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Close, but not the same: Locally headquartered organizations and agglomeration economies in a declining industry

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ABSTRACT

Departing from research on expanding, high-technology industries, we study the impact of agglomeration in a declining, low-technology industry. The setting is U.S. footwear manufacturing between 1975 and 1991, when import competition rendered local support critical for survival. We examine how agglomeration-related survival benefits depended upon the presence of locally headquartered manufacturing plants and whether such benefits came at the expense of other local industries. Consistent with ecological arguments, plant failure rates were higher in agglomerations but this effect was attenuated and, in some cases, reversed in agglomerations with more locally headquartered plants. Moreover, only locally headquartered plants experienced such benefits; remotely headquartered plants failed at higher rates in agglomerations. Although more footwear manufacturing jobs were retained in agglomerations with many locally headquartered plants, such locales also exhibited lower manufacturing job growth in other industries. These findings lend greater generalizability to agglomeration theories and also imply trade-offs at the community level.

1. Introduction

Industries tend to concentrate in geographic space (Marshall, 1920; Arthur, 1990; Krugman, 1991; Porter, 2000) – a phenomenon known as *spatial agglomeration*. Research on spatial agglomeration addresses questions like, "Why do industries concentrate in geographic space?" (e.g., Arthur, 1990; Krugman, 1991) and "What are the effects of agglomerations on co-located firms?" (e.g., Audretsch and Feldman, 1996; Baptista and Swann, 1998; Beaudry and Breschi, 2003). Generally, this body of work suggests that when similar organizations co-locate in geographic space, the co-located organizations benefit from specialized labor and other inputs as well as knowledge spillovers among local producers. While such studies have progressively refined our understanding of agglomerations and the economies they generate, we aim to contribute to this literature in three ways.

First, drawing on research that suggests that agglomeration advantages hinge on interactions among co-located organizations and other local actors, we examine whether the beneficial effects of agglomerations vary with the presence of locally headquartered versus remotely headquartered organizations – two types of organizations that exhibit different levels of involvement in the locales where they reside. Second, we aim to lend greater generalizability to theories of agglomeration by examining an industry during a period of contraction, not expansion. Evidence of the benefits of agglomerations comes primarily from studies of high-technology and expanding industries (Saxenian, 1994; Kenney, 2000; Lee et al., 2000; Owen-Smith and Powell, 2004; Aharonson et al., 2007). But, some studies of mature and declining industries fail to show evidence of agglomeration economies (Glaeser et al., 1992; Appold, 1995; Staber, 2001). We aim to reconcile these puzzling findings by studying agglomerated organizations in a declining, low-technology industry while also focusing on differences in the types of agglomerated organizations. Third, we consider both advantages *and* disadvantages of agglomeration by examining whether agglomeration of one industry detracts from growth in other local industries. This aspect of our study is particularly important because some scholars indicate that agglomerations are often unlike the idealized settings described in the work on Silicon Valley or Northern Italy (Paniccia, 1998) and, furthermore, that some agglomeration studies may be tainted by sampling on the dependent variable (Scott and Davis, 2007, p. 298). Although less skeptical than such scholars, we do believe that our knowledge of agglomeration advantages exceeds our knowledge of their potential disadvantages and so we advance a more balanced view of agglomerations.

Our starting point is a growing theoretical and empirical literature which suggests that agglomeration benefits may

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be conditional on local industrial organization, the manner in which co-located firms organize their activities (Saxenian, 1994; Rosenthal and Strange, 2003; Owen-Smith and Powell, 2004; Aharonson et al., 2007, 2008; Whittington et al., 2009). A central theme of this work is that open and collaborative organizations are instrumental in facilitating agglomeration economies. By logical extension, some benefits of agglomeration may not be realized absent extensive interaction among local organizations. Moreover, organizations that limit interactions with other local actors may not realize the benefits of agglomeration. Along these lines, recent work reveals two general analytical approaches to examining how agglomeration benefits depend upon the local industrial organization.

One way to better understand the relationship between local industrial organization and agglomeration benefits is to identify specific behaviors of local actors and their empirical relationships with measures like patenting or organizational survival. This approach is especially conducive to understanding why some organizations benefit more from agglomeration than others. One challenge with this approach is that data collection constraints render comparisons across many locales difficult. A second approach is to leverage geographic variation in organizational forms that clearly differ in their propensities to interact with other local actors. This approach permits examination of how the presence or absence of particular organizational forms across locales influences the relationship between agglomerations and measures like patenting or survival. Either approach can inform us of how agglomeration benefits are conditional on the industrial local organization. Because recent work (e.g., Owen-Smith and Powell, 2004; Aharonson et al., 2008; Whittington et al., 2009) admirably advances the first approach, we adopt the second approach to examine how different kinds of organizations condition the benefits of agglomeration across multiple locales.

We focus on whether organizations are locally or remotely headquartered because an extensive literature ranging from studies of board interlocks (Kono et al., 1998; Marquis, 2003) to studies of local subcontracting (Kelley and Harrison, 1990; Harrison, 1994) indicates that, compared to remotely headquartered organizations, locally headquartered organizations tend to be more involved in the civic, political, and economic affairs of the locale in which they reside. Although many agglomeration advantages depend upon interactions among local organizations and other actors (Saxenian, 1994; Porter, 1998), the implications that the locally versus remotely headquartered distinction may have for agglomerations remain unexamined. We believe it necessary to fill this gap in the literature because, as Porter (1998, p. 225) suggests, "a firm's identification with and sense of locale and its 'civic engagement' beyond its own narrow confines of a single entity, according to cluster theory, translates into economic value." If interaction among local organizations fosters agglomeration benefits then these benefits should be greatest in locales populated with organizations that facilitate interactions. Moreover, these advantages should be greatest for those organizations that are more involved in local affairs. Consequently, we examine how the distribution of locally headquartered organizations across locales conditions agglomeration benefits and if the effects of agglomeration are experienced differently by locally and remotely headquartered organizations.

Pursuing a balanced view on agglomerations, we also examine whether or not agglomeration advantages are realized at the expense of other local industries. Much of the literature on agglomerations touts benefits for organizations within the agglomerated industry. If these organizations enjoy advantaged access to local resources, then such resources are unlikely to be available to local organizations that are not part of the agglomerated industry. We think this trade-off is particularly important when the agglomerated industry is declining. Locales that depend on a declining industry may need to balance the need to sustain the industry on which they depend with the need to invest in other industries (Safford, 2009). If agglomeration economies induce local actors to invest resources in the agglomerated industry, then other local industries are likely to suffer and this may hinder a locale's ability to renew its industrial base. Consequently, we examine how agglomeration and the presence of locally headquartered organizations within one industry influence employment in other local industries.

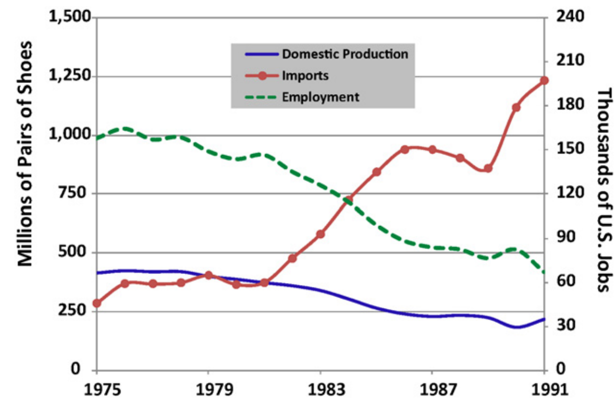

Fig. 1. Domestic production, imports and U.S. footwear employment, 1975–1991. Source: *Footwear Industries of America.*

The empirical setting for our analysis is the U.S. footwear manufacturing industry from 1975 to 1991. We are enthusiastic about this setting for several reasons. First, the U.S. footwear industry exhibited substantial agglomeration during this time period with some areas densely populated with footwear plants and others sparsely populated or unpopulated (Sorenson and Audia, 2000). Second, the U.S. map was populated liberally with both locally headquartered and remotely headquartered footwear plants during this time. So, our two explanatory variables of interest – the degree of agglomeration and the presence of locally headquartered organizations – exhibit substantial variation across the U.S. during this time. Third, between 1975 and 1991 the footwear industry experienced a period of sustained decline due to globalization pressures, as evidenced by a 431 percent increase in imported pairs of shoes and a 47 percent decrease in domestic production (see Fig. 1). During this time, locales with many footwear manufacturing plants sought to not only retain footwear jobs but to also foster job creation in related industries. Because our understanding of agglomeration economies is based primarily on studies of industries during periods of expansion, studying a declining industry offers an opportunity to lend greater generalizability to theories of agglomeration.

