.

6.2 Limitations

Finally, this study does come with several limitations, in additions to the index discussions in our Data section. In addition to the aforementioned challenges of approximating urban regime shifts using spending as a proxy measure, some scholarship has highlighted cases where urban regimes are more difficult to characterize (DeLeon, 1992; Shin et al., 2015; Davies and Blanco, 2017; Russo and Scarnato, 2018). Depending on the country, urban governance and levels of local autonomy may vary due to institutional differences, laws, and tax structure (Sellers, 2002; Sorensen, 2011). Some municipalities lack stable governing coalitions, dubbed 'non-regimes' (Mossberger, 2009). In practice, these either would not spend consistently on the same priorities, or would spend little on any new priorities, resembling a caretaker regime.

Another important factor that might influence spending spendings, but was not explored in this study, is women's representation in public office (eg. city council). This study did not explore this variable due to data collection challenges; municipal electoral data is quite difficult to collect for multi-decade duration of the study period, and the full range of municipalities. Recent studies have tried to resolve this gap; a recent study examined municipal level gender representation in 764 cities from 2007 to 2012 (Suzuki and Avellaneda, 2018); future studies could attempt to expand this to our full range of over 1700 municipalities from 2000 to 2018. Also, gender representation can be endogenously related to collective action potential, in that communities with greater collective action potential might be more likely to overturn male incumbents and vote in greater shares of women in public office, reshaping spending patterns. Future scholars are strongly encouraged to investigate the independent effects of women's representation in politics on urban regime type.

Neighborhood organizations, nonprofits, and labor movements can also motivate and structure these municipalities' regimes (Logan and Rabrenovic, 1990; Nissen, 1995; Takao, 2006; Camou, 2014; Stone et al., 2015) as can higher levels of government (Sellers, 2002; Tsukamoto, 2012; Shin et al., 2015). These limitations aside, urban regimes, even amidst varying governance conditions, remain a useful way to characterize that development remains so prioritized in some municipalities, while opportunity-expanding policies remain

prioritized in others (Sorensen and Funck, 2007; Ji and Imai, 2022). This study's measurement using developmental, opportunist, and progressive regime indices helps achieve that aim.

