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The Prevalence of Prosperous Shrinking Cities

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Abstract

The majority of the shrinking cities literature focuses solely on instances of population loss and economic decline. This article argues that shrinking cities exist on a spectrum between prosperity and decline. Taking a wider view of population loss, I explore the possibility of prosperous shrinking cities – if they exist, where they exist and under what conditions shrinking cities can thrive. Examining census place data from the 1980 to 2010 U.S. Census and American Community Surveys, 27 percent of 886 shrinking cities were found to have income levels greater than their surrounding regions. Shrinking and prosperous shrinking cities of all sizes were found across the United States. Shrinkage was most prevalent in the Rust Belt region and prosperous shrinkage in coastal regions. Prosperous shrinking cities were overwhelmingly found within megapolitan regions and were rarely principal cities. Multivariate regression analysis found that both population (city size) and the severity of shrinkage (magnitude of population loss) had no effect on economic prosperity. Talent (location quotient of education) was found to be the strongest predictor of prosperous shrinkage.

Keywords
Shrinking city, urban decline, demographic change, economic prosperity

Introduction

Broadly speaking, a prosperous city enables residents to flourish, institutions to develop, and businesses to thrive (UN Habitat 2013). According to Sen (1984), there are three core concepts of prosperity: opulence, where an increase in material commodities represents an increase in prosperity; utility, which relates to the satisfaction that commodities provide; and the capability to flourish, whether residents are in a position to grasp the opulence and utility of a prosperous life.

In postindustrial Western countries, urban growth is synonymous with prosperity (Jackson 2009). The pursuit of boundless demographic and economic urban growth is closely tied with Sen's (1984) notion of opulence – bigger is perceived to be better (Parkinson, Meegan, and Karecha 2015; David et al. 2013). But historically, urban growth has not always been coveted (Rieniets 2006). During the rapid industrialization of the early 20th century, many urban scholars promoted shrinkage as an antidote to the infrastructure problems, housing shortages and poor social and hygienic conditions of large cities (Schatz 2010). Ebenezer Howard's (1898) *Garden City* and Frank Lloyd Wright's (1932) *The Disappearing City* both promoted low density living in response to the shortcomings of urban centralization. "Ideas of shrinkage were perceived as desirable, controllable, and progressive developments as opposed to the undesired, uncontrolled, and failed urbanization of the early industrial metropolises" (Rieniets 2006, 12).

However, since then a shift in the political economy and individual perception has rendered growth ideal and stigmatized population loss (Beauregard 2003). Growth is now customarily associated with prosperous urban living and shrinkage "as a symptom of crisis, an undesirable side effect of failed economic and political policy" (Rieniets 2006, 5). Leo and Anderson (2006) argue that the stigma of shrinkage can lead to a diminished sense of self-worth, which in turn can provoke civic leaders in shrinking cities to pursue damaging pro-growth policies.

The hegemony of growth-oriented decision-making in local government has been called into question (Hollander 2011b) as shrinking cities are increasingly viewed as a permanent symptom of globalization rather than a temporary stage of cyclical growth (Martinez-Fernandez et al. 2012). A growing number of academics have called for policymakers to concentrate efforts on increasing the wellbeing of residents in shrinking cities, rather than pursuing population growth (Hollander 2011b; Rieniets 2009; Pallagst et al. 2009). Their perspective is built around one key underlying assumption: that it is possible for a place to lose population and still prosper and offer a high quality of life to its residents (Hollander 2011b).

The mismatch between a city's population and built environment created by urban shrinkage can increase vulnerability to issues of neighborhood disinvestment, property abandonment and chronic vacancy (Hollander et al. 2018). And these changes, in turn, can propagate existing patterns of decline (Glaeser and Gyourko 2006; Hospers 2014). However, it is important to note that while population decline is likely to amplify physical distress, economic decline is a stronger predictor of social distress (Weaver et al. 2017). Although economic decline and population shrinkage are often perceived to be synonymous, they are distinct phenomena (Ryan 2012; Dewar and Thomas 2012). Shrinkage is not a necessary condition for decline, as decline exists in even the fastest-growing cities. Places with shrinking populations that have not experienced atypical levels of decline can have high levels of social wellbeing (Weaver et al. 2017), yet with the exception of a few limited studies, the premise has not been empirically examined. The majority of the shrinking cities scholarship has concentrated exclusively on instances of severe population loss *and* economic decline. The sensationalism of extreme decline has garnered widespread academic and media interest. While cases like Detroit are incredibly important, they are only one subset of a wide variety of places experiencing population loss.

This research takes a wider view of population loss in order to provide a more comprehensive understanding of urban shrinkage. Specifically, the objectives are to determine if prosperous shrinking cities exist, where they are located, and what factors generate economic prosperity in shrinking cities. By demonstrating that shrinking cities can be prosperous places, the findings presented in this article contribute to alleviating the stigma of population loss. Furthermore, the geographic breadth of the analysis provides an empirical foundation for future research by exploring the relationship between population loss and economic prosperity in every shrinking city across the United States.

Shrinking Cities

A consensus definition of urban shrinkage or shrinking city (the terms are typically used interchangeably) has yet to emerge. Although there is disagreement concerning the multidimensionality and the scope of urban shrinkage, population loss is the one variable central to every definition. Beauregard's (1993, 2003, 2009) seminal works on U.S. population loss clarify much about how places have shrunk over time. He argues that the rate of population change is an insufficient measure to capture the complexity of population loss. Rather population loss must be unpacked into prevalence (instances of population loss), severity (magnitude of population loss), persistence (duration of population loss) and geographical incidence (regional distribution of population loss). Beauregard (2009) concludes that although large-scale population loss from cities has diminished, it has not disappeared.

The critical challenge of the shrinking city is that population loss causes a diminished demand for real estate, which results in lower property values and thus decreased tax revenues (Glaeser and Gyourko 2006). Reduced fiscal capacity translates to fewer and poorer quality

services, which can in turn lead to further population loss (Hollander 2011b). Beyond the local feedback cycle of shrinkage, trends at the regional, national and international level can also perpetuate shrinkage. In Castells' (2004) *The Network Society,* he argues that as the relative importance of a city within its wider network wanes, it becomes increasingly removed from movements of human, monetary and knowledge capital. Therefore in addition to local challenges, shrinking cities are limited by the broader economic and demographic forces behind decline (Oswalt 2005; Hollander et al. 2009).