We conduct two sets of analyses. The first involves failure analyses of footwear plants. We examine how the geographic concentration of footwear production conditions the failure rate of footwear plants and whether this effect varies with the presence of locally versus remotely headquartered plants. The second set of analyses focuses on employment levels across U.S. locales. We examine how agglomeration and locally headquartered plants influence local manufacturing employment – both within and outside of the local footwear industry.

2. Locally headquartered organizations and agglomerations

The classic view on agglomeration economies, dating back to Marshall (1920), suggests that organizations located in proximity to similar organizations benefit from the circulation of information through face-to-face interaction, the presence of supporting industries, the availability of a large pool of trained workers, and the existence of a specialized and supportive institutional infrastructure. In recent years a number of influential scholars including Krugman (1991), Saxenian (1994), and Porter (1998) have reignited interest in the presumed benefits of agglomeration and inspired numerous contributions to the growing empirical literature on agglomeration economies. Although much of this research documents agglomeration benefits for co-located firms, the evidence is not uniformly positive. For example, Glaeser et al. (1992) and Appold (1995) report null findings and both Sorenson and Audia (2000) and Staber (2001) report negative effects of agglomerations on firm survival. Although evidence contradicting the universality of agglomeration economies is growing, studies that seek to identify theoretical boundary conditions are still limited. At least two explanations might account for these conflicting findings.

A first explanation for conflicting empirical evidence on agglomeration benefits is that the strength of such benefits depends upon local industrial organization – the way that local firms organize their activities. Specifically, agglomeration economies may be weak or even absent if local industrial organization is not supportive. Local industrial organization has long been recognized as a key feature of agglomerations (Chinitz, 1961; Jacobs, 1969) and Saxenian's (1994) study of the Route 128 and Silicon Valley regions is credited with reviving interest in this important aspect of the theory. Both regions were important centers for the electronics and computer industries but Saxenian found greater evidence of agglomeration benefits in Silicon Valley than in Route 128. Based on in-depth qualitative analyses, she attributed the difference to variations on three distinct dimensions of the social organization of regions – local institutions and culture, industrial structure, and corporate organization. But, her contrast between the large and insular organizations of Route 128 and the small and collaborative organizations of Silicon Valley has received the most scholarly attention. In her account, Silicon Valley firms enjoyed greater agglomeration economies in part because they were more engaged in local interactions and these local interactions are often believed to confer advantage by favoring the circulation of information, lowering transaction costs in market exchange with local suppliers, and providing greater access to the local labor market and other specialized inputs. Subsequent agglomeration researchers have extended this line of inquiry by examining the impact of organizational features, like size and age, thought to influence organizational propensities to interact with other local actors (Rosenthal and Strange, 2003; Aharonson et al., 2007) and, thereby, the strength of agglomeration economies.

A second explanation for the mixed evidence on agglomeration benefits is that studies that fail to find empirical support for agglomeration benefits are often situated in mature, declining industries. Yet, agglomeration economies may be less pronounced in such settings. For example, in one of the most detailed analyses producing such lack of evidence, Glaeser et al. (1992) suggest that an important source of agglomeration economies – knowledge spillovers – may be weakened by industrial decline. Producers in declining industries still generate valuable ideas. For example, in the footwear industry some producers responded to the competitive pressures brought by globalization by introducing counter-intuitive human resource practices that actually decreased productivity but increased profitability (Freeman and Kleiner, 2005); others exploited emerging niche markets in customized footwear (Hollie, 1985). However, as the industry declines and innovative efforts dwindle, the innovative gap between firms outside agglomerations and firms inside agglomeration becomes less significant (Pouder and St. John, 1996). Consequently, Glaeser et al. speculate, geographical proximity becomes less important for the transmission of knowledge.

Besides weakening knowledge spillovers, industrial decline may also exacerbate local competition for skilled workers, as suggested in ecological analyses of the effects of agglomerations (Sorenson and Audia, 2000, p. 433; Staber, 2001, p. 333). Scholars of agglomerations often identify labor pooling as one of the benefits of residing in an agglomeration. Local workers, it is argued, have a greater incentive to invest in industry-specific skills when there are many employers that value those skills (e.g., Rotemberg and Saloner, 2000). The resulting deeper pool of skilled workers enables producers in agglomerations to effectively meet their recruitment needs when demand increases. But when the agglomerated industry declines these advantages may be attenuated or even turn into disadvantages. Consider that skilled workers employed by struggling producers may reduce their unemployment risk by securing employment at stronger producers. Given that empirical evidence suggests that workers are generally reluctant to move outside of the locale in which they reside (e.g., Figueiredo et al., 2002; Dahl and Sorenson, 2010), worker movement within agglomerations is more likely than relocation outside an agglomeration. If true, then skilled workers employed by isolated producers may be more likely to remain with their current employer than workers employed by producers located within agglomerations. As a result, struggling producers inside agglomerations may find their workers seeking jobs elsewhere and their deep pool of local, skilled laborers increasingly shallow.

Given that industrial decline may diminish at least two of the theorized benefits of agglomeration – knowledge spillovers and labor pooling – we believe that it is especially important to consider how local industrial organization conditions agglomeration economies in a declining industry. Our approach to reconciling the growing body of mixed evidence on agglomerations is to examine how agglomerations influence survival at the plant level as well as employment growth at the community level. We start from the assumption that industrial decline may diminish agglomeration economies such as knowledge spillovers and labor pooling while also exacerbating local competition for skilled labor. Accordingly, consistent with past studies (Sorenson and Audia, 2000; Staber, 2001), the net effect on organizational survival of residing in an agglomeration within a declining industry should be either null or negative. Adding to past work, we theorize that, if local interaction is critical to realizing agglomeration benefits, agglomeration economies in a declining industry will be strongest in the presence of organizations that are more extensively involved in the locale. This effect would be reflected either in a positive effect of agglomeration on organizational survival or in an attenuation of any negative effect that agglomeration may have. To restate our expectations regarding organizations located in agglomerations during a focal industry's decline, we expect that the advantages of agglomeration will be stronger (or the disadvantages weaker) if the local industrial organization is particularly conducive to facilitating agglomeration economies.

The specific advantageous feature of local industrial organization we focus on is the extent to which locally headquartered organizations are present within the locale. A voluminous literature spanning work in sociology, economics, and management suggests that members of locally headquartered organizations interact more with local actors than members of remotely headquartered organizations. For example, Mills and Ulmer's (1946) classic study raised the concern that remotely headquartered organizations eroded community welfare, alienated residents, and permitted the physical deterioration of neighborhoods largely because their owners and managers were disconnected from local actors. Friedland and Palmer (1984) argued that while remotely headquartered organizations obtained community support by threatening to move production elsewhere, locally headquartered organizations obtained support through extensive involvement in community politics. In an extensive review of research contrasting locally headquartered and remotely headquartered organizations, Stern and Aldrich (1980, p. 163) noted that, "Local owners of productive enterprises provided community political leadership, were integrated into local stratification systems and were committed to the community as a location for social and political life, as well as work."

More recently, a study of local and non-local interlocking boards of the largest U.S. industrial corporations found that locally headquartered industrial firms were more likely to maintain local board interlocks than remotely headquartered firms (Kono et al., 1998). According to Kono et al., board interlocks are an important indicator of political involvement in the local community because these relationships are critical to the efforts of local business elites and public officials to promote policies intended to stimulate community growth (Molotch, 1976). Consistent with these findings, Marquis' (2003) study of the 51 largest U.S. communities reports that the number of firms with headquarters in a community is positively associated with the prevalence of local board interlocks and with the presence of civic organizations that depend on the support of local elites (e.g., upper-class clubs and arts organizations). Additional research on inter-organizational networks involving exchanges of information, support, and money among 77 private, public, and partisan organizations in the Minneapolis-St. Paul community reveals that organizations that were locally headquartered tended to be more central in local information and support networks and, to a lesser extent, in local financial networks (Galaskiewicz, 1979). Furthermore, centrality in these networks was positively related to an organization's political influence in the community.

It is not only local civic and political affairs in which locally headquartered organizations are more involved than remotely headquartered organizations; similar differences are observed in local production networks. Locally headquartered organizations and remotely headquartered organizations tend to vary in terms of their involvement with local suppliers. The organizational structure of the prototypical multi-unit, multi-market organization consists of many distinct operating units managed by a hierarchy of executives who make important strategic decisions at headquarters that are often located at great distance from the branch unit (Chandler, 1977). This division of labor constrains local managers' authority to conduct business locally. For example, Taylor and Wood (1973) find that single-plant organizations that by definition are locally headquartered organizations are much more likely to be integrated into local production networks than branches that in most cases are remotely headquartered organizations. Taylor (1978) also finds that changes in ownership structure – from owner–operator to membership in a multi-unit firm with headquarters typically outside the locale – substantially decreased organizational dependence on local firms for subcontracting purposes.