Appendix

Table of Contents

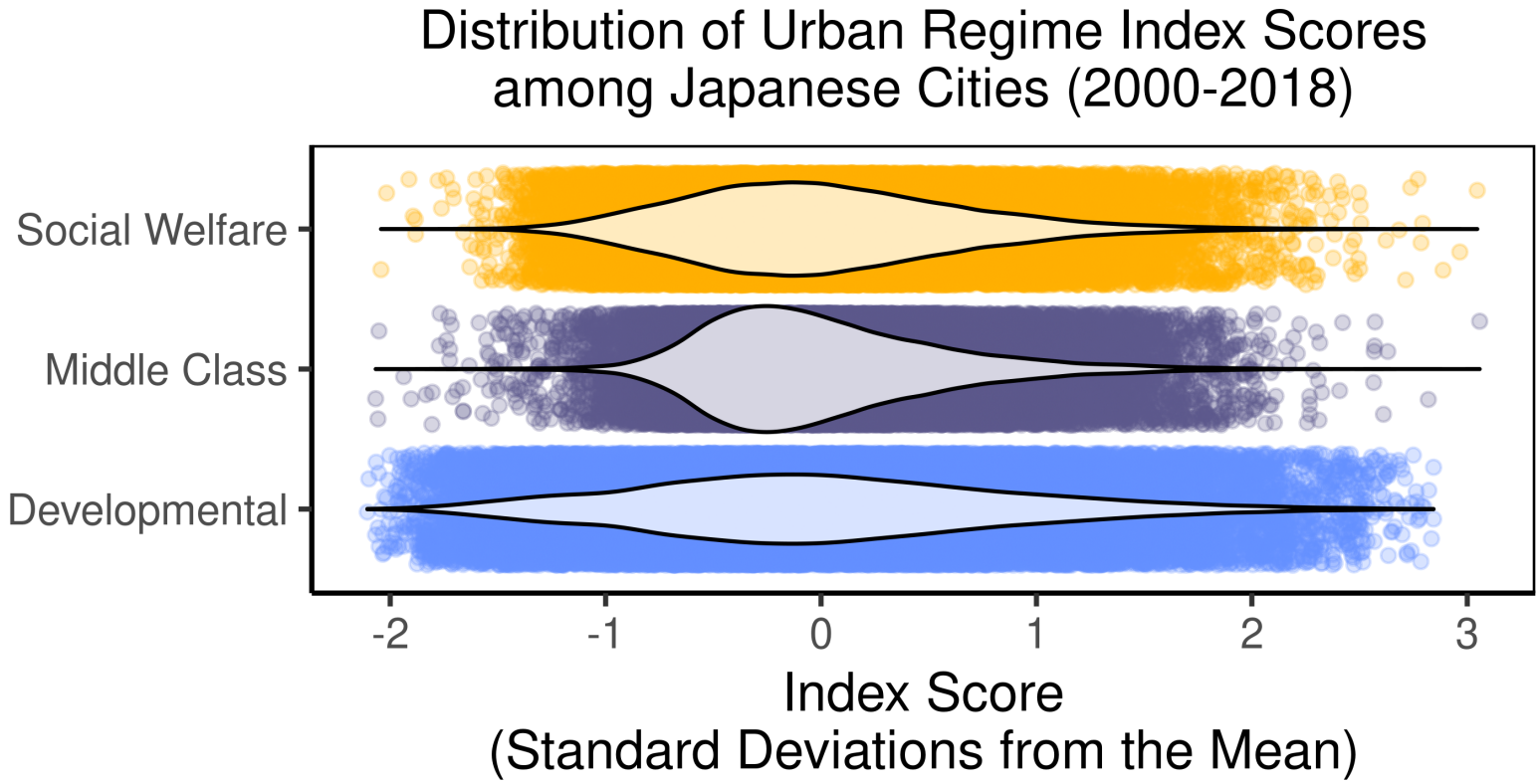
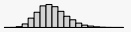
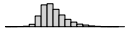
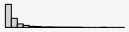
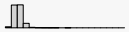
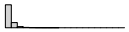
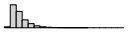
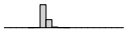
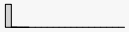
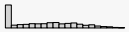
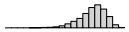
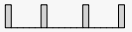
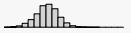
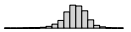
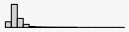
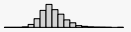


Figure A1: Distributions of Urban Regime Indices

Table 1: Descriptive Statistics

40043 Japanese city-years (2000-2018)

	Statistics					Observations				
Variable	Mean	SD	Min	Median	Max	N	% Missing	Distribution[3]	Transformed[3]	Transformation
Urban Regime Indices										
Social Welfare Regime	0	0.63	-2.04	-0.05	3.05	40029	0.0			x
Middle Class Regime	0	0.53	-2.07	-0.09	3.06	40029	0.0			x
Developmental Regime	0	0.85	-2.11	-0.05	2.84	40029	0.0			x
Demographics										
Population	60866	169234	178	17299	3724844	40043	0.0			$x^{1/10}$
Inhabitable Area (ha)	5736.24	6716.1	74	3402	80524	40043	0.0			log(x)
% Over Age 65	0.28	0.08	0.08	0.28	0.6	40043	0.0			logit(x)
Income per capita[1]	1207.26	338.49	263.9	1174.82	9058.48	39773	0.7			log(x)
Revenue										
Revenue per capita[1]	696.22	570.52	120.52	521.21	14123.27	40029	0.0			sqrt(x)
% National & Prefectural Funding	0.16	0.07	0.01	0.15	0.84	40029	0.0			logit(x)
Real Term Budget Balance (+/-)	5.38	4.45	-50.7	4.7	113.4	40029	0.0			x
Disaster Conditions										
Disaster Deaths[2]	11.32	238.48	0	0	9077.99	40043	0.0			$x^{1/10}$
Disaster Damage[2]	187.91	1328.48	0	0	23774.73	40043	0.0			$x^{1/10}$
Disaster Spending										
Disaster Recovery Spending Rate[1]	8.74	44.65	0	0.44	3388.75	40029	0.0			$x^{1/10}$
Disaster Relief Spending Rate[1]	1.89	33.04	0	0	1910.01	40029	0.0			$x^{1/10}$
Political Parties										
% LDP Coalition Votes: Prefecture	0.31	0.26	0	0.31	0.97	34964	12.7			logit(x + 0.01)