However, not every city that loses population will fall prey to cyclical decline. Population loss and economic decline are complex, context-specific, diverse processes (Hartt 2018a). Many cities, like New York, regain and surpass their former populations after a period of shrinkage. Many others, like Boston, prosper despite smaller populations. In order to explore the notion of a prosperous shrinking city, we need to widen our perspective of why cities lose population in the first place. The social construction of the spatial stigma associated with shrinkage eclipses the fact that in certain instances, population loss can be more aligned with notions of prosperity than decline (Audirac 2017). For example, population loss can simply be a reflection of changes in the built environment. Since 1975, the average size of new single-family American homes has increased by more than 1,000 square feet (U.S. Department of Housing and Urban Development 2016, 1976). Therefore, prosperity could co-exist with a decline in population due to a shift in the housing stock to fewer, larger units. While the size of houses has increased, the size of the average American household has been decreasing steadily since the late 1800s (Moura, Smith, and Belzer 2015). The demographic shift in household sizes alone has contributed considerably to changing population structures in many cities – regardless of prosperity or decline. Philadelphia lost 26 percent of its population between 1950 and 2010, but if household sizes had remained at the 1950

level, the city would have actually grown by 1 percent (Hartt and Hackworth 2018). Shifts in the number and size of households can also reflect migration patterns between the central city and its surrounding suburbs. The change from family to individual or smaller, higher income households has occurred in many cities as former suburbanites or would-be-suburbanites are choosing to live downtown (Smith 1996). Although both resulting in demographically smaller cities, the population loss due to the "back-to-the-city" movement (Florida 2017), or as Ehrenhalt (2013) calls it "the great inversion", is markedly different from the suburbanizing "doughnut effect" and the "hollowing out" of city centers (Frey 1979; P. Hall 2006; Pallagst 2008).

Considering the wide variety of shrinking cities, it follows that a wide range of planning and economic development strategies are needed. The need to further develop local strategies echoes a number of scholars that have called for a paradigm shift away from growth-centered planning and the assumption that population growth is a precondition for prosperity (Pallagst et al. 2009; Hollander et al. 2009; Rieniets 2009).

Prosperous Shrinkage

Smart decline is one alternative to the traditional growth-focused approach of managing depopulation and its associated challenges. Popper and Popper (2002, 23) define smart decline as "planning for less – fewer people, fewer buildings, fewer land uses." The idea has continued to evolve as other scholars have applied the approach to severely declining neighborhoods within shrinking cities (Meerow and Newell 2017; Rink and Arndt 2016; Schilling 2009; Pearsall and Lucas 2014; C. De Sousa 2014). The central hypothesis is that smart decline can break the shrinkage cycle by diminishing, or rightsizing, the excess supply of houses, roads and other infrastructure to reflect a smaller population (Koziol 2006; Wiechmann 2008; Schwartz and

Rugare 2008). Hollander (2011b, 132) asserts that a "timely smart decline strategy should be able to reduce municipal expenditures to a lower level, concomitant with the city's new smaller population." Schilling and Logan (2008, 451) argue that a systematic strategy to convert vacant properties to green infrastructure would "revitalize urban environments, empower community residents and stabilize dysfunctional real estate markets." In their article outlining the foundations of the smart decline theory, Hollander and Németh (2011) stress the importance of socially just processes in planning for smart decline. In order to produce just outcomes, they argue that planning for shrinkage must be grounded in principles of fairness and equity.

Although the arguments for smart decline, rightsizing and greening are compelling and the ideals laudable, Hackworth's (2015) examination of the rightsizing plans of five U.S. cities (Detroit, Flint, Rochester, Saginaw and Youngstown) shows that in practice rightsizing has failed to meet expectations. In the rightsizing plans, he found the language of greening to be omnipresent but actual commitments superficial, a serious mismatch in scale between the sprawling infrastructure problem and the scale of solution, and a general lack of interest in building affordable housing near any of the putative clusters. In short, "actualized rightsizing is not a postgrowth epiphany; it is an attempt to reset growth by converting the most expensive parts of the territorial social economy into a new investment opportunity" (Hackworth 2015, 780).

Proponents of smart decline, rightsizing and greening have attempted to develop a policy path to fiscal stability for shrinking cities. Thus far, the ethos of their arguments has been lost in translation, as actualized rightsizing has lacked the principles of fairness and equity. But what about the more fundamental question of whether shrinking cities are inherently failing? Smart decline argues for focus on the quality of life of the remaining population, but does population decline necessarily result in a decline in quality of life? How do the place-based effects of urban

shrinkage differ from the people-based impacts? In short, how does urban shrinkage impact individuals?

A few studies have explored the relationship between happiness, wellbeing and population. Okulicz-Kozaryn (2016) asserts that despite a widely held belief, there is no evidence to support the notion that people are happiest in big cities. He demonstrates that in the U.S., the probability of being unhappy increases significantly when city size exceeds hundreds of thousands of people. Specifically, size and density are the strongest drivers of unhappiness in cities (Okulicz-Kozaryn and Mazelis 2016). Therefore, if shrinkage leads to a smaller, less dense environment, residents may be happier. In concert with Okulicz-Kozaryn's findings, Delken's (2008) examination of population loss and wellbeing across Germany found that overall life satisfaction for cities that shrank between 1990 and 2005 was not any lower than for growing cities. Furthermore, in some domains, life satisfaction was even higher for shrinking cities. Using survey data on opinions of neighborhood quality as a surrogate variable for happiness, Hollander (2011b) found that residents' perceptions of neighborhood quality vary drastically. Examining 38 U.S. cities, he found that during periods of shrinkage, opinions of neighborhood quality actually increased slightly in shrinking cities.

Of course, people-based measures are not limited to happiness and wellbeing. Economic indicators have often been used as measures for individual prosperity. Weaver et al.'s (2017) in depth examination of U.S. urban shrinkage and decline demonstrated that shrinking places are more prone to decline than non-shrinking places. Using a concentrated disadvantage index comprised of racial, employment, education and economic variables, they demonstrated that between 1970 and 2010, concentrated disadvantage rose in shrinking and growing places, but increase was generally greater in shrinking places. However, they also note that shrinkage and

decline are not identical processes and that social distress is more a function of decline than shrinkage. Therefore, shrinking places that do not decline may have high social wellbeing and individual economic prosperity.

The Spectrum of Shrinking Cities

Much of the shrinking cities discourse concentrates on communities that have experienced severe and persistent shrinkage and decline. However, as noted above, shrinking and decline do not always exist in concert (Weaver et al. 2017). Furthermore, smaller, less dense and even shrinking cities have been shown to be home to happier people (Hollander 2011b; Delken 2008; Okulicz-Kozaryn 2016). Aspiring artists, for one, may be attracted to declining and shrinking neighborhoods precisely because of the space, cheap rent and lack of nearby neighbors (Markusen 2013). Recently, Detroit in particular has been touted as a new urban bohemia. According to Ager (2015, 57), "tough, cheap, and real, Detroit is cool again. With the nation's biggest urban bankruptcy in the review mirror, the Motor city is attracting investors, innovators and young adventurers." From the individual's perspective, prosperity in a shrinking city may not only be possible, shrinkage itself may be fundamental to achieving prosperity.