Harrison (1994, pp. 80–89) provides more detailed evidence of this process of disengagement from the local production networks in his analysis of Sasib, an Italian holding company. As Sasib acquired small firms, staff members in the Bologna headquarters increasingly outsourced production to distant contractors, imposed strict criteria on suppliers, required that complex machining work be shipped to Bologna for processing, and mandated that all supplier communications be mediated by headquarters staff. As headquarters staff restricted branch managers' discretion and their business ties to local organizations, the degree to which Sasib's branches interacted with producers in their locales diminished. A similar example in the footwear industry is the U.S. Shoe Company, a footwear manufacturer that in 1980 planned to link design and manufacturing systems at its Cincinnati, Ohio, headquarters to its branch plants. Headquarters staff would log incoming orders, perform materials requirement planning, and transmit production data, thus tasking branch managers with merely producing shoes according to these dictates (Industrial Production, 1980). More recent studies suggest that the greater propensity of locally headquartered plants to conduct business locally persists. For example, a study of the geographically concentrated Irish electronics industry finds that organizations with headquarters located outside Ireland have less inter-firm linkages than do organizations with headquarters in Ireland (Görg and Ruane, 2000).

Because of their members' greater involvement in local civic, political and economic affairs, locally headquartered organizations are also more likely than remotely headquartered organizations to support local community actors and to receive support from them. Relative to transient managers of remotely headquartered organizations who rotate from branch to branch as they progress through the company, managers of locally headquartered organizations hold a stronger interest in the socioeconomic welfare of the local community (Mills and Ulmer, 1946; Stern and Aldrich, 1980). The community is their home, not simply a stop along the path to an executive position. This may be the reason why a study of 1859 chemical plants found that organizations headquartered out-of-state emit more toxins, on average, than do organizations headquartered in-state (Grant et al., 2004). The intertwined fates of producers and other community members manifests itself in producers' greater reluctance to relocate to other locales, as shown by Romo and Schwarz (1995), who found in a study of New York manufacturing that remotely headquartered organizations (i.e., subsidiaries) were more likely to migrate long distances than were locally headquartered organizations (i.e., autonomous plants).

The shared fates of communities and local producers may also encourage local resource providers to support producers whose survival is threatened. For example, when the Belleville Shoe Manufacturing Company built a $2.5 million manufacturing plant in Belleville, Illinois in 1986, the State of Illinois, St. Clair County, and the City of Belleville all contributed grant and loan financing, with the city selling revenue bonds worth $2 million to fund a loan to the company (Goodman, 1990). Four years later, when the company made plans to lay off 203 employees, its president informed the mayor of Belleville two months in advance (Goodman, 1990). Additionally, in January 1984, when a fire destroyed Allen-Edmonds' main manufacturing plant in Belgium, Wisconsin, the town helped the company set up a production facility in an abandoned schoolhouse and union employees at a local competitor, the Levernz Shoe Company in New Holstein, Wisconsin, voted to allow Allen-Edmonds employees to work in their plant three days a week (Fenn, 1985). These anecdotes nicely illustrate the reciprocal nature of the producer–community relationship and, more specifically, the community support that might be marshaled to sustain declining local industries even when the economic rationale for doing so is weak.

To our knowledge, the insights offered by this literature contrasting locally headquartered and remotely headquartered organizations have not been applied to the study of agglomerations in declining industries. A first implication is that in times of crisis that threaten the future of the local industry the presence of locally headquartered organizations will encourage material support from local actors more than the presence of remotely headquartered organizations. The reason is that locally headquartered organizations are more tightly bound to the locale than remotely headquartered organizations. Therefore, they are perceived by local actors as more likely to battle for their survival and less likely to relocate. A second implication is that agglomeration economies that hinge on local interactions such as knowledge spillovers and reduced coordination costs may be stronger in locales that have a greater presence of locally headquartered organizations. In summary, there are numerous benefits associated with the presence of locally headquartered organizations including greater support from local actors, greater access to localized information flows, and lower coordination costs. Therefore, we propose the following hypotheses.

Hypothesis 1. Organizations will fail at lower rates in agglomerations with more locally headquartered organizations than in agglomerations with more remotely headquartered organizations.

If our argument is correct, then locally headquartered organizations should benefit more than remotely headquartered organizations from residing in agglomerations populated by other locally headquartered organizations. Extensive involvement in the locale should provide greater support from local actors, access to localized information flows, and lower coordination costs.

Hypothesis 2. The survival-enhancing benefits of agglomerations with more locally headquartered organizations will be greater for locally headquartered organizations than for remotely headquartered organizations.

Consistent with prior work on agglomeration, our analysis of agglomeration benefits thus far focuses on firms within the agglomerated industry. But, we also believe it is insightful to consider how the presence of agglomerations and locally headquartered organizations impact other local industries. One might expect that if organizations in the agglomerated industry benefit, then the locale will also benefit. When the agglomerated industry is a declining industry, though, it may be risky for locales to tie their fate to industries that are contracting and at risk of disappearing entirely. As Safford (2009) reports in his comparative analysis of the diverging trajectories of Allentown and Youngstown, two major U.S. centers of steel production that faced strong competitive pressures in the 1970s and 1980s, Allentown rebounded better than Youngstown did because Allentown successfully developed a renewed industrial base that did not involve the steel industry.

When the agglomerated industry is declining, local resource providers face a trade-off between sustaining existing sources of employment and supporting the development of alternative sources. For example, consider the case of Falcon Shoe Manufacturing in Lewiston, Maine, a locale with a high concentration of footwear manufacturing. Faced with stronger competition from foreign producers, this firm had to decide whether to diversify away from footwear production or to find ways to remain profitable in footwear manufacturing. It chose to continue manufacturing footwear but to regularly alter the market niches it targeted. Falcon first switched from producing boys' shoes to athletic shoes and when athletic shoes became unprofitable, Falcon switched to producing boys' boots and dress shoes (Hollie, 1985). Similarly, Red Wing Shoes survived and thrived in the 1980s and 1990s in part by exploiting an emerging niche market in customized footwear for oil rig workers and capitalizing on Japanese fashion trends towards rugged work boots. These strategic adjustments likely helped the struggling firms survive and maintain footwear employment in their local communities but such organizational changes are risky (Hannan and Freeman, 1984; Amburgey et al., 1993) and are likely to require the trusting support of local resource providers to implement. Because these producers relied upon local creditors and suppliers during challenging periods, this local support likely diverted resources that could have been allocated to helping local producers develop alternative sources of employment.

We think that a potential downside of agglomeration when the agglomerated industry is in decline is that struggling organizations' local connections might enable them to obtain resources like capital, raw materials, or labor that could be utilized elsewhere. In such situations, opportunities arising in other economic sectors might be neglected. In other words, residents in a locale may become narrowly focused on preserving the agglomerated industry and, consequently, overlook opportunities to support the development of others. Obviously the presence of agglomeration implies that other industries are less represented in a locale. Our inquiry avoids making such a tautological prediction in two ways. First, we think that this downside is most likely to be observed in locales characterized by both agglomeration *and* many locally headquartered organizations because locally headquartered organizations are extensively involved in local affairs and are therefore likely to attract attention and resources to support the agglomerated industry. Second, if agglomeration combined with the presence of locally headquartered organizations detracts from other local industries, we should observe such an effect when focusing only on variation within a locale. We, therefore, examine the impact that within-locale variations in agglomeration and locally headquartered organizations over time have on variations in employment outside the agglomerated industry. This logic leads to our second set of hypotheses.

Hypothesis 3. The greater the focal industry agglomeration and the presence of locally headquartered organizations within a locale, the lesser is employment in local industries outside the agglomerated industry.

Hypothesis 4. The greater the focal industry agglomeration and the presence of locally headquartered organizations within a locale, the greater is employment within the agglomerated industry.

To summarize, our argument is that in a declining industry survival chances will be greater in locales with more locally headquartered organizations than in locales with more remotely headquartered organizations and that these empirical relationships will be stronger for locally headquartered organizations than for remotely headquartered organizations. As for employment levels, while we argue that more jobs in the agglomerated industry will be retained (or created) in agglomerations, we also expect fewer jobs to be created outside the agglomerated industry. We also expect this trade-off to be most pronounced in locales with many locally headquartered organizations. We now turn to the empirical analyses.