Bonding Social Capital	0.7	0.05	0.39	0.71	0.81	35011	12.6			logit(x)
Collective Action										
Bridging Social Capital	0.32	0.08	0.09	0.32	0.57	35011	12.6			quartiles(x)
Linking Social Capital	0.26	0.08	0.06	0.25	0.55	35011	12.6			logit(x)
% Some College	0.24	0.08	0.05	0.23	0.88	39961	0.2			logit(x)
Extra Controls										
% Unemployed	0.05	0.02	0	0.04	0.23	40043	0.0			logit(x)
Total Migration per capita	0.07	0.04	0.01	0.06	0.62	31493	21.4			log(x)

Note:
Categorical Variables include Year[a], Prefecture[b], and Tsunami[c]. Models use multiple imputation with 5 imputations to account for missing data.

[a] Years range from 2000 (n = 1428 cities) to 2018 (n = 1727). Mode is 2010 (n = 1732). In models, baseline year is 2000. Some municipalities consolidated over time, while others split. Dataset omits outliers including Fukushima Exclusion Zone cities from 2011-2018 and Yubari 2000-2018.

[b] 47 Prefectures. Modal prefecture is Hokkaido, with 178 cities (10%, n = 1,738) and 3,327 city-years (10%, n = 31,493). In models, the baseline prefecture is Hokkaido.

[c] Tsunami hit 85 municipalities in 2011; cities labeled 2011-2018 as tsunami-affected (n = 680).

[1] Spending measured in 1,000s of yen.

[2] Disaster deaths and damages (# of buildings damaged) measured per 100,000 persons.

[3] Zeros from unaffected cities in disaster variable distributions omitted to show nonzero values clearly.

Table 2: **OLS Models of Social Welfare Regimes.**
Dependent Variable: Social Welfare Regime Index (Z-score).
Unit of Observation: 31493 Japanese municipality-years (2000-2018), with annual fixed effects.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Best Model Model 8
	Basic Controls	Disaster Controls	Other Regimes	Collective Action	Prefecture Effects[1]	Lagged Outcome[2]	Lagged Controls[3]	Transformed[4]
Demographics								
Population	**-0.00*** **	**-0.00*** **	**-0.00** **	**-0.00** **	**-0.00** **	-0.00	0.00	**-0.04*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)	(0.00)	**(0.01)**
Inhabitable Area (ha)	**0.00*** **	**0.00*** **	0.00	**0.00*** **	**0.00*** **	-0.00	0.00	**0.01*** **
	(0.00)	**(0.00)**	(0.00)	**(0.00)**	**(0.00)**	(0.00)	(0.00)	**(0.00)**
% Over Age 65	**3.40*** **	**3.39*** **	**2.41*** **	**2.38*** **	**1.87*** **	**0.43*** **	**0.47*** **	**0.06*** **
	(0.04)	**(0.04)**	**(0.04)**	**(0.05)**	**(0.05)**	**(0.03)**	**(0.04)**	**(0.01)**
Income per capita (1000s of yen)	**-0.00*** **	**-0.00** **	**0.00***	**0.00*** **	**0.00*** **	**0.00***	**-0.00*** **	**-0.09*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.01)**
Revenue								
Revenue per capita (1000s of yen)	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
% National & Prefectural Funding	**0.42*** **	**0.72*** **	**0.90*** **	**0.78*** **	**0.41*** **	**0.23*** **	**0.06** **	0.01.
	(0.03)	**(0.04)**	**(0.03)**	**(0.03)**	**(0.04)**	**(0.02)**	**(0.02)**	(0.00)
Real Term Budget Balance (+/-)	**-0.01*** **	**-0.01*** **	**-0.01*** **	**-0.01*** **	**-0.00*** **	-0.00	**0.00*** **	0.00
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)	**(0.00)**	(0.00)
Disaster Conditions								
Disaster Deaths (per 100,000)		**-0.00*** **	0.00.	**0.00*** **	-0.00.	**-0.00** **	**-0.00*** **	0.00
		(0.00)	(0.00)	**(0.00)**	(0.00)	**(0.00)**	**(0.00)**	(0.01)
Disaster Damage (per 100,000)		**-0.00*** **	**-0.00*** **	**-0.00*** **	**0.00*** **	-0.00	-0.00	**-0.01***
		(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)	(0.00)	**(0.00)**
Hit by 2011 tsunami (1/0)		0.01	0.00	-0.01	**0.11*** **	**0.03** **	**0.03** **	**0.02***
		(0.01)	(0.01)	(0.01)	**(0.01)**	**(0.01)**	**(0.01)**	**(0.01)**
Disaster Spending								
Disaster Recovery Spending Rate		**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00** **	0.00
		(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)
Disaster Relief Spending Rate		**-0.00*** **	**-0.00*** **	**-0.00** **	-0.00	**0.00*** **	**0.00*** **	**0.01*** **
		(0.00)	**(0.00)**	**(0.00)**	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**
Other Urban Regimes								
Middle Class Regime Index			**0.16*** **	**0.15*** **	**0.12*** **	**0.04*** **	**0.02*** **	**0.01*** **
			(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Developmental Regime Index			**0.23*** **	**0.20*** **	**0.23*** **	**0.07*** **	**0.02*** **	-0.00
			(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)