Population loss can lead to the exodus of affluent residents and poverty traps for those with lower socioeconomic statuses (Fol 2012), but population loss can also be driven by the shrinking household sizes and birth rates of a prosperous population (Hartt and Hackworth 2018). The effects of population loss may push people away, but they may also motivate current residents to stay and others to come. Therefore, the effects of shrinkage are best framed as a spectrum, instead of strictly a destructive process. For example, shrinkage can often result in residential vacancy and abandonment (Newman et al. 2016; Accordino and Johnson 2000; S. Sousa and Pinho 2015),

which can lead to issues of blight and crime (Silverman, Yin, and Patterson 2013; Cui and Walsh 2015; Immergluck 2016). But residential vacancy can also increase housing affordability (Whitaker and Fitzpatrick 2013; Lacy 2015; Hendricks 2013; Han 2014). Similarly, population loss can lead diminish the local tax base and limit municipal budgets, resulting in deteriorating road conditions and public transit service (S. Hall and Jonas 2014; Manville and Kuhlmann 2018). However, shrinkage can also result in less traffic and shorter commutes (S. Sousa and Pinho 2015). And while many shrinking cities are left with environmental contamination and brownfield sites, the vacant land resulting from population loss could potentially be transformed into green space or parks (Schilling and Logan 2008; Haase, Haase, and Rink 2014; Kruth 2015).

Of course, the causes and effects of urban shrinkage are dependent on a wide variety of contextual factors including the persistence, severity and prevalence of population loss. It would be shortsighted to suppose that all shrinking cities are affordable, green havens. However, it is also imprudent to assume that no community losing population can prosper. Shrinking cities exist on a spectrum between prosperity and decline. This article explores the possibility of prosperous shrinking cities – if they exist, where they exist and under what conditions shrinking cities can thrive.

Data, Operationalization and Methods

Spatial, correlation and regression analysis were used to examine the relationship between population loss and economic prosperity in cities across the United States. Every city that maintained a minimum population of 10,000 residents through the study time period, 1980-2010, was included in the analysis. 1980 was chosen as the start date of the analysis as contemporary urban shrinkage is considered a spatial symptom of the pronounced changes in the geography and

structure of the global economy that began in the late 1970s and early 1980s (Sassen 2012, 2001; Martinez-Fernandez et al. 2012). Data were collected at the city level using census place data, and at the regional level using core based statistical area (metropolitan statistical area and micropolitan statistical area) data from the U.S. Decennial Census and American Community Survey five-year estimates.

The city is an important level of analysis as many of the challenges of population loss, especially in the American context, must be managed by the municipality. However, the city is a difficult geographic unit of analysis as the boundaries of census places can shift over time. To minimize false positive cases of shrinkage from being included in this study, cities with land areas that shrank over time were excluded from the analysis. Although no growing cities (with shrinking land area) are included in the analysis, this approach may underestimate the severity of population loss in physically growing cities. As noted in the literature review, there are a variety of views concerning the definition and operationalization of a shrinking city. Although shrinking cities are generally defined as both a demographic and economic phenomenon, the majority of empirical studies on urban shrinkage rely solely on population trends to identify shrinking cities. Even within such a narrow definition, there exist a wide range of operationalization methods. Weaver et al. (2017) differentiate two broad approaches used by urban scholars to identifying shrinking cities: the binary method and the threshold method. The binary method simply classifies a city according to its absolute population change (either shrink or grow) over a set time period, and the threshold method uses a predetermined critical value of population loss to characterize shrinkage. The binary method is precise but does not distinguish between cities experiencing minor, and potentially temporary, population decline with those undergoing long-term shrinkage. The threshold method allows for the differentiation of minor and major shrinkage, but suffers from arbitrariness. Because

the severity and persistence of shrinkage are included as additional variables in the regression models in this study, a more inclusive and less subjective operational definition of a shrinking city is adopted. Any city whose population peaked within the study period prior to the most recent population estimate is considered to be shrinking. For this study, the past peak operational definition of a shrinking city is preferred to the threshold method as it does not rely upon an arbitrary cutoff point. And although it is similar to the binary method, the past peak definition was adopted as it allows for flexibility regarding the base year of population change. By not having a set time period, the full extent of the population loss can be captured. As a city grows, decisions are made and plans and policies are formed to adapt to the growth. It is from that point that adjustments to manage population loss must begin. The built environment, in particular, reflects the peak population of a city. When investments such as roads or sewage infrastructure are built to suit the needs of a growing population, they remain even if population declines. The past peak method captures the full extent of the population loss and allows for a more in depth exploration of the relationship between population loss and economic prosperity.

In addition to examining whether a city is deemed to be shrinking, three additional demographic variables were included in the analysis to capture the extent and severity of population loss. The severity of shrinkage was measured by the percentage of population lost relative to the city's peak population. The persistence of shrinkage denotes the number of years since peak population. Total estimated 2010 population was also included in the analysis to examine the relationship between city size, shrinkage and prosperity.

Whereas population change is inherently a temporal assessment, a city's prosperity can be measured relative to itself or to its peers. Hartt (2018b) and Weaver et al. (2017) both examined the temporal relationship between population loss and economic indicators – demonstrating that

cities can lose population while improving economically. And although measuring improvement is important, this study takes a broader view of economic prosperity by examining shrinking cities relative to the status quo of their surrounding region. Several cross-sectional variables (outlined below) were collected from the 2010 U.S. Decennial Census and American Community Survey to determine whether prosperous shrinking cities exist, and if so, the conditions that may lead to economic prosperity. The cross-sectional approach captures not only the relative economic prosperity of a shrinking city within a region, but also allows for the exploration of other variables that might contribute to a regional advantage and explain a shrinking city's economic prosperity (or lack thereof).