3. Empirical setting, data and analyses

We test our theoretical arguments with data on U.S. footwear manufacturing between 1975 and 1991 because it was during this period that U.S. footwear producers experienced the competitive pressures of globalization most intensely. Yet, the decline of the U.S. footwear industry is much easier to identify in retrospect than it was between 1975 and 1991. During this time, producers and communities exerted considerable efforts to maintain industry employment, which was concentrated in communities across the U.S.. Additionally, because the U.S. map was dotted liberally with both locally headquartered and remotely headquartered branch plants during this time, this setting is an excellent one for testing our arguments related to organizational forms and agglomeration.

Our two main sources of data are the Annual Shoemaking Directory of Shoe Manufacturers, a comprehensive listing of U.S. footwear manufacturing plants published annually by the Shoe Traders Publishing Company and the U.S. Bureau of Labor Statistics (BLS) Covered Employment and Wages program, which collects quarterly data on employees covered by various unemployment insurance programs. From the BLS we obtained data about employment in footwear and other manufacturing industries in order to identify the presence of a footwear industry agglomeration and manufacturing employment outside the footwear industry. From the Annual Shoemaking Directory of Shoe Manufacturers we obtained data about each plant's year of opening, year of failure, daily production volume (pairs of shoes), physical location, and membership in a multi-unit organization.

Table 1
Descriptive statistics and correlations for plant failure analyses ($n = 11{,}516$ plant-years).

	Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Plant age	25.04	15.23	1.00												
2	Imports	593.9	279.3	0.12	1.00											
3	Domestic production	337.1	79.1	−0.12	−0.97	1.00										
4	Exports	9.52	3.61	0.11	0.68	−0.71	1.00									
5	Left censored	0.23	0.42	0.63	−0.04	0.05	−0.03	1.00								
6	Log (plant volume)	7.19	2.10	0.18	−0.05	0.05	−0.04	0.12	1.00							
7	Population/10,000	301.2	412.1	−0.13	−0.01	0.01	0.00	−0.10	−0.17	1.00						
8	Average LMA wage ($1000s)	15.29	5.01	0.09	0.79	−0.82	0.67	−0.03	−0.15	0.39	1.00					
9	Non-local plant density	2.48	1.52	0.09	−0.39	0.39	−0.31	0.14	0.19	−0.05	−0.31	1.00				
10	Comparative agglomeration ratio	5.41	8.82	0.02	−0.03	0.03	−0.03	0.06	0.15	−0.23	−0.16	0.23	1.00			
11	Plant density	25.71	28.96	−0.07	−0.22	0.21	−0.16	−0.02	−0.02	0.73	0.09	0.37	0.10	1.00		
12	Locally headquartered plant density	22.48	27.30	−0.08	−0.20	0.20	−0.15	−0.03	−0.05	0.77	0.12	0.34	0.05	1.00	1.00	
13	Remotely headquartered plant density	0.5	0.7	0.07	−0.18	0.18	−0.14	0.03	0.23	−0.22	−0.31	0.13	0.24	−0.02	−0.08	1.00

Table 2
Descriptive statistics and correlations for analyses of LMA manufacturing employment ($n = 3{,}438$ LMA-years).

	Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Non-footwear manufacturing jobs (1000s)	64.9	117.3	1.00													
2	Footwear manufacturing jobs (1000s)	0.58	1.83	0.47	1.00												
3	Non-footwear manufacturing employers	1286.7	2,915.2	0.95	0.52	1.00											
4	Non-footwear manufacturing wages ($1M)	1500.0	3,080.0	0.94	0.35	0.91	1.00										
5	Imports	647.2	293.3	0.00	−0.10	0.04	0.14	1.00									
6	Domestic Production	322.1	82.16	0.00	0.10	−0.04	−0.14	−0.97	1.00								
7	Exports	10.1	3.77	0.01	−0.07	0.04	0.12	0.70	−0.72	1.00							
8	Population/10,000	85.3	149.3	0.95	0.47	0.97	0.93	0.04	−0.04	0.04	1.00						
9	Non-local plant density	1.71	1.09	0.18	0.34	0.12	0.13	−0.29	0.30	−0.24	0.13	1.00					
10	LMA average plant volume	3174.7	5,182.9	−0.01	0.07	−0.02	−0.02	−0.04	0.05	−0.04	−0.02	0.18	1.00				
11	Average LMA wage ($1000s)	15.02	4.51	0.27	0.00	0.28	0.43	0.79	−0.81	0.68	0.33	−0.20	−0.10	1			
12	Comparative agglomeration ratio	1.81	6.12	−0.02	0.41	−0.02	−0.03	0.02	−0.02	0.02	−0.04	0.17	0.07	−0.04	1.00		
13	Locally headquartered plant density	2.89	8.30	−0.05	0.13	−0.06	−0.08	−0.13	0.14	−0.11	−0.08	0.16	0.15	−0.23	0.14	1.00	
14	Remotely headquartered plant density	0.25	0.59	0.67	0.86	0.73	0.57	−0.05	0.05	−0.04	0.67	0.26	0.05	0.08	0.20	0.04	1.00

Plant closing events were recorded in the year in which plants ceased to be listed in the directory. There were 825 plant closings between 1975 and 1991. To determine whether plants were locally or remotely headquartered, we first identified all company headquarters locations during the study period using a variety of archival sources, including investor reports, legal filings, news articles, and websites. We define locally headquartered producers as those plants located within the same locale as the headquarters of the parent company. By this definition, locally headquartered producers include both single-plant organizations and the plants of multi-unit organizations that are located within the same locale as the organization's headquarters.[2] Remotely headquartered producers are defined as those plants owned by companies that are headquartered in locales other than the locale in which the plant is located. In other words, the local versus remote distinction is determined by a plant's location relative to headquarters.

In our analyses the geographical boundaries of locales are drawn using U.S. Labor Market Areas (LMAs), "economically integrated geographic areas within which individuals can reside and find employment within a reasonable distance or can readily change employment without changing their place of residence" (U.S. Bureau of Labor Statistics, 2005). We use the 1980 classification because this was the applicable definition for the majority of years in our study. Every U.S. county belongs to a single LMA, and the entire country is covered by 382 LMAs that, in many cases, span state boundaries. LMAs overlap to a large extent with Metropolitan Statistical Areas (MSAs). The primary difference is that, unlike MSAs, LMAs are not required to contain a metropolitan area with at least one urbanized area of 50,000 people. So LMAs include the rural U.S., where many footwear manufacturing plants were located. Tables 1 and 2 present summary statistics and correlations for all variables used in the plant failure and LMA employment analyses, respectively. Independent and control variables are lagged one year so that, for example, 1976 outcomes are modeled as a function of 1975 independent variables.

3.1. Dependent variables

For our failure analyses, we coded a dependent variable that took a value of "1" if a footwear plant ceased to be listed in the industry directory in a given year and "0" otherwise. To examine LMA employment, we aggregated county-level employment figures at the LMA level. LMA-level footwear employment consisted of all reported jobs in Standard Industrial Classification (SIC) 31, which consists of manufacturers of leather and leather products and includes the following three-digit industries: SIC 311, leather tanning and finishing; SIC 313, boot and shoe cut stock; SIC 314 footwear, except rubber; SIC 315, leather gloves and mittens; SIC 316, luggage; SIC 317, handbags and other personal leather goods; SIC 318, other leather goods. It would have been desirable to focus only on workers employed in SIC 314, but three-digit SIC data at the level of the LMA is not available prior to 1984. Between 1975 and 1984, only two-digit SIC codes are reported by the Bureau of Labor Statistics. Nonetheless, analyses of the BLS data from 1984 to 1989 reveal that the correlation between employment figures for SIC 31 (Leather and Leather Products) and SIC 314 (Footwear, Except Rubber) is approximately 0.8.

To compute manufacturing employment outside footwear manufacturing we computed two measures. The first subtracts employment in the footwear industry from all manufacturing employment in the LMA. The second takes into account that some of the industries outside footwear are linked to footwear by supplier relationships. To compute this second measure, we subtracted from manufacturing employment footwear employment as well as employment in the rubber (SIC 28) and chemical industries (SIC 30), two important suppliers to the footwear industry.[3] The results of the job analyses did not change when we used these measures. Below we report analyses where we use the latter dependent variable.