Political Parties								
% LDP Coalition Votes: Lower House				**-0.03***	0.03.	0.01	0.00	
				(0.01)	(0.01)	(0.01)	(0.01)	
% LDP Coalition Votes: Prefecture				0.01.	**0.04***	**0.02***	**0.02***	
				(0.01)	**(0.01)**	**(0.00)**	**(0.00)**	
Collective Action								
Bonding Social Capital (0-1)				**-0.77***	**-0.97***	**-0.28***	**-0.32***	**-0.07***
				(0.05)	**(0.08)**	**(0.05)**	**(0.05)**	**(0.01)**
Bridging Social Capital (Quartiles)				**0.02***	**0.04***	**0.01**	**0.01***	**0.01**
				(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Linking Social Capital (0-1)				**0.29***	-0.05	**-0.14***	**-0.10**	-0.01.
				(0.03)	(0.06)	**(0.04)**	**(0.04)**	(0.01)
Extra Controls								
% College Educated				**-0.67***	**-0.38***	0.01	**-0.13***	-0.01
				(0.03)	**(0.04)**	(0.02)	**(0.03)**	(0.01)
% Unemployed					**2.03***	**0.66***	**-0.45***	**-0.04***
					(0.14)	**(0.09)**	**(0.10)**	**(0.01)**
Total Migration (per capita)				**1.29***	**0.44***	0.08.	**0.13**	0.00
				(0.07)	**(0.07)**	(0.04)	**(0.05)**	(0.00)
Lagged Outcome (1 year prior)						**0.73***	**0.79***	**0.78***
						(0.00)	**(0.00)**	**(0.00)**
Constant	**-1.47***	**-1.54***	**-1.21***	**-0.81***	**-0.37***	-0.09.	**0.12***	**0.52***
	(0.02)	**(0.02)**	**(0.02)**	**(0.04)**	**(0.07)**	(0.05)	**(0.05)**	**(0.07)**
Model Fit								
N (city-years)	31493	31493	31493	31493	31493	29755	29755	29755
Max VIF	2.30	2.33	4.36	5.16	8.12	8.16	8.06	8.40
F-statistic (df)	**3011.7***	**2619.8***	**3182.5***	**2769.3***	**1590.6***	**4105.5***	**3803.8***	**3834.3***
	(25)	**(30)**	**(32)**	**(39)**	**(86)**	**(86)**	**(86)**	**(86)**
Change in Deviance (df)	-	**-113.1***	**-636.5***	**-133.4***	**-495.4***	**-1298.9***	**-1410.5***	**-38.5***
		(5)	**(2)**	**(7)**	**(47)**	**(1)**	**(1)**	**(17)**
Sigma (Avg. Error)	0.35	0.34	0.31	0.30	0.28	0.18	0.18	0.18
R^2	0.71	0.71	0.76	0.77	0.81	0.92	0.92	0.92

Note:
Statistical Significance: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.10$. All p-values and asterisks reflect two-tailed hypothesis tests. (F-statistic is one-tailed by default.)