The dependent variable of the analysis was economic prosperity. However, prosperity is a broad notion that is difficult to measure. The economic prosperity of a city can be measured in any number of ways, including gross domestic product or gross value added. Rather than explore how population loss impacts the economy of the city as a whole, the focus of this study is on individual measures. The person-focused approach echoes the call from urban shrinkage scholars to shift attention from the wellbeing of the city as a whole to the residents (Hollander 2011b; Rieniets 2009; Pallagst et al. 2009). An income index, a location quotient that compares local median income to the regional median income, was used as a proxy for individual economic prosperity. An income index result of 1.0 indicates that local income perfectly resembles regional income. If the result greater than 1.0, the city has disproportionately high income. Conversely, an index of less than 1.0 indicates that the city's income is low relative the region as a whole. Given that there are limitations associated with representing economic prosperity with any variable, the income index was selected as it captures the change in economic prosperity of people and the migratory movement of higher earners within an area (Glaeser and Redlick 2008).

In addition to the demographic variables detailed above (severity, persistence and population), several other factors that contribute to economic prosperity were included in the analysis. Descriptive statistics for all variables are summarized in Table 1. Similar to income, unemployment is included in the analysis as an index comparing the local unemployment rate to the regional unemployment rate. Unemployment has often been linked to decline and prosperity. Okun's (1962) examination of unemployment and gross domestic product (GDP), now known as Okun's law, found that a 1 percent reduction in unemployment, produced a 3 percent increase in GDP. Unemployment has also been shown to have a negative relationship with happiness at the individual (Blanchflower and Oswald 2004) and county (Lawless and Lucas 2011) level. Meanwhile, Glaeser (2011) asserts that the high unemployment rate often found in larger cities is a function of their success. He contends that large, prosperous cities attract individuals in need of employment. Many scholars have shown the agglomeration effect of niche economic markets, economic prosperity and highly educated people (Glaeser 1998; Glaeser and Resseger 2009; Glaeser and Saiz 2004; Florida 2002). Therefore, a version of Florida's (2002) talent index was included in the analysis. The index measures the local proportion of residents with a bachelor's degree (and above) relative to the national proportion. Lastly, income inequality was measured using the Gini coefficient.

Table 1: Descriptive statistics for U.S. shrinking cities with population of at least 10,000.

Variable	Mean	Standard Deviation	Minimum	Maximum
Population (2010)	45,368	122,364	10,038	2,695,598
Severity[1]	0.10	0.09	0	0.67
Persistence[2]	22.56	9.07	10	30
Income Index[3]	0.95	0.33	0.38	3.71
Unemployment Index[4]	1.1	0.39	0.23	4.50
Talent Index[5]	1.5	0.71	0.17	4.76
Income Inequality Index[6]	0.96	0.12	0.65	1.39

(1) Severity is defined as percentage of population lost relative to the peak population.
(2) Persistence denotes the number of years since peak population.
(3) Income index is a location quotient comparing local to regional median income.
(4) Unemployment index is a location quotient comparing local to regional unemployment rate.
(5) Talent index is a location quotient comparing local to regional proportion of residents with a bachelor's degree and above.
(6) Income inequality index is a location quotient comparing local to regional income inequality using the Gini coefficient.

Findings

Existence and Prevalence of Prosperous Shrinking Cities

Of every census designated place with a population greater than 10,000 (*n*=2,558), 1067 were classified cities as shrinking based on having peaked in population prior to 2010. Of the 1067 shrinking cities, 181 were excluded due to their census place boundaries shrinking between 1980 and 2010. In total, 886 cities (35 percent of all U.S. cities) were considered to be shrinking and included in the analysis. Of the shrinking cities, more than one quarter (238) had an income index greater than 1.0 demonstrating that their local median income was greater than that of their surrounding region.

A closer examination of the shrinking cities and prosperous shrinking cities highlights several common patterns (Table 2). Notably, a smaller proportion of the prosperous shrinking cities experienced absolute or continuous population loss between 1980 and 2010. However, overall, the population loss trends between the two groups are fairly similar. For both shrinking cities and prosperous shrinking cities, the decade between 2000 and 2010 had the largest

proportion of shrinkage, and 1990 to 2000 the smallest. Similarly, the largest proportion of cities in both groups peaked in population in 1980 and smallest proportion in 1990.

Table 2: Patterns of growth and decline in shrinking and prosperous shrinking U.S. cities between 1980 and 2010.

		Shrinking Cities		Prosperous[1] Shrinking Cities	
		N	%	N	%
	Total	886	100	238	100
Population Loss	Absolute (1980-2010)	607	69	136	57
	Continuous	267	30	43	18
	1980-1990	582	66	138	58
	1990-2000	470	53	79	33
	2000-2010	697	79	196	82
Peak Population	1980	507	57	114	48
	1990	99	11	19	8
	2000	280	32	105	44

(1) Prosperity is defined as a city having an income index greater than 1.0, where an income index is a location quotient comparing local to regional median income.

Geography of Prosperous Shrinkage

The geography of shrinking cities is illustrated in Figure 1. The points on the map represent cities. The size of the points indicates population size, with small (10,000 – 50,000), mid (50,000 – 250,000) and large cities (over 250,000) symbolized by increasingly large points. The analysis concentrates on the groups of states outlined by U.S. census divisions.

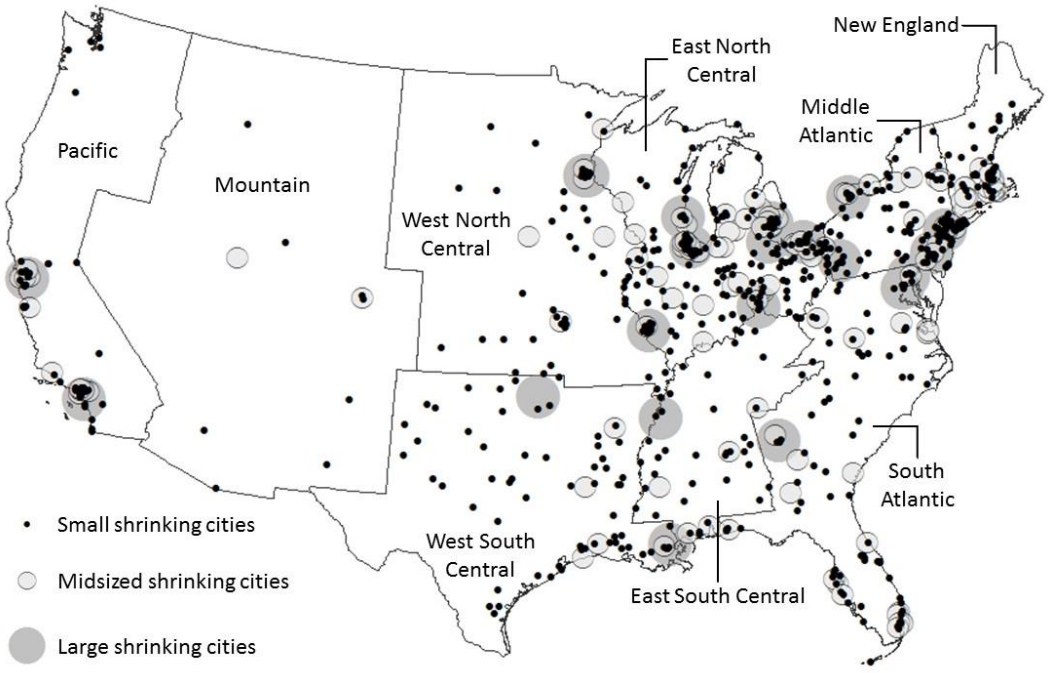

Figure 1: Geography of U.S. shrinking cities[1] by size[2] and Census Division.