3.2. Independent variables

We first summed the number of locally headquartered and remotely headquartered footwear plants in each LMA. We then created measures of locally headquartered and remotely headquartered plants that take into account the impact that the number of plants operated by the parent firm has on a given plant's interaction with the locale. For example, remotely headquartered plants belonging to a multi-unit company consisting of 35 plants (the largest multi-unit company in our sample) may be less connected to the locale in which they reside than remotely headquartered plants belonging to a multi-unit company consisting of only two plants. The reason is that, as the number of plants increases, more functions become centralized in the headquarters and less and less autonomy is left to production units to establish and maintain local ties. Similarly, some locally headquartered plants may be more "local" in nature than others. For example, members of a single-plant are likely to interact more with local actors than those who work at a plant owned by a multi-unit company that happens to be headquartered in the LMA. The formula for the plant-weighted measure of locally headquartered plants is as follows:

$$PWLD_j = \sum_i (L_i)\left(\frac{1}{p_i}\right)$$

where j indexes all LMAs, i indexes footwear plants in LMA j, $L_i = 1$ if a plant is locally headquartered or $L_i = 0$ if a plant is remotely headquartered, and p_i is the number of plants owned by plant i's parent company. The formula for the plant-weighted measure of remotely headquartered plants is as follows:

$$PWRD_j = \sum_i (R_i) + \left(\frac{p_i}{P}\right)$$

where j indexes all LMAs, i indexes footwear plants in LMA j, $R_i = 1$ if a plant is remotely headquartered or $R_i = 0$ if a plant is locally headquartered, p_i is the number of plants owned by plant i's parent company in year t, and P is the maximum number of plants operated by any company. Basically, single-plants contribute the most to the plant-weighted locally headquartered variable and the remotely headquartered plants of the largest multi-unit firms contribute the most to the plant-weighted remotely headquartered variables. Results obtained using the unweighted measures are qualitatively and quantitatively similar to those reported here and are available upon request.

To account for variance in agglomeration economies across geographies we compute a comparative agglomeration ratio that measures the extent to which a locality specializes in an indus-

[2] Although both single-plant organizations and plants of multi-unit organizations fall into the locally headquartered definition, we recognize that these two types of plants likely vary in their degree of localness and take into account this potential difference when we create the plant-weighted measure of locally headquartered plants. See below for details.

[3] We use input–output tables to compute the proportion of inputs footwear organizations purchased from other industries. Averaging the values in the 1977 and 1987 tables, the rubber industry contributed 2.5% whereas the chemical industry contributed 1.4%. These were the highest proportions for supplier industries. For comparison, the paper industry, which tends to be a supplier for most industries, contributed 0.3% of the total value of inputs purchased.

try. Our measure is the ratio of the proportion of a LMA's workers employed in SIC 31 to the proportion of U.S. workers employed in the same sector (Glaeser et al., 1992; Romo and Schwarz, 1995). Comparative agglomeration ratios greater than 1.0 indicate that the LMA's percentage of workers in footwear manufacturing and related industries is greater than the U.S. average and that, therefore, the LMA specializes disproportionately (relative to the rest of the U.S.) on SIC 31 for employment. LMAs with heavy concentrations of footwear production have agglomeration ratios greater than 20. In 1975, for example, Manchester Metro, spanning counties in New Hampshire and Maine, has a value of 21; Portland, Maine, has a value of 30; Bangor, Maine, has a value of 20; Cape Girardeau, spanning counties in Missouri and Illinois, has a value of 22; and Adirondacks, New York, has a value of 46.

3.3. Control variables

We also include several control variables in the plant failure and employment models. Three industry-level variables capture the extent of globalization. Imports count shoes (in millions of pairs) produced outside the United States that were sold in the U.S. during a given year. Exports counts shoes (also in millions of pairs) produced in the U.S. and shipped to other countries. Domestic production counts the shoes (millions of pairs) produced by U.S. manufacturers for both domestic and international sale. Plant size controls for plant-level economies of scale and is the log of the number of pairs of shoes manufactured daily. We used linear interpolation to fill in missing values. Average size is the mean daily production volume of all plants within the LMA; this variable accounts for the likely impact that plants of different scale may have on local employment. Average wage (for all LMA jobs) controls for local labor costs. Human population controls for variation across locales in the size of the potential labor pool. Chemical and rubber plant density control for the presence of the two primary suppliers of the footwear industry; both counts were obtained from the BLS data.

We also control for spatial interdependence that may arise as a result of the presence of footwear plants in nearby locales by including non-local density. To construct this measure, we first identified the center point of each LMA, defined as the center of the most populous county in the locale, and then calculated the geographic distance between each pair combination of the 382 LMAs. We then assigned to each non-local footwear plant the latitude and longitude of the center of the LMA in which the plant was located and computed the geographic distance from that point to the center of the focal LMA. This measure weights the contribution of each non-local footwear plant to non-local density according to the inverse of the geographic distance between the LMA in which the non-local plant is located and the LMA where the focal plant is located. We then summed these weighted contributions across all non-local footwear plants. Smaller values on this variable indicate greater geographical distance from footwear plants located outside the LMA. The formula for non-local density weighted by geographic distance is as follows:

$$NLDW_j = \sum_u (D_u) + \left(\frac{1}{d_{uj}}\right), \quad u \neq j$$

where j indexes all LMAs, u indexes LMAs excluding LMA j, D_u is the number of footwear plants in LMA u, d_{uj} is the geographic distance between LMA u and LMA j. Basically, adjacent LMAs with high populations of footwear plants contribute the most to this measure while distant LMAs contribute the least and unpopulated LMAs do not contribute at all.

4. Analyses and results

4.1. Organizational failure analyses

We employ a piecewise exponential model to estimate the instantaneous hazard rate of plant failure. The unit of observation is the plant-year. Because organizational age is known to have complex effects on organizational failure (Carroll and Hannan, 2000), we include four age intervals – 0–5 years, 6–10 years, 11–20 years, and greater than 20 years – rather than the simple variable of organizational age. Note that the results reported here are robust to increasing or decreasing the number of age intervals and specifying various intervals. In essence this approach allows us to avoid the possibility of mis-specifying the effect of age on the failure rate by accounting for age dependence without formally theorizing on the age-failure relationship. In this setting, the greatest negative impact that age has on the failure rate occurs in the first interval, between zero and five years. Because we can only trace the age of plants founded after 1920, we also include a left-censored indicator variable for plants that were in existence in 1921. This accounts for any systematic differences introduced by the downward bias in our age measure for these plants.

Table 3 reports the results of these analyses. Model 1 reports several significant effects for the control variables. Imports and domestic production have a positive effect on the failure rate whereas exports have a negative effect. Footwear plants in LMAs with a greater human population are less likely to fail whereas those located in LMAs with higher wages are more likely to fail. Models 2, 3, and 4 examine the effect of the agglomeration ratio, local plant density, and their interaction. In Model 2, the main effect of the agglomeration ratio is positive but not significant. As evidenced by the positive coefficient on plant density in Model 3, proximity to other footwear plants increases the failure rate, as in Sorenson and Audia (2000). When the interaction between the agglomeration ratio and local plant density is included in Model 4, we observe that residing in an agglomeration increases the failure rate but this effect is attenuated as the number of footwear plants in the locale increases.

Note that these results do not distinguish between locally headquartered and remotely headquartered plants. Therefore, our next step is to disaggregate the local plant density variable into locally headquartered plant density and remotely headquartered plant density. Model 5 reveals a positive effect on failure of locally headquartered plants and a negative effect of remotely headquartered plants. To test Hypothesis 1 we need to examine the interactions between these density variables and the agglomeration ratio. Model 6 reveals positive and significant effects of the agglomeration ratio and locally headquartered density on plant failure but also a negative and significant coefficient for the interaction between these two variables. Remotely headquartered plants do not modify the competitive effect of residing in an agglomerated locale. Furthermore, the negative and significant coefficient of remotely headquartered plants in Model 5 becomes not significant when the interactions between these local plant densities and the agglomeration ratio are included. So these plant failure analyses support Hypothesis 1 that organizations exhibit lower failure rates in agglomerations with more locally headquartered organizations than in agglomerations with more remotely headquartered organizations.