[1] Annual Fixed Effects included in every model. Prefectural effects added starting in Model 5. Excluded from table to conserve space.

[2] Lagged Outcome by 1 year in Models 6-8, to control for path dependence and any temporal correlation. Constrains final models to 2001-2018.

[3] Lagged Controls: All other numeric predictors lagged by 1 year in Models 7-8 to avoid endogeneity bias. Despite the 1% drop in R^2, lagging controls ensures more conservative estimates.

[4] Transformations: In Model 8, predictors were log-, logit-, or root-transformed to fit their distribution and nonlinear trends, adding a small constant where necessary. These made statistically significant improvements in log-likelihood compared to Model 7 ($p < 0.001$). Area, income, and migration were logged. Revenue used the square root; the 10th root was used for Population (to avoid colinearity with spending), disaster deaths, damages, recovery spending, and relief spending (since the distributions have frequent, meaningful zeros). Age, voteshares, social capital, education, and unemployment were logit tranformed, since they are bounded at 0 and 1. Bridging social capital was split into quartiles, to avoid collinearity with regime indicators.

Table 3: **OLS Models of Developmental Regimes.**
Dependent Variable: Developmental Regime Index (Z-score).
Unit of Observation: 31493 Japanese municipality-years (2000-2018), with annual fixed effects.

								Best Model
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
	Basic Controls	Disaster Controls	Other Regimes	Collective Action	Prefecture Effects[1]	Lagged Outcome[2]	Lagged Controls[3]	Transformed[4]
Demographics								
Population	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00***	-0.00	0.00	**-0.12*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)	(0.00)	**(0.01)**
Inhabitable Area (ha)	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.05*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
% Over Age 65	**3.38*** **	**3.32*** **	**1.66*** **	**1.88*** **	**2.02*** **	**0.46*** **	**0.48*** **	**0.06*** **
	(0.05)	**(0.05)**	**(0.05)**	**(0.06)**	**(0.06)**	**(0.04)**	**(0.04)**	**(0.01)**
Income per capita (1000s of yen)	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00** **	**-0.00*** **	**-0.12*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.01)**
Revenue								
Revenue per capita (1000s of yen)	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.01*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
% National & Prefectural Funding	**-0.91*** **	**-0.41*** **	**-0.51*** **	0.04	**0.23*** **	**0.52*** **	**-0.41*** **	**-0.04*** **
	(0.05)	**(0.05)**	**(0.04)**	(0.04)	**(0.04)**	**(0.03)**	**(0.03)**	**(0.00)**
Real Term Budget Balance (+/-)	-0.00	**0.00*** **	**0.01*** **	**0.01*** **	**0.01*** **	**0.00*** **	**0.00*** **	**0.00*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Disaster Conditions								
Disaster Deaths (per 100,000)		**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00** **	**0.05*** **
		(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.01)**
Disaster Damage (per 100,000)		**0.00*** **	**0.00*** **	**0.00*** **	**0.00** **	0.00	**0.00*** **	0.00
		(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)	**(0.00)**	(0.00)
Hit by 2011 tsunami (1/0)		**0.05***	**0.05** **	**0.11*** **	**0.05** **	-0.00	**0.03***	0.00
		(0.02)	**(0.02)**	**(0.02)**	**(0.02)**	(0.01)	**(0.01)**	(0.01)
Disaster Spending								
Disaster Recovery Spending Rate		**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**0.00*** **	**0.01*** **
		(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Disaster Relief Spending Rate		**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**0.00*** **	**0.01***
		(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
Other Urban Regimes								
Social Welfare Index			**0.38*** **	**0.31*** **	**0.33*** **	**0.11*** **	**0.05*** **	**0.02*** **
			(0.01)	**(0.01)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.00)**
Middle Class Regime Index			**0.31*** **	**0.27*** **	**0.25*** **	**0.11*** **	**-0.01***	**-0.02*** **
			(0.01)	**(0.01)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.00)**