(1) Shrinking city defined as any city whose population peaked within the study period prior to the most recent population estimate.

(2) City size defined as small (10,000-50,000 residents), mid (50,000-250,000 residents) or large (over 250,000 residents).

Shrinking cities have traditionally been considered a Rust Belt phenomenon – appearing primarily in the East North Central, Middle Atlantic and West North Central census divisions (Johnson, Hollander, and Hallulli 2014; Weaver et al. 2017). However, the findings show the wide geographic distribution of shrinking cities across the country (Figure 1). The spatial distribution of shrinking cities echoes Weaver et al. (2017) and Hollander's (2011a) findings that shrinkage is not limited to the Rust Belt region. Pockets of shrinkage are found in New England and throughout the Sun Belt, primarily from Florida to Texas and in California. In fact, the South Atlantic census divisions had the third highest number of shrinking cities with 117 (Figure 2). Shrinking city location does not appear to be determined by population size, as small, midsized and large shrinking cities are located in every census division save Mountain (the most sparsely populated).

That being said, the clustering of points in the East North Central and Middle Atlantic clearly echoes Beauregard's (2009) finding that population loss is most prevalent in the Rust Belt. The East North Central census division has the greatest number of shrinking cities (259), followed by the Middle Atlantic (176).

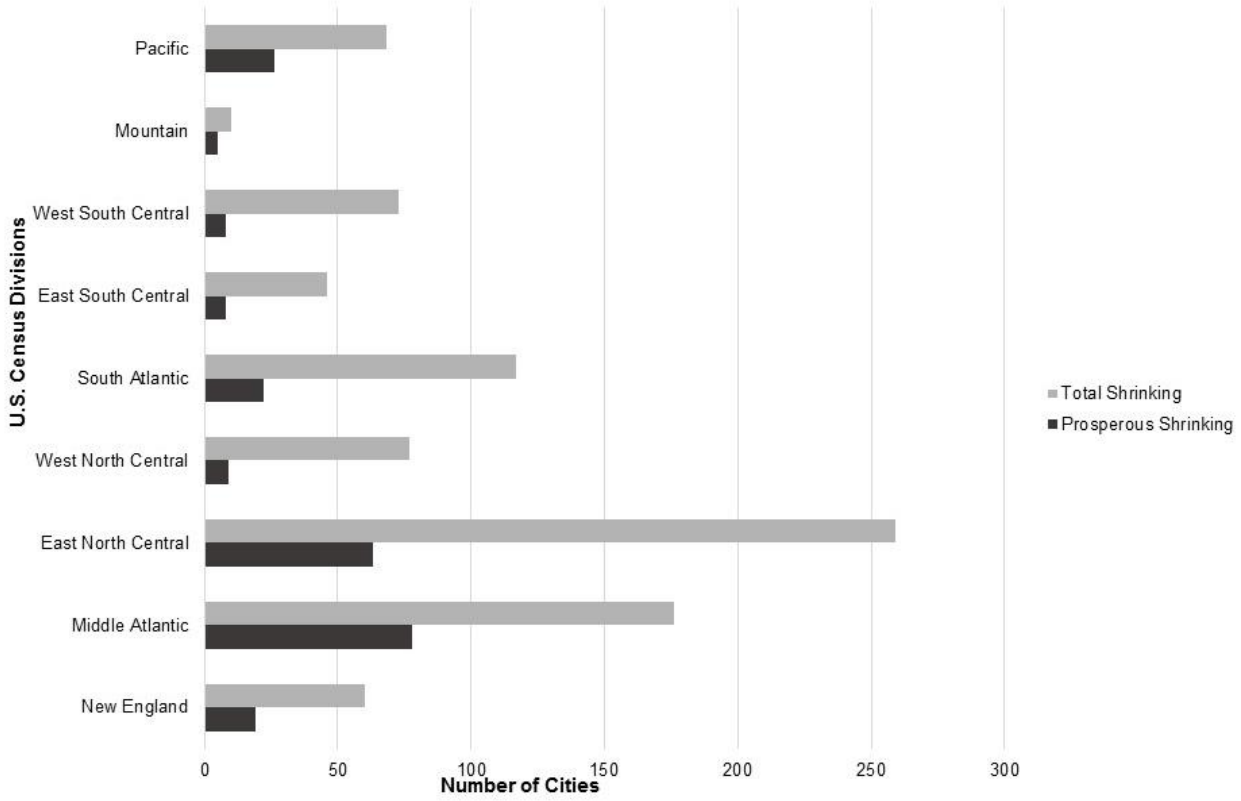

Figure 2: Absolute number of U.S. shrinking[1] and prosperous[2] shrinking cities by Census Division.

(1) Shrinking city defined as any city whose population peaked within the study period prior to the most recent population estimate.

(2) Prosperity is defined as a city having an income index greater than 1.0, where an income index is a location quotient comparing local to regional median income.

The geography of prosperous shrinking cities is illustrated in Figure 3. Similar to the geography of shrinkage (Figure 1), prosperous shrinking cities exist in every census division and are primarily located in the North East. The pattern across the country resembles that of shrinking

cities (Figure 1) with clusters in the Rust Belt, Eastern Sun Belt and in California. Looking closer at the geographic distribution by census division (Figure 2), the absolute number of prosperous shrinking cities appears to be relatively proportional to the number of shrinking cities. The relative proportionality suggests that prosperous shrinking cities may be a consistent subset of shrinking cities, rather than a geographically distinct phenomenon. However, while the ratio of prosperous to non-prosperous shrinking cities is approximately proportional across census divisions, there are still some notable trends. Over 30 percent of the shrinking cities in the Pacific, Mountain, Middle Atlantic and New England census divisions were prosperous, whereas shrinking cities in West North Central and West South Central were least likely to be prosperous (12 percent and 11 percent respectively). Therefore, the shrinking cities on the country's coasts are most likely to be prosperous.