Fig. 2 quantifies the impact that the agglomeration ratio has on the failure of plants residing in LMAs that have low, medium, and high densities of locally headquartered plants. We use values of 0, 25, and 50 for locally headquartered density to generate our graphs. The values in the graph are the sum of the effects of the agglomeration ratio, locally headquartered density, and the interaction term. To compute these values we use the coefficients in Model 6. First,

Table 3
Piecewise exponential failure models for U.S. footwear manufacturing plants, 1975–1991.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Plant age: 0–5 years	−24.7*	−24.8*	−24.8*	−24.8*	−24.9*	−24.9*	−25.7*
	(0.989)	(0.999)	(0.996)	(0.995)	(0.993)	(0.992)	(1.00)
Plant age: 6–10 years	−21.4*	−21.5*	−21.5*	−21.5*	−21.6*	−21.5*	−22.4*
	(1.05)	(1.06)	(1.05)	(1.05)	(1.05)	(1.05)	(1.06)
Plant age: 11–20 years	−21.8*	−21.9*	−21.9*	−21.9*	−22.0*	−22.0*	−22.8*
	(1.03)	(1.04)	(1.04)	(1.04)	(1.03)	(1.03)	(1.05)
Plant age: >20 years	−21.9*	−21.9*	−22.0*	−22.0*	−22.0*	−22.0*	−22.9*
	(1.03)	(1.04)	(1.04)	(1.04)	(1.04)	(1.04)	(1.05)
Imports	0.010*	0.010*	0.010*	0.010*	0.010*	0.010*	0.010*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Domestic Production	0.023*	0.023*	0.023*	0.023*	0.023*	0.023*	0.025*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Exports	−0.050*	−0.050*	−0.051*	−0.055*	−0.052*	−0.055*	−0.068*
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Left censored	−0.215*	−0.218*	−0.216*	−0.208*	−0.214*	−0.205*	−0.188†
	(0.100)	(0.100)	(0.101)	(0.100)	(0.101)	(0.101)	(0.101)
Log (plant volume)	0.025	0.025	0.025	0.024	0.031†	0.029	0.028
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
Population/100,000	−0.005*	−0.005*	−0.007*	−0.009*	−0.008*	−0.009*	−0.002*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Average LMA wage ($1000s)	0.179*	0.181*	0.185*	0.191*	0.185*	0.190*	0.217*
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	0.016	(0.018)
Non-local plant density	−0.021	−0.023	−0.052†	−0.046	−0.054†	−0.047	−0.061*
	(0.024)	(0.024)	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)
Comparative agglomeration ratio		0.002	−0.001	0.020*	0.002	0.019*	0.024*
		(0.004)	(0.004)	(0.008)	(0.005)	(0.008)	(0.008)
Plant density			0.004*	0.008*			
			(0.002)	(0.002)			
Comp. agg. ratio × Plant density				−0.001*			
				(0.000)			
Locally headquartered plant density					0.005*	0.009*	0.012*
					(0.002)	(0.003)	(0.003)
Remotely headquartered plant density					−0.153*	−0.112	−0.069
					(0.063)	(0.076)	(0.076)
Comp. agg. ratio × Locally HQ'd plants						−0.001*	−0.001*
						(0.000)	(0.000)
Comp. agg. ratio × Remotely HQ'd plants						−0.004	−0.006
						(0.006)	(0.006)
Chemical plant density							−0.004*
							(0.001)
Chemical plant density^2/1000							0.002*
							(0.001)
Rubber plant density							0.005*
							(0.001)
Rubber plant density^2/1000							−0.002*
							(0.001)
Plants	1277	1277	1277	1277	1277	1277	1277
Spells	11,516	11,516	11,516	11,516	11,516	11,516	11,516
Closings	825	825	825	825	825	825	825
Log likelihood	17.80	17.88	19.84	24.04	24.07	26.98	40.71
Wald χ^2 (df)	41,509.4 (12)	41,508.0 (13)	41,464.5 (14)	41,416.2 (15)	41,365.6 (15)	41,339.7 (17)	41,172.4 (21)

The units for imports, domestic production, exports and plant volume are "millions of pairs of shoes".
* $p < 0.05$; two-tailed tests.
† $p < 0.10$; two-tailed tests.

we note that in locales that do not have large values for the agglomeration ratio, the density of locally headquartered plants increases plant failure rates. We see evidence of the predicted effect of locally headquartered density for values of the agglomeration ratio that exceed 12. When the agglomeration ratio equals approximately 12, variations in the density of locally headquartered plants do not alter the impact of residing in an agglomeration. The failure rate of plants in such locations is between 24% and 26% higher than the failure rate of isolated plants.

When the agglomeration ratio equals 20, though, the presence of locally headquartered plants in the locale has a noticeable beneficial impact. In the total absence of locally headquartered plant density, the failure rate is 47% higher than the failure rate of isolated plants but a locally headquartered plant density of 50 implies a failure rate only 7.7% higher than the failure rate of isolated plants – close to a 40% drop in the failure rate. Moreover, at high levels of locally headquartered plant density and agglomeration, plants become more likely to survive, as evidenced by a failure rate that is 10% lower for plants in locales with a locally headquartered plant density of 50 and an agglomeration ratio of 30 than for isolated plants. Consider that Manchester, New Hampshire, had an agglomeration ratio of 21 and a locally headquartered density of 42 in 1975. Cape Girardeau, Missouri, or Adirondacks, New York, are examples of locales that had large agglomeration ratios in 1975 – 22 and 46, respectively – but had very few locally headquartered plants – 0 and 5, respectively. Footwear plants in Cape Girardeau, Missouri, or Adirondacks, New York, did not experience any agglomeration economies. In fact, based on the values in Fig. 2, they experienced considerably higher failure rates than if they had resided in locales with a lesser presence of footwear production.

Next, we split the sample into two sub-samples of locally headquartered and remotely headquartered plants and replicate our

Table 4
Piecewise exponential failure models for locally headquartered footwear plants, 1975–1991.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Plant age: 0–5 years	−24.3*	−24.3*	−24.3*	−24.4*	−24.4*	−24.4*	−25.6*
	(1.12)	(1.14)	(1.14)	(1.13)	(1.13)	(1.13)	(1.14)
Plant age: 6–10 years	−21.0*	−21.0*	−21.0*	−21.1*	−21.1*	−21.1*	−22.2*
	(1.19)	(1.21)	(1.20)	(1.20)	(1.20)	(1.20)	(1.20)
Plant age: 11–20 years	−21.4*	−21.4*	−21.5*	−21.6*	−21.5*	−21.6*	−22.7*
	(1.18)	(1.20)	(1.20)	(1.20)	(1.19)	(1.19)	(1.20)
Plant age: >20 years	−21.5*	−21.5*	−21.5*	−21.6*	−21.6*	−21.6*	−22.7*
	(1.17)	(1.19)	(1.19)	(1.18)	(1.18)	(1.18)	(1.18)
Imports	0.010*	0.010*	0.010*	0.009*	0.009*	0.009*	0.009*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Domestic Production	0.022*	0.022*	0.022*	0.022*	0.022*	0.022*	0.024*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Exports	−0.053*	−0.053*	−0.053*	−0.060*	−0.054*	−0.057*	−0.070*
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.022)
Left censored	−0.161	−0.161	−0.160	−0.123	−0.142	−0.118	−0.081
	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.112)	(0.114)
Log (plant volume)	0.014	0.014	0.013	0.012	0.015	0.015	0.009
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Population/100,000	−0.004*	−0.004*	−0.006*	−0.009*	−0.008*	−0.010*	−0.002*
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Average LMA wage ($1000s)	0.179*	0.179*	0.182*	0.193*	0.189*	0.195*	0.227*
	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)	(0.019)	(0.020)
Non-local plant density	−0.014	−0.014	−0.031	−0.022	−0.016	−0.005	−0.011
	(0.025)	(0.026)	(0.030)	(0.030)	(0.030)	(0.031)	(0.032)
Comparative agglomeration ratio		0.000	−0.002	0.037*	0.009†	0.030*	0.038*
		(0.005)	(0.005)	(0.009)	(0.006)	(0.009)	(0.009)
Plant density			0.003	0.009*			
			(0.002)	(0.003)			
Com p. agg. ratio × Plant density				−0.001*			
				(0.000)			
Locally headquartered plant density					0.007*	0.012*	0.015*
					(0.002)	(0.003)	(0.004)
Remotely headquartered plant density					−0.576*	−0.478*	−0.439*
					(0.133)	(0.167)	(0.171)
Com p. agg. ratio × Locally HQ'd plants						−0.001*	−0.001*
						(0.001)	(0.001)
Comp. agg. ratio × Remotely HQ'd plants						0.001	−0.002
						(0.011)	(0.011)
Chemical plant density							−0.004*
							(0.002)
Chemical plant density^2/1000							0.002*
							(0.001)
Rubber plant density							0.006*
							(0.001)
Rubber plant density^2/1000							−0.003*
							(0.001)
Plants	1,058	1,058	1,058	1,058	1,058	1,058	1,058
Spells	9,190	9,190	9,190	9,190	9,190	9,190	9,190
Closings	678	678	678	678	678	678	678
Log likelihood	−37.675	−37.675	−36.934	−27.204	−24.710	−21.075	−5.030
Wald χ^2 (df)	34,528.8 (12)	34,528.8 (13)	34,508.5 (14)	34,386.6 (15)	34,299.7 (15)	34,261.7 (17)	34,067.2 (21)

The units for imports, domestic production, exports and plant volume are "millions of pairs of shoes".
* $p < 0.05$; two-tailed tests.
† $p < 0.10$; two-tailed tests.

models from Table 3 for each sub-sample. Table 4 shows that the coefficient of the interaction between the agglomeration ratio and locally headquartered plants is negative, thus indicating that at high levels of geographic concentration of footwear production and density of locally headquartered plants the failure rate of locally headquartered plants declines. Table 5 shows the opposite effect for remotely headquartered plants. The coefficient of this interaction term is positive and significant. Residing in locales with heavy concentrations of footwear production and large numbers of locally headquartered plants increases the failure rate of remotely headquartered plants. These results support Hypothesis 2, according to which the survival-enhancing benefits of agglomerations with more locally headquartered organizations will be greater for locally headquartered organizations than for remotely headquartered organizations.

