Cities xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Cities

journal homepage: www.elsevier.com/locate/cities

Specialized vs. diversified: The role of neighborhood economies in shrinking cities

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1. Introduction

A recent strain of research highlights the problems faced by "shrinking cities" that have experienced prolonged population loss and problems associated with the loss of jobs and industry (Oswalt, 2006; Martinez-Fernandez, Audirac, Fol, & Cunningham-Sabot, 2012). Research in this vein challenges assumptions of unfettered growth and argues that decline and shrinkage are inevitable in the global economy (Audirac, 2009; Martinez-Fernandez et al., 2012; Rieniets, 2009). Developed economies in particular have experienced a concentration of economic success in global cities that support financial, telecommunication, and other advanced services, while cities that once prospered from manufacturing and other production-oriented firms have experienced job loss and abandonment (Sassen, 2001). In the U.S., classic examples include Detroit and Flint, MI and Buffalo, NY.

In response, many urban planners, public officials, and other stakeholders question neoliberal forms of governance that rely on market-oriented solutions and fierce competition that inevitably leave many cities in a state of decline. Researchers are suggesting planning that encourages ground-up, cooperative, and participatory solutions that are more sustainable in the long-run (Dewar & Thomas, 2013; Ryan, 2012). This form of planning, however, often takes place at the neighborhood and community level, in which shrinking city research has paid little attention. An exception is Murgante and Rotondo (2013), who point out the likelihood of spatial patterns of growth and decline *within* shrinking cities. Particular neighborhoods may continue to support strong local economies and vibrant communities, while others suffer from problems of continual decline and abandonment.

This study draws on the literature of agglomeration economies to determine how economies that specialize in particular industries compare to more diversified economies in terms of population loss within shrinking cities. Results suggest that neighborhoods with diverse economies experience less shrinkage on average than neighborhoods with more economic specialization; however, this difference is due to other neighborhood characteristics that tend to be present in these neighborhoods. Once these are controlled for, the analysis suggests neighborhoods in advanced economies that are more specialized experience slightly less population loss, although other factors in the neighborhood have more explanatory power. These factors include high levels of population shrinkage in surrounding neighborhoods, rental and seasonal housing, people that work remotely from home or travel to work in other cities, and large families, which are strongly associated with increased neighborhood shrinkage, as well as higher levels of income, education, single and nonfamily populations, immigrants, and migration, which are associated with less shrinkage.

The remaining sections begin with a brief review of the literature that informs the specification of a neighborhood-level spatial lag regression model explaining the variation in population loss within shrinking cities. Next, the data and methods used to perform the analysis are detailed and the results of the analysis are presented and discussed. The paper concludes with a discussion of how the findings can help inform the planning and policy efforts advocated and pursed in shrinking cities.

2. Literature review

At the macro-level, one of the major causes of urban shrinkage that relates to the experience of the United States is deindustrialization, or the loss of manufacturing jobs as firms outsource to locales with lower labor costs (Audirac, 2009; Großmann, Bontje, Haase, & Mykhnenko, 2013; Martinez-Fernandez et al., 2012). Central to this argument is the theory that cities in the global economy have undergone an economic restructuring as the logic of industrial location has changed. Advancements in transportation technologies removed the need for manufacturing firms to locate close to raw materials and/or consumer markets, while, at the same time, the high cost of inputs such as fiber optics and the need for an increasingly skilled labor force encouraged the co-location of financial, high-tech, and other firms that offer advanced services (Castells, 1989; Clark, 2011; Sassen, 2001; Stanback, 2002). The result of this process was that cities that were once prosperous manufacturing hubs such as Detroit and Flint, MI, Youngstown, OH, and Buffalo, NY faced significant decline, while cities such as San Francisco, CA and New York City able to support advanced services experienced prolonged growth. The implication for many urban economists is that, in order to grow, cities must attract talented individuals with high levels of human capital to provide the needed labor pool for the advanced services that drive the new economy (Clark, Lloyd, Wong, & Jain, 2002; Florida, 2002; Glaeser, Kolko, & Saiz, 2001; Markusen & Schrock, 2009).

Although the focus on human capital and labor rather than physical capital such as natural resources or transportation arterials seems like a major shift, both are factors that have long been considered important in explaining the co-location, or agglomeration, of firms. In the 19th Century, Alfred Marshall famously discussed the importance of skilled

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http://dx.doi.org/10.1016/j.cities.2016.12.006

Please cite this article as: Murdoch, III, J., Specialized vs. diversified: The role of neighborhood economies in shrinking cities, *Cities* (2016), http://dx.doi.org/10.1016/j.cities.2016.12.006

labor and the inputs of production in explaining where firms locate. In particular, Marshall suggested that similar firms co-locate so that they can increase productivity by sharing the costs of training the labor force as well as sharing the costs of expensive inputs necessary to the production process (Beaudry & Schiffauerova, 2009; Martin & Sunley, 2003). Marshallian agglomerations are often seen as drivers of innovation, employment growth, and prosperity (Martin & Sunley, 2003; Porter, 2003; Storper & Scott, 2009; van der Panne, 2004). The recent push for cities to support human capital to encourage economic success can be seen as a line of research in this vein.