Many of the prosperous shrinking cities also appear to be clustered around major cities such as New York, San Francisco, Chicago and Miami. In order to assess the influence of regional interdependency on economic prosperity, the location of the shrinking cities were examined to see if they were within one of the ten megapolitan regions as defined by Lang and Knox (2009). Megapolitan regions "have become the basis for economic regions with distinctive economic, political and cultural profiles where functional interdependencies exist" (Lang and Knox 2009, 797). In 2004, megapolitan regions captured approximately 70 percent of the U.S. population but covered only one fifth of the lower 48 states (Lang and Knox 2009). A distinct difference between the geography of prosperous and unprosperous shrinking cities was found. While 87 percent of prosperous shrinking cities were located in megapolitan regions, the regions were home to only 66 percent of the unprosperous shrinking cities.

Figure 3: Geography of U.S. prosperous[1] shrinking[2] cities by size[3] and Census Division.

(1) Prosperity is defined as a city having an income index greater than 1.0, where an income index is a location quotient comparing local to regional median income.
(2) Shrinking city defined as any city whose population peaked within the study period prior to the most recent population estimate.
(3) City size defined as small (10,000-50,000 residents) or mid (50,000-250,000 residents).

In order to distinguish between the main core city of a metropolitan area and other secondary, suburban and commuter communities, the principal city[1] status of all shrinking cities was reviewed. In both prosperous and unprosperous shrinking cities, the majority of cities were not considered principal cities. Only 19 percent of all shrinking cities and 4 percent of prosperous shrinking cities were a core city within their metropolitan area.

[1] The US Office of Management and Budget Standards defines a principal city as the largest incorporated place in a core-based statistical area (CBSA); and any additional incorporated place with population of at least 250,000 or in which 100,000 or more persons work; and any additional incorporated place with population of at least 50,000, but less than 250,000, and in which the number of workers working in the place meets or exceeds the number of workers living in the place; and any additional incorporated place with a population of at least 10,000, but less than 50,000, and at least one-third the population size of the largest place, and in which the number of workers working in the place exceeds the number of workers living in the place (Office of Management and Budget 2010).

Correlation Analysis

Spearman's rank order correlation coefficients were calculated to determine the strength and direction of the monotonic relationship between the dependent and independent variables. The results of the bivariate correlation analysis show a significant relationship between income index and the five independent variables (Table 3). Scatterplots are used to depict the relationships between the dependent and independent variables (Figure 4).

Table 3: Correlation analysis results

	Income Index[1]
Severity[2]	-0.272***
Population (2010)	-0.122***
Unemployment Index[3]	-0.788***
Talent Index[4]	0.595***
Income Inequality Index[5]	-0.357***

*** Significant at the 0.01 level

(1) Income index is a location quotient comparing local to regional median income.
(2) Severity is defined as percentage of population lost relative to the peak population.
(3) Unemployment index is a location quotient comparing local to regional unemployment rate.
(4) Talent index is a location quotient comparing local to regional proportion of residents with a bachelor's degree and above.
(5) Income inequality index is a location quotient comparing local to regional income inequality using the Gini coefficient.

A significant negative correlation between the income index and both severity and population suggests that larger shrinking cities and those with more severe population loss have lower incomes. Although the correlation is significant, the effect size in both cases is relatively small. Similarly, there was a negative relationship between the income and unemployment indices. However, this relationship had a large effect size (-0.788) demonstrating a strong tie between unemployment and lower incomes. Further examination of the unemployment versus income indices scatterplot (Figure 4) shows that there may be a nonlinear relationship, either exponential

or quadratic, present. For higher level income cities, an increase in the unemployment index results in a considerable drop in the income index. And in lower income cities the relative change is reversed - a small decrease in the income index is associated with a large increase the unemployment index. There was also a significant, strong correlation between the talent and income indices. The positive linear relationship between the two suggests that the clustering of talent is strongly associated with higher incomes in shrinking cities. Lastly, there was also a significant, negative correlation between the income inequality and income indices, indicating that higher incomes are associated with less income inequality.