We also conducted supplemental analyses of the effect of the densities of two important suppliers to the footwear industry – plants in the rubber and chemical industries. We report models that include both plant density and density squared terms for the rubber and chemical industries because, as the results reveal, the relationships between these suppliers and footwear plants are both mutualistic and competitive. This may be because these plants supply footwear manufacturers but they also employ similar workers and target the same local investors. The squared terms allow the dominating effect to depend on density levels. Model 7 in Table 3 reveals that the density of chemical plants lowers the failure rate of footwear plants but that at high densities this effect reverses, turning into a competitive effect. The opposite pattern emerges for the density of rubber plants: a positive effect on the failure rate of footwear plants that is attenuated

Table 5
Piecewise exponential failure models for remotely headquartered footwear plants, 1975–1991.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Plant age: 0–5 years	−24.9*	−24.8*	−25.0*	−24.9*	−25.1*	−25.0*	−28.3*
	(2.40)	(2.40)	(2.40)	(2.40)	(2.41)	(2.41)	(2.61)
Plant age: 6–10 years	−21.7*	−21.5*	−21.7*	−21.5*	−21.8*	−21.7*	−24.5*
	(2.52)	(2.51)	(2.51)	(2.51)	(2.52)	(2.52)	(2.70)
Plant age: 11–20 years	−22.5*	−22.3*	−22.5*	−22.4*	−22.7*	−22.5*	−25.2*
	(2.45)	(2.45)	(2.45)	(2.45)	(2.46)	(2.46)	(2.65)
Plant age: >20 years	−22.0*	−21.8*	−22.0*	−21.9*	−22.2*	−22.0*	−25.1*
	(2.52)	(2.52)	(2.52)	(2.52)	(2.53)	(2.53)	(2.71)
Imports	0.009*	0.009*	0.009*	0.009*	0.009*	0.009*	0.009*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Domestic Production	0.022*	0.022*	0.022*	0.022*	0.022*	0.023*	0.026*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Exports	−0.083	−0.097	−0.093	−0.087	−0.098	−0.090	−0.155*
	(0.060)	(0.061)	(0.060)	(0.060)	(0.061)	(0.061)	(0.060)
Left censored	−0.578*	−0.635*	−0.572*	−0.547*	−0.584*	−0.555*	−0.468*
	(0.231)	(0.232)	(0.234)	(0.235)	(0.233)	(0.234)	(0.234)
Log (plant volume)	0.051	0.052	0.089	0.059	0.088	0.061	−0.009
	(0.096)	(0.098)	(0.101)	(0.100)	(0.100)	(0.099)	(0.105)
Population/100,000	−0.012	−0.001	−0.023*	−0.014	−0.023*	−0.015	−0.003
	(0.007)	(0.001)	(0.011)	(0.011)	(0.011)	(0.011)	(0.006)
Average LMA wage ($1000s)	0.301*	0.315*	0.318*	0.308*	0.319*	0.309*	0.537*
	(0.042)	(0.043)	(0.043)	(0.044)	(0.043)	(0.044)	(0.062)
Non-local plant density	−0.111	−0.153†	−0.248*	−0.234†	−0.249*	−0.249*	−0.030
	(0.087)	(0.092)	(0.118)	(0.119)	(0.117)	(0.119)	(0.151)
Comparative agglomeration ratio		0.020*	0.012	−0.014	0.015	−0.015	−0.024
		(0.009)	(0.010)	(0.019)	(0.010)	(0.022)	(0.024)
Plant density			0.014	0.001			
			(0.009)	(0.011)			
Comp. agg. ratio × Plant density				0.001*			
				(0.001)			
Locally headquartered plant density					0.015	0.001	0.014
					(0.010)	(0.012)	(0.020)
Remotely headquartered plant density					−0.032	−0.031	0.007
					(0.088)	(0.109)	(0.111)
Comp. agg. ratio × Locally HQ'd plants						0.002*	0.001
						(0.001)	(0.001)
Comp. agg. ratio × Remotely HQ'd plants						0.003	0.008
						(0.009)	(0.009)
Chemical plant density							−0.015†
							(0.009)
Chemical plant density^2/1000							0.014*
							(0.004)
Rubber plant density							−0.004
							(0.006)
Rubber plant density^2/1000							0.012*
							(0.006)
Plants	236	236	236	236	236	236	236
Spells	2,326	2,326	2,326	2,326	2,326	2,326	2,326
Closings	147	147	147	147	147	147	147
Log likelihood	72.46	74.70	75.94	78.08	76.01	78.30	95.33
Wald χ^2 (df)	6,860.2 (12)	6,855.8 (13)	6,847.8 (14)	6,808.9 (15)	6,838.4 (15)	6,803.3 (17)	6,556.3 (21)

The units for imports, domestic production and exports are "millions of pairs of shoes".
* $p<0.05$; two-tailed tests.
† $p<0.10$; two-tailed tests.

and then reversed into a negative effect at high densities. Interestingly, identical models in Tables 4 and 5 demonstrate that the competitive effects of these densities apply to both locally headquartered and remotely headquartered organizations but that the mutualistic effects of these supplier densities are slightly more pronounced for locally headquartered organizations than for remotely headquartered organizations. This may be because locally headquartered organizations, by virtue of their greater involvement in local supplier networks, are best positioned to reap informational, coordination, and transaction costs advantages from local suppliers. Yet, the interaction between the agglomeration ratio and locally headquartered organizations does not disappear when the supplier densities are entered (Model 7 in Tables 3 and 4), which suggests that it is not the mere presence of suppliers that accounts for the beneficial effects of locally headquartered organizations. The agglomerative effects of locally headquartered organizations likely stem from the manner in which locally headquartered organizations interact with a broad range of local actors.

4.2. Employment analyses

We examine the annually updated total number of manufacturing jobs outside SIC 31 using ordinary least squares regressions. We include LMA-fixed effects which control for a wide range of LMA characteristics that might influence employment including fiscal policies as well as natural advantages such as climate, proximity to harbors, and mineral deposits. Essentially, our identification strategy examines within-LMA employment levels as a function of the joint occurrence of footwear agglomeration and the presence of locally headquartered organizations. For example, according to Hypothesis 4, we expect footwear employment levels to be greatest within a hypothetical locale during years when the locale exhibits

Table 6
Ordinary least squares regressions of LMA non-footwear manufacturing employment levels, 1975–1991.

	(1)	(2)	(3)	(4)
Non-footwear manufacturing employers	0.023*	0.023*	0.023*	0.022*
	(0.001)	(0.001)	(0.001)	(0.001)
Non-footwear manufacturing wages ($1M)	−0.005*	−0.005*	0.005*	0.005*
	(0.000)	(0.000)	(0.000)	(0.000)
Imports	0.009*	0.009*	0.009*	0.009*
	(0.003)	(0.003)	(0.003)	(0.003)
Domestic Production	0.012	0.011	0.012	0.012
	(0.011)	(0.011)	(0.011)	(0.011)
Exports	0.343*	0.357*	0.342*	0.343*
	(0.085)	(0.085)	(0.085)	(0.085)
Population/10,000	0.147*	0.148*	0.150*	0.147*
	(0.031)	(0.032)	(0.032)	(0.031)
Non-local plant density	4.34*	3.68*	3.81*	4.34*
	(0.753)	(0.727)	(0.746)	(0.753)
LMA average plant volume (1000s)	−0.301*	−0.300*	−0.287*	−0.306*
	(0.086)	(0.086)	(0.086)	(0.086)
Average LMA wage ($1000s)	−0.922*	−0.922*	−0.894*	−0.895*
	(0.188)	(0.188)	(0.189)	(0.188)
Comparative agglomeration ratio		−0.004	0.002	0.002
		(0.109)	(0.109)	(0.124)
Locally headquartered plant density			0.008	0.337*
			(0.112)	(0.135)
Remotely headquartered plant density			−1.63†	−1.19*
			(0.854)	(0.895)
Comp. agg. ratio × Locally HQ'd plants				−0.046*
				(0.011)
Comp. agg. ratio × Remotely HQ'd plants				−0.117
				(0.085)
Constant	25.9*	25.9*	25.2*	24.7*
	(6.71)	(6.72)	(6.73)	(6.71)
R-squared (within)	0.339	0.339	0.339	0.344
N (LMAs)	208	208	208	208
N (LMA-years)	3438	3438	3438	3438
F-statistic (df)	183.29 (9)	164.91 (10)	137.80 (12)	120.30 (14)