Arguably, a more fundamental shift in economic thinking occurred with the work of Jane Jacobs in the 1960s. She begins similar to Marshall by suggesting that firms co-locate to share access to markets and costly infrastructure; however, she departs from the theory saying that the agglomeration of different types of firms is what increases productivity, not the agglomeration of similar firms that can share costs (Jacobs, 1969). Central to the theory is the idea that the close proximity of diverse people and firms encourages a crosspollination of ideas that can lead to new products and more efficient and advanced methods of production that stimulate economic growth (Lucas, 1988). Moreover, Jacobs and more recent followers suggest that a diversified economy is much more likely to be able to weather severe economic shocks, as losses in employment are made up by gains in other industries less affected by the economic downturn (Dissart, 2003; Malizia & Ke, 1993; Wagner & Deller, 1998; among others).

In the context of shrinking cities, both theories have explanatory power. The relatively recent success of Sunbelt cities that attract skilled labor forces and support agglomerations of high-tech, finance, and other advanced services demonstrate the power of Marshallian economies. On the other hand, the decline of cities in the Rustbelt that were predominantly focused in manufacturing and the resilience of diversified economies such as New York City and Boston demonstrate the importance of Jacobian diversity. Moreover, both theories are found to be valid in empirical research (for a review see Beaudry & Schiffauerova, 2009). What remains uninvestigated, however, is how these theories help to explain the variation in growth and decline *within* shrinking cities.

3. Data and methods

The following sections describe the data and methods used to address two research questions:

1. In shrinking cities, do neighborhood-level Marshallian or Jacobian agglomerations help to explain variation in population decline?
2. How do these economic variables compare to other neighborhood variables including urban context, demographics, migration, housing characteristics, and labor force characteristics?

3.1. Census tracts in the US

The analysis uses a sample of 5090 census tracts in shrinking cities in the 50 states and Washington D.C in the United States.[1] The majority of studies examining the factors associated with economic agglomeration focus on the city, region, or state level of geography (Beaudry & Schiffauerova, 2009). There is, however, some evidence that the impacts of agglomeration are highly localized and fade quickly with distance (Glaeser, Kallal, Scheinkman, & Shleifer, 1992; van Soest, Gerking, & van Oort, 2002). Moreover, the purpose of the study is to determine factors that are associated with decline within Shrinking Cities. The neighborhood is thus a viable unit of analysis, as it facilitates an analysis that can uncover the potentially highly localized effects of economic agglomeration as well as examine variation in population loss within a city. Although the neighborhood is the unit of analysis, the study does not assume that economic agglomeration will conform to neighborhood boundaries. Rather, as shown in Fig. 2, each neighborhood included in the analysis is classified as being within a specific economy type, which can have a boundary that spreads well beyond the neighborhood boundary.

A shrinking city is defined as any city that has continually lost population in each decennial census since 1970, or since the census date closest to incorporation if after 1970. Each of the census tracts in the sample is in one of four categories that include (1) urban, (2) suburban, (3) small town, or (4) rural.[2] Table 1 shows the number and percent of census tracts within each of the classifications. It also provides the definitions used for each classification, which are based on the categories of urbanicity defined by the National Center for Education Statistics (NCES).

3.2. Measures of shrinkage

The degree of shrinkage, or population loss, from the year 2000 to 2010 in each census tract is calculated with a standard population growth formula:

$$Shrinkage = -\ln\left(\frac{pop2010}{pop2000}\right)$$

The formula adds a negative sign so that higher levels of population loss are shown with higher levels of the variable *Shrinkage* and lower levels of population loss are shown with lower levels of the variable. Without the negative sign, this would be reversed.

In addition to this variable, the analysis uses a spatial lag term that represents the degree of shrinkage in surrounding neighborhoods.[3] Murgante and Rotondo (2013) find that shrinkage and decline are often concentrated in specific areas and it is likely that decline in one locale may influence how another in close proximity develops.

3.3. Measures of economic agglomeration

To capture economic agglomeration, 2-digit North American Industry Classification System (NAICS) codes are used to classify employment into 14 industry categories shown in Fig. 1.[4] The figure also shows the results of a factor analysis of total employment in the categories that produces two constructs, economy size and economy type, that show how the variables group together.[5] After the factor analysis, a score for each construct is produced using the regression scoring method (Thomson, 1951).

Economy size has strong positive loadings for virtually all of the employment categories and reflects the overall level of employment within a census tract. High scores for this factor indicate a tract with a high level of total employment and thus a larger economy, while lower scores indicate a smaller economy. Economy type, on the other hand has some

[1] The sample does not include tracts with a total population less than 1000 or tracts with a total employment less than 500.

[2] The Missouri Census Data Center's correspondence tool matches census tracts to principal cities, urbanized areas, and urban clusters. The four designations are determined based on proximity to these geographies (see Table 1).

[3] The open source software Geoda generated the spatial weights matrix used to calculate the spatial lag by defining neighbors of a given census tract as any tract that shares any part of the boundary of the given tract (queen contiguity).

[4] Two digit codes are the most general (the most specific contain six digits) and capture a wide range of industry types within each category. Thus, the measures of specialization in this paper may carry the potential problem of obscuring some of the effect of diversified agglomerations (Beaudry & Schiffauerova, 2009). Two digit NAICS codes fit the purposes of this paper, however, because they allow easy identification of the broad sectors of interest. Future research may wish to examine the effects of more nuanced agglomeration clusters at the neighborhood level.

[5] To determine the number of factors to retain in the analysis, I examined a scree plot and found that the first two factors explain virtually all of the variation in variables included in the analysis. Second, the first two factors meet Kaiser's (1960) selection criterion that states factors should have an eigenvalue above 1, while all other factors do not.

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