Political Parties								
% LDP Coalition Votes: Lower House				0.01 (0.01)	-0.00 (0.02)	-0.00 (0.01)	0.02 (0.01)	
% LDP Coalition Votes: Prefecture				-0.01 (0.01)	**0.02* (0.01)**	-0.00 (0.01)	0.01 (0.01)	
Collective Action								
Bonding Social Capital (0-1)				**0.55*** (0.06)**	**-0.21* (0.09)**	**-0.13* (0.06)**	**-0.16* (0.07)**	**-0.04** (0.01)**
Bridging Social Capital (Quartiles)				**0.07*** (0.00)**	**0.05*** (0.00)**	0.01. (0.00)	**0.02*** (0.00)**	**0.01*** (0.00)**
Linking Social Capital (0-1)				**-0.18*** (0.04)**	**0.24*** (0.07)**	0.04 (0.04)	0.05 (0.05)	0.01. (0.01)
Extra Controls								
% College Educated				**-1.70*** (0.04)**	**-1.34*** (0.04)**	**-0.23*** (0.03)**	**-0.23*** (0.03)**	**-0.01* (0.01)**
% Unemployed				**-5.60*** (0.15)**	**-6.55*** (0.17)**	**-1.65*** (0.11)**	**-1.92*** (0.12)**	**-0.09*** (0.01)**
Total Migration (per capita)				**0.42*** (0.08)**	**0.19* (0.08)**	-0.07 (0.05)	**0.31*** (0.06)**	**0.04*** (0.01)**
Lagged Outcome (1 year prior)						**0.72*** (0.00)**	**0.81*** (0.00)**	**0.77*** (0.00)**
Constant	**-0.68*** (0.03)**	**-0.82*** (0.02)**	0.02 (0.02)	**-0.26*** (0.06)**	0.05 (0.09)	0.03 (0.06)	**0.13* (0.06)**	**0.31*** (0.08)**
Model Fit								
N (city-years)	31493	31493	31493	31493	31493	29755	29755	29755
Max VIF	2.30	2.33	3.86	4.92	8.12	8.17	8.06	8.40
F-statistic (df)	**3146.4*** (25)**	**2893.6*** (30)**	**3718.3*** (32)**	**3720.6*** (40)**	**2128.6*** (86)**	**5488*** (86)**	**4723.9*** (86)**	**4808.6*** (86)**
Change in Deviance (df)	-	**-458.6*** (5)**	**-1323.9*** (2)**	**-805.5*** (8)**	**-651.8*** (46)**	**-1923*** (1)**	**-2127*** (1)**	**-99.4*** (17)**
Sigma (Avg. Error)	0.46	0.44	0.39	0.36	0.33	0.21	0.22	0.22
R^2	0.71	0.73	0.79	0.83	0.85	0.94	0.93	0.93

Note:
Statistical Significance: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.10$. All p-values and asterisks reflect two-tailed hypothesis tests. (F-statistic is one-tailed by default.)

[1] Annual Fixed Effects included in every model. Prefectural effects added starting in Model 13. Excluded from table to conserve space.

[2] Lagged Outcome by 1 year in Models 14-16, to control for path dependence and any temporal correlation. Constrains final models to 2001-2018.

[3] Lagged Controls: All other numeric predictors lagged by 1 year in Models 15-16 to avoid endogeneity bias. Despite the 1% drop in R^2, lagging controls ensures more conservative estimates.