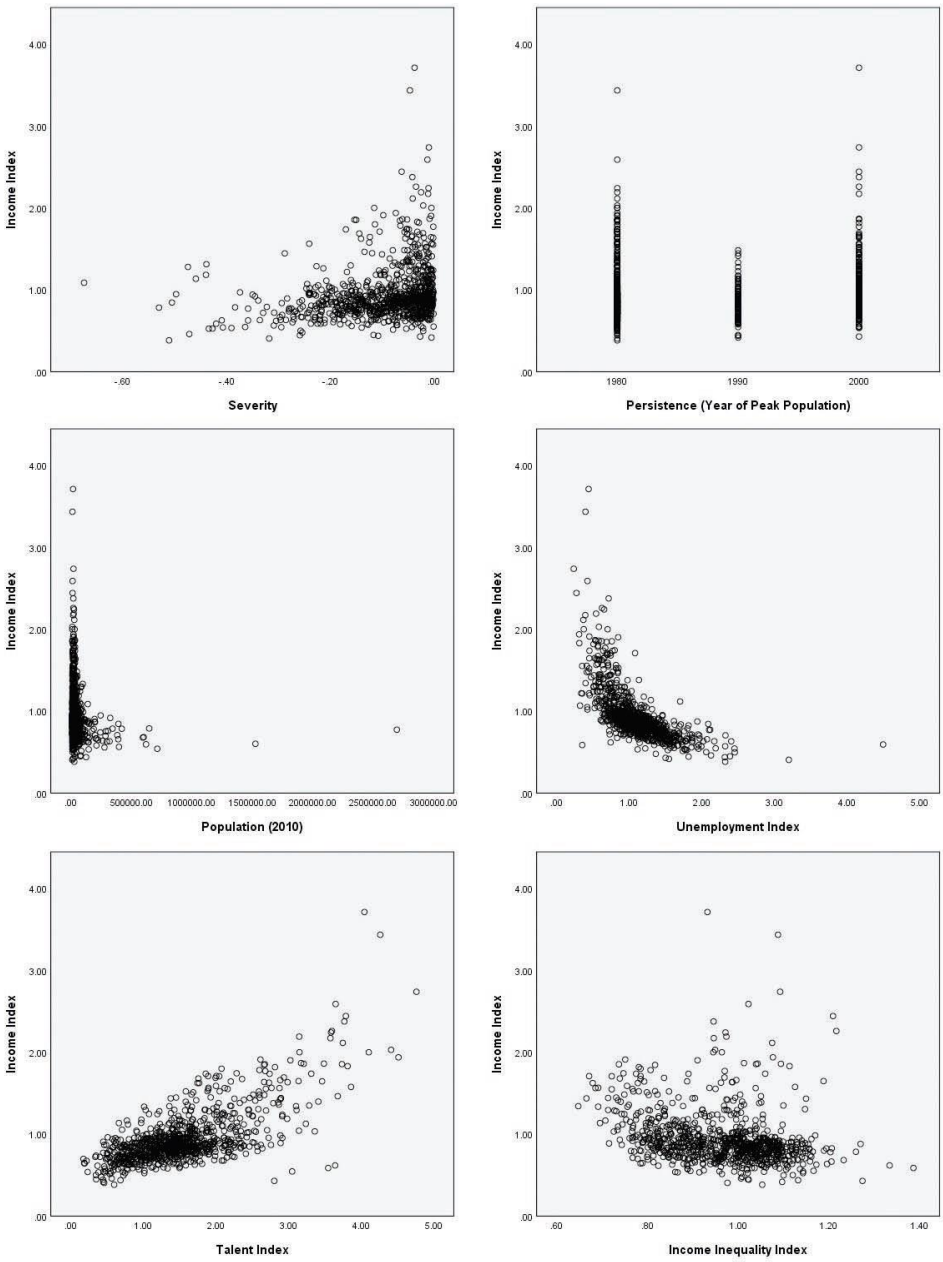

Figure 4: Scatterplot of income index[1] with (1) severity[2], (2) persistence[3], (3) population, (4) unemployment index[4], (5) talent index[5], and (6) income inequality index[6] for U.S. shrinking[7] cities.

(1) Income index is a location quotient comparing local to regional median income.
(2) Severity is defined as percentage of population lost relative to the peak population.
(3) Persistence denotes the number of years since peak population.
(4) Unemployment index is a location quotient comparing local to regional unemployment rate.
(5) Talent index is a location quotient comparing local to regional proportion of residents with a bachelor's degree and above.
(6) Income inequality index is a location quotient comparing local to regional income inequality using the Gini coefficient.
(7) Shrinking city defined as any city whose population peaked within the study period prior to the most recent population estimate.

Regression Analysis

Multivariate regressions were used to further explore the relationships observed in the correlation analysis. As all the variables in the correlation analysis had statistically significant relationships with the income index, they were all included in the regression analysis. It is worth noting that although there were significant correlations among the independent variables, the effect sizes were not remarkably high (all smaller than 0.4, except unemployment and talent which was -0.538). Still, considering the variables at play, some collinearity is expected. Therefore, several regressions were run and variance inflation factor (VIF) value tests are included in the analysis. Dummy variables were used for the location variables with East North Central as the reference variable. The East North Central census division was selected as it contained the largest number of shrinking cities and is the area most commonly associated with urban shrinkage. Dummy variables were also used to measure the persistence of shrinkage with the length of time since peak population operationalized as peaked 1980, peaked 1990, and peaked 2000 (with peaked 1980 as the reference variable). The five versions of the regression model generated R^2 values between 0.080 and 0.728, the latter indicating a robust relationship (Table 4).

Table 4: Regression model results

	Equation 1	VIF	Equation 2	VIF	Equation 3	VIF	Equation 4	VIF	Equation 5	VIF
Constant	1.057***		1.035***		1.688***		1.657***		1.717***	
Severity[1]	0.831***	1.275	0.814***	1.333	0.047	1.422	0.086	1.406	0.255**	1.409
Population	0.000***	1.002	0.000***	1.005	0.000	1.039	0.000	1.036	0.000	1.037
Peaked 1980 (ref)										
Peaked 1990	-0.117**	1.097	-0.104**	1.183	-0.054***	1.190	-0.060***	1.186	-0.054*	1.190
Peaked 2000	0.001	1.351	0.009	1.506	0.004	1.524	0.007	1.522	-0.012	1.522
Unemployment Index[2]					-0.108***	1.994			-0.511***	1.164
Talent Index[3]					0.347***	2.030	0.386***	1.184		
Income Inequality Index[4]					-1.197***	1.694	-1.346***	1.358	-0.181**	1.522
East North Central (ref)										
New England			-0.028	1.181	-0.017	1.182	-0.016	1.181	-0.027	1.181
Middle Atlantic			0.148***	1.350	0.044**	1.201	0.043**	1.422	0.089***	1.411
South Atlantic			-0.042	1.191	-0.018	1.315	-0.020	1.314	-0.028	1.314
East South Central			-0.067*	1.297	-0.012	1.163	-0.010	1.163	0.001	1.163
West North Central			-0.011	1.141	0.006	1.422	0.013	1.196	-0.045	1.194
West South Central			-0.054	1.180	0.032	1.201	0.040*	1.197	-0.034	1.190
Mountain			0.105	1.039	0.113**	1.047	0.133**	1.042	0.037	1.045
Pacific			0.060	1.285	0.013	1.298	0.014	1.298	0.534	1.298
R^2	0.080		0.130		0.728		0.720		0.460	
R^2 adjusted	0.076		0.118		0.723		0.716		0.451	

* Significant at the 0.01 level; ** significant at the 0.05 level; *** significant at the 0.01 level

(1) Severity is defined as percentage of population lost relative to the peak population.

(2) Unemployment index is a location quotient comparing local to regional unemployment rate.

(3) Talent index is a location quotient comparing local to regional proportion of residents with a bachelor's degree and above.

(4) Income inequality index is a location quotient comparing local to regional income inequality using the Gini coefficient.

The first equation examines how much of the income index variation is explained by the demographic variables severity, population size, and persistence (peaked 1980, peaked 1990, peaked 2000). Although several variables are statistically significant and the VIF values are relatively low, the R^2 is only 0.080, suggesting that demographic variables explain roughly 8 percent of the variation. The second version (equation 2), with added location variables, shows a slight increase in R^2 (0.130). The third version (equation 3) includes all of the variables and has a R^2 of 0.728. Equation 3 has the highest explanatory power, explaining over 70 percent of the variation. However, the relatively high VIF values for the unemployment and talent indices show strong collinearity. The collinearity reflects the relatively strong correlation (-0.538) found between the two variables. In order to compare the effect of the two variables and minimize the collinearity, version four of model (equation 4) includes all variables except unemployment, and version five (equations 5) includes all variables except talent. In both instances, there is a notable decrease in VIF values. However, the R^2 values differ considerably. Equation 4 (with talent) explains just over 70 percent of the variation, while equation 5 (with unemployment) explains roughly 45 percent. Furthermore, by omitting unemployment, equation 4 minimizes the impact of the potential nonlinear relationship between the unemployment and income indices.