[4] Transformations: In Model 16, predictors were log-, logit-, or root-transformed to fit their distribution and nonlinear trends, adding a small constant where necessary. These made statistically significant improvements in log-likelihood compared to Model 15 ($p < 0.001$). Area, income, and migration were logged. Revenue used the square root; the 10th root was used for Population (to avoid colinearity with spending), disaster deaths, damages, recovery spending, and relief spending (since the distributions have frequent, meaningful zeros). Age, voteshares, social capital, education, and unemployment were logit tranformed, since they are bounded at 0 and 1. Bridging social capital was split into quartiles, to avoid collinearity with regime indicators.

Table 4: **OLS Models of Middle Class Regimes.**
Dependent Variable: Middle Class Regime Index (Z-score).
Unit of Observation: 31493 Japanese municipality-years (2000-2018), with annual fixed effects.

	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Best Model Model 24
	Basic Controls	Disaster Controls	Other Regimes	Collective Action	Prefecture Effects[1]	Lagged Outcome[2]	Lagged Controls[3]	Transformed[4]
Demographics								
Population	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00** **	**-0.07*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.01)**
Inhabitable Area (ha)	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	0.00	**0.00*** **	**0.03*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)	**(0.00)**	**(0.00)**
% Over Age 65	**1.26*** **	**1.24*** **	**-0.44*** **	**-0.44*** **	0.11	**-0.15*** **	**0.14** **	0.00
	(0.05)	**(0.04)**	**(0.05)**	**(0.06)**	(0.07)	**(0.04)**	**(0.04)**	(0.01)
Income per capita (1000s of yen)	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	-0.00.	**-0.04*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)	**(0.01)**
Revenue								
Revenue per capita (1000s of yen)	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **	**0.00*** **
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**
% National & Prefectural Funding	**-0.86*** **	**-0.53*** **	**-0.59*** **	**-0.63*** **	**-0.58*** **	**0.07***	**-0.27*** **	**-0.04*** **
	(0.04)	**(0.04)**	**(0.04)**	**(0.04)**	**(0.05)**	**(0.03)**	**(0.03)**	**(0.00)**
Real Term Budget Balance (+/-)	**-0.01*** **	**-0.01*** **	**-0.01*** **	**-0.01*** **	**-0.00*** **	**-0.00** **	**0.00***	0.00
	(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)
Disaster Conditions								
Disaster Deaths (per 100,000)		**-0.00*** **	**-0.00** **	-0.00	-0.00.	0.00	0.00	**0.03** **
		(0.00)	**(0.00)**	(0.00)	(0.00)	(0.00)	(0.00)	**(0.01)**
Disaster Damage (per 100,000)		**-0.00***	**-0.00***	-0.00	**-0.00** **	-0.00.	0.00	-0.00
		(0.00)	**(0.00)**	(0.00)	**(0.00)**	(0.00)	(0.00)	(0.00)
Hit by 2011 tsunami (1/0)		-0.01	-0.03.	**-0.03***	-0.02	-0.02.	0.01	0.00
		(0.02)	(0.02)	**(0.02)**	(0.02)	(0.01)	(0.01)	(0.01)
Disaster Spending								
Disaster Recovery Spending Rate		**-0.00*** **	**-0.00*** **	**-0.00*** **	**-0.00***	**-0.00***	-0.00	0.00
		(0.00)	**(0.00)**	**(0.00)**	**(0.00)**	**(0.00)**	(0.00)	(0.00)
Disaster Relief Spending Rate		**-0.00*** **	**-0.00** **	-0.00.	-0.00	0.00	**0.00** **	0.01.
		(0.00)	**(0.00)**	(0.00)	(0.00)	(0.00)	**(0.00)**	(0.00)
Other Urban Regimes								
Social Welfare Index			**0.23*** **	**0.23*** **	**0.19*** **	**0.06*** **	**0.04*** **	**0.03*** **
			(0.01)	**(0.01)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.00)**
Developmental Regime Index			**0.27*** **	**0.27*** **	**0.28*** **	**0.11*** **	0.00	**-0.02*** **
			(0.01)	**(0.01)**	**(0.01)**	**(0.00)**	(0.00)	**(0.00)**