The strongest and most consistent finding is for the talent and income inequality indices. The strong association between talent and income mirrors the agglomeration economies of large, growing cities (Glaeser 1998; Glaeser and Resseger 2009; Glaeser and Saiz 2004; Florida 2002). Black and Henderson (1998) argue that the accumulation of human capital produces knowledge spillover and higher productivity. Put simply, workers are more productive when surrounded by others with high levels of talent. Whether the advantages of population loss attracted talented individuals to prosperous shrinking cities or the human capital is homegrown and existed prior to

depopulation is not clear. Though understandably tempting, shrinking cities should be apprehensive about aggressively trying to attract talent, as such an approach has been criticized for both requiring and perpetuating socioeconomic inequalities (Pallagst et al. 2009).

The income inequality index (Gini coefficient) was also strongly related to the income index. However, here there was a negative relationship, suggesting that higher incomes are strongly associated with income equality. The negative relationship could be due to the potential homogeneity of the population. The sample of shrinking cities was largely made up of places with small and midsized populations. Large cities are generally home to a wide variety of people, cultures, races and incomes. And although quickly becoming more diverse, midsized and small cities are generally more likely to host less diversity than their large counterparts (Frey 2018). Furthermore, as this study concentrated on the census place level, the effect could be capturing the homogeneity of suburban areas.

It is interesting to note that population and the severity of shrinkage had no effect in equation 4 of the model, suggesting that city size and the amount of population loss have no impact on the ability to have above average incomes. Similarly, the impact of the persistence (operationalized as peak 1980, peak 1990, peak 2000) of shrinkage was also minor. It was significant, but with a small effect size. The lack of significance between population and severity and income runs counter to the widely held notion that the length and extent of shrinkage are key drivers of economic decline.

The results for the location variables indicate that prosperous shrinkage is more likely in the Middle Atlantic census division than in the East North Central (reference variable). The regression results are in line with the geographic findings as almost 60 percent of the shrinking cities in the Middle Atlantic had income indices greater than 1.0. The results also suggest that

prosperous cities are more likely to be in the Mountain census division. However, the weight of this finding is limited due to the small sample size of shrinking cities in the Mountain census division.

Conclusion

The objectives of this study were to identify if prosperous shrinking cities exist, where they are located, and what factors influence their economic prosperity. In doing so it makes four key contributions to the field: (1) it presents an up-to-date analysis of the extent and geography of urban shrinkage in the United States, (2) it demonstrates the diversity of shrinkage, (3) challenges the notion that the extent of shrinkage amplifies economic decline, and (4) it advances our understanding of the potential for shrinking cities to prosper. Furthermore, the findings highlight and provide baseline analysis for numerous future research opportunities.

The results clearly show that population loss and economic prosperity are not mutually exclusive. 35 percent of all cities had passed their peak population and 27 percent of those had an income index greater than 1.0. For example, Metairie, Louisiana peaked in population in 1980, lost approximately 15 percent of its residents by 2010, but still boasted a median income above the regional average. There are both shrinking and prosperous shrinking cities all across the U.S. Shrinkage was found to be most prevalent in the Rust Belt region; home to well-known shrinking cities such as Detroit, Cleveland and Pittsburgh. Whereas prosperous shrinking cities like Norfolk, Virginia were most likely to be found in coastal regions. The extremely high proportion of prosperous shrinking cities within megapolitan regions (87 percent) demonstrates the importance of regional economies and connectivity. Affluent suburban areas like Mountain Brook, Alabama have seen decreases in population while boasting high levels of income and talent. The fact that

only 4 percent of prosperous shrinking cities were principal cities further suggests their dependence on a larger, potentially growing cities and the regional economy. The potential intra-regional dependence of prosperous shrinking cities reinforces Adhya's (2017) call for additional research on small city and suburban shrinkage. How do processes leading to population loss differ between urban and suburban places? And what associated economic, social and environmental challenges and opportunities arise?

Remarkably, the severity of shrinkage was found to have no effect on income and the impact of persistence was minimal. The lack of relationship between severity, persistence and income demonstrates the diversity and complexity of urban shrinkage processes. Although population loss is widely associated with decline and the selective out migration of educated and more mobile residents, it can also hypothetically result from an influx of those very same residents and the subsequent decline in household sizes and birth rates. 78 percent of the shrinking cities examined had a talent index greater than 1.0; demonstrating that many shrinking cities are able to retain or attract a higher proportion of educated individuals than their regional average. And 97 percent of the prosperous shrinking cities had a talent index greater than 1.0. The relationship between talent and income indices is also demonstrated by the strength of the talent index in the regressions. In line with findings in growing cities, talent was the strongest predictor of economic prosperity in shrinking cities.

The findings complement Hollander (2011b), Delken (2008) and Okullicz-Kozaryn's (2016) work, which has shown that smaller, less dense and even shrinking cities can boast happier residents than bigger, growing cities. The effects of urban shrinkage like residential vacancy are multidimensional and can be viewed as both advantages and disadvantages. From an individual's perspective, shrinking cities exist along a spectrum of happiness and melancholy, prosperity and

decline. By no means do these findings advocate the unbridled success of shrinking cities or undermine the very real challenges faced in many shrinking cities across the nation. The results simply show the wide variety of shrinking cities and highlight that shrinkage is not necessarily decline.

One limitation of this study was the narrow operationalization of prosperity. The income index is a useful economic measure for prosperity, but relative income comparisons can be misleading. Future studies can build directly upon this work by expanding the measurement of prosperity to include cost of living. Furthermore, a range of economic, socioeconomic, social and environmental factors concentrating more broadly on quality of life than economic prosperity could provide additional, important, insight and help differentiate the processes, outcomes and spatial dispersion of population loss. There is also an opportunity for follow-up research to explore the nonlinear relationships between income, severity and unemployment, and to simultaneously investigate shrinkage at different spatial scales to help uncover commonalities and singularities between local and regional economic and demographic shifts. A shrinking city within a shrinking region has considerably different processes, impacts and policy options than one within a growing region. Incorporating multi-scalar analysis would help further unpack the complexity and diversity of shrinkage and prosperity.

Using an expanded operationalization of prosperity and multi-scalar analysis, future research can explore the relationship between changing household sizes and prosperous shrinkage, as well as the idea of shrinking-but-prosperous suburbs of central cities. Both efforts contribute to identifying and understanding shrinking cities that are already prospering and providing a high quality of life to their residents. In doing so, they take an important first step in alleviating the

stigma of population decline and fostering a shift to more appropriate metrics with which to evaluate the success of cities.

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