Political Parties								
% LDP Coalition Votes: Lower House				0.03. (0.02)	0.02 (0.02)	0.00 (0.01)	-0.00 (0.01)	
% LDP Coalition Votes: Prefecture				**-0.02*** **(0.01)**	-0.01 (0.01)	-0.00 (0.01)	0.01 (0.01)	
Collective Action								
Bonding Social Capital (0-1)				**-0.53*** ** (0.07)**	**0.25** ** (0.10)**	0.04 (0.06)	-0.11 (0.07)	**-0.03*** **(0.01)**
Bridging Social Capital (Quartiles)				**-0.01*** ** (0.00)**	**0.02*** ** (0.00)**	0.00 (0.00)	**0.02*** ** (0.00)**	**0.01*** ** (0.00)**
Linking Social Capital (0-1)				**0.15*** ** (0.04)**	0.10 (0.07)	-0.00 (0.05)	-0.01 (0.05)	0.00 (0.01)
Extra Controls								
% College Educated				**0.25*** ** (0.04)**	0.09. (0.05)	**0.16*** ** (0.03)**	**-0.08*** **(0.03)**	0.00 (0.01)
% Unemployed				**-1.50*** ** (0.16)**	**-1.27*** ** (0.18)**	-0.01 (0.12)	**-1.18*** ** (0.12)**	**-0.07*** ** (0.01)**
Total Migration (per capita)				**1.02*** ** (0.08)**	**1.33*** ** (0.08)**	**0.21*** ** (0.06)**	**0.33*** ** (0.06)**	**0.02*** ** (0.01)**
Lagged Outcome (1 year prior)						**0.75*** ** (0.00)**	**0.80*** ** (0.00)**	**0.80*** ** (0.00)**
Constant	**-0.74*** ** (0.02)**	**-0.82*** ** (0.02)**	**-0.24*** ** (0.02)**	**0.19** ** (0.07)**	**-0.45*** ** (0.09)**	-0.09 (0.06)	**0.13*** **(0.06)**	-0.01 (0.08)
Model Fit								
N (city-years)	31493	31493	31493	31493	31493	29755	29755	29755
Max VIF	2.30	2.33	4.38	5.32	8.12	8.16	8.06	8.40
F-statistic (df)	**1039.7*** ** **(25)**	**921.8*** ** **(30)**	**1242*** ** **(32)**	**1016.3*** ** **(40)**	**552*** ** **(86)**	**1872.4*** ** **(86)**	**1715.6*** ** **(86)**	**1727.8*** ** **(86)**
Change in Deviance (df)	-	**-148*** ** **(5)**	**-867.7*** ** **(2)**	**-54*** ** **(8)**	**-365.3*** ** **(46)**	**-2177.3*** ** **(1)**	**-2337*** ** **(1)**	**-29.7*** ** **(17)**
Sigma (Avg. Error)	0.41	0.40	0.37	0.36	0.35	0.22	0.23	0.23
R^2	0.45	0.47	0.56	0.56	0.60	0.84	0.83	0.83

Note:
Statistical Significance: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, . $p < 0.10$. All p-values and asterisks reflect two-tailed hypothesis tests. (F-statistic is one-tailed by default.)

[1] Annual Fixed Effects included in every model. Prefectural effects added starting in Model 21. Excluded from table to conserve space.

[2] Lagged Outcome by 1 year in Models 22-24, to control for path dependence and any temporal correlation. Constrains final models to 2001-2018.

[3] Lagged Controls: All other numeric predictors lagged by 1 year in Models 23-24 to avoid endogeneity bias. Despite the 1% drop in R^2, lagging controls ensures more conservative estimates.

[4] Transformations: In Model 24, predictors were log-, logit-, or root-transformed to fit their distribution and nonlinear trends, adding a small constant where necessary. These made statistically significant improvements in log-likelihood compared to Model 23 ($p < 0.001$). Area, income, and migration were logged. Revenue used the square root; the 10th root was used for Population (to avoid colinearity with spending), disaster deaths, damages, recovery spending, and relief spending (since the distributions have frequent, meaningful zeros). Age, voteshares, social capital, education, and unemployment were logit tranformed, since they are bounded at 0 and 1. Bridging social capital was split into quartiles, to avoid collinearity with regime indicators.

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