Employment units are 1000s of jobs; units for imports, domestic production and exports are "millions of pairs; of shoes".
All models include unreported LMA-level fixed effects.
* $p < 0.05$; two-tailed tests.
† $p < 0.10$; two-tailed tests.

its greatest level of footwear producer agglomeration *and* its greatest presence of locally headquartered organizations. In the same year, according to Hypothesis 3, we would also expect manufacturing employment in non-footwear industries to be at their lowest level. Because employment outside the footwear industry is likely to be affected by time-varying local economic conditions outside the footwear industry, we also include the total number of plants and the average wage outside footwear manufacturing to account for such spatial variation.

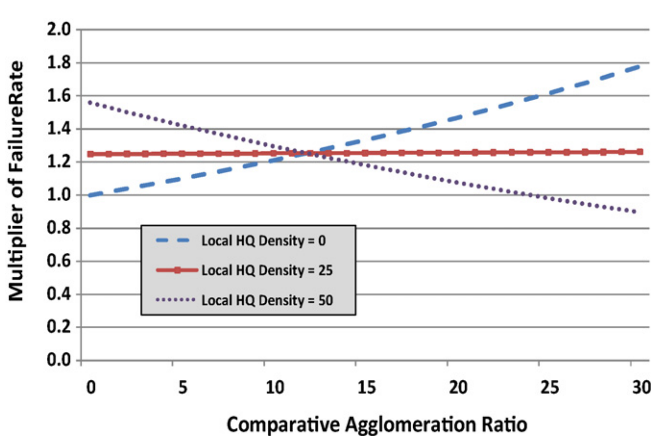

Fig. 2. Plant failure rates as a function of agglomeration and the density of locally headquartered producers (*based on results in Table 3, Model 6*).

Table 6 presents the results of these analyses. Model 1 shows several significant effects for the control variables, including positive effects for total plants outside footwear, exports, LMA population, and the non-local density of footwear plants and negative effects for wages outside footwear, domestic production, footwear wages, and footwear average plant size. Model 2 shows that the concentration of footwear production does not have a negative impact on manufacturing employment outside the footwear industry but interpretation of this result must be suspended until we consider the interaction with the plant density variables. Model 3 shows that locally headquartered footwear plants do not have significant impact on employment outside footwear but Model 4 indicates a negative and significant interaction between the agglomeration ratio and the locally headquartered plant density whereas the interaction between the agglomeration ratio and the remotely headquartered density is not significant. These results support Hypothesis 3 and reveal a potential downside of agglomerations populated heavily with locally headquartered organizations: the simultaneous demands of agglomerated footwear producers and many locally headquartered plants improve the survival chances of footwear plants but, at the same time, they also decrease manufacturing employment in other local industries. Supplemental analyses not reported here but available form the authors show that these results were robust to specifications that excluded control variables such as imports and domestic production.

In Table 7 we present regression results from models in which the dependent variable is the annually updated total number of jobs in SIC 31. We also use LMA-fixed effects in this analysis as well as the same control variables as in Table 6. As predicted in Hypothesis

Table 7
Ordinary least squares regressions of LMA footwear manufacturing employment levels, 1975–1991.

	(1)	(2)	(3)	(4)
Non-footwear manufacturing employers	0.001*	0.001*	0.000*	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)
Non-footwear manufacturing wages ($10M)	−0.004*	−0.004*	−0.002*	−0.002*
	(0.000)	(0.000)	(0.000)	(0.000)
Imports	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Domestic Production	−0.001*	−0.001†	0.000	0.000
	(0.001)	(0.001)	(0.000)	(0.000)
Exports	0.014*	0.013*	0.013*	0.012*
	(0.004)	(0.004)	(0.003)	(0.003)
Population/10,000	−0.010*	−0.010*	−0.010*	−0.010*
	(0.002)	(0.002)	(0.001)	(0.001)
Non-local plant density	0.562*	0.551*	0.311*	0.218*
	(0.035)	(0.035)	(0.030)	(0.028)
LMA average plant volume × 10,000	−0.076†	−0.092*	−0.065†	−0.024
	(0.042)	(0.041)	(0.034)	(0.032)
Average LMA wage ($1000s)	0.001	0.004	0.006	0.008
	(0.009)	(0.009)	(0.007)	(0.007)
Comparative agglomeration ratio		0.040*	0.032*	−0.018*
		(0.005)	(0.004)	(0.005)
Locally headquartered plant density			0.172*	0.115*
			(0.004)	(0.005)
Remotely headquartered plant density			0.149*	0.007
			(0.034)	(0.033)
Comp. agg. ratio × Locally HQ'd plants				0.008*
				(0.000)
Comp. agg. ratio × Remotely HQ'd plants				0.041*
				(0.003)
Constant	−0.105	−0.130	−0.231	−0.131
	(0.325)	(0.323)	(0.267)	(0.246)
R-squared (within)	0.472	0.481	0.646	0.701
N (LMAs)	208	208	208	208
N (LMA-years)	3438	3438	3438	3438
F-statistic (df)	319.30 (9)	298.43 (10)	488.62 (12)	538.26 (14)

Employment units are 1000s of jobs; units for imports, domestic production and exports are "millions of pairs of shoes".
All models include unreported LMA-level fixed effects.
* $p < 0.05$; two-tailed tests.
† $p < 0.10$; two-tailed tests.

4, in Model 4 we observe a positive and significant effect of the interaction between the agglomeration ratio and the locally headquartered plant density. We also find a positive effect on footwear employment of the interaction between the agglomeration ratio and remotely headquartered plant density. Perhaps the simultaneous presence of agglomerated footwear producers and remotely headquartered plants enhance locally headquartered producers' efforts to obtain support that may maintain or increase employment levels. This interpretation seems consistent with the finding in Table 4 that remotely headquartered density lowers the failure rate of locally headquartered plants.

5. Discussion

One might summarize the story of the U.S. footwear industry's decline with Fig. 1. From 1975 to 1991, annual domestic footwear production decreased from 413 million pairs of shoes to 218 million while imports increased from 286 million pairs of shoes to 1.2 billion (Footwear Industries of America, various years). During the same period, U.S. footwear employment declined by 57 percent from approximately 157,700 jobs in 1975 to 67,300 jobs in 1991. Facing mounting competition from foreign manufacturers and the removal of trade barriers that had long protected the industry from import competition, 825 U.S. footwear manufacturing plants closed between 1975 and 1991. Foundings, plant relocations and consolidations offset some plant closures but the number of operating plants in the U.S. decreased from over 1,000 plants in 1975 to only 581 plants in 1991.

As Fig. 1 clearly illustrates, globalization and the accompanying 431 percent increase in imports between 1975 and 1991 nearly eradicated the once-vibrant U. S. footwear manufacturing industry. But locales were not uniformly affected by the decline of the footwear industry. Consistent with previous analyses of the U.S. footwear industry (Sorenson and Audia, 2000), we found that footwear plants were more likely to fail if they resided in locales densely populated with other footwear plants. Residing in locales that had a heavy concentration of footwear production also increased the failure rate but this effect was attenuated and, in some cases, reversed by the presence of locally headquartered plants. Furthermore, our analyses revealed that only locally headquartered plants enjoyed the agglomeration economies associated with the simultaneous presence of a heavy concentration of footwear production and a large number of locally headquartered plants. And while agglomerated locales were more likely to support footwear producers and footwear jobs despite the industry's grim prospects, our results suggest that such outcomes came at the expense of reduced employment in other local industries. Specifically, our analyses indicate that increases in locally headquartered plants and geographic concentration of footwear production were associated with employment decreases in other manufacturing industries.

This study offers two primary contributions to the agglomerations literature. First, our results shed additional light on the generalizability of agglomeration economies. Much of the evidence supporting the existence of agglomeration economies comes from studies of expanding high-technology industries like life sciences (e.g., Owen-Smith and Powell, 2004; Whittington et al., 2009; Aharonson et al., 2007, 2008) and electronics (e.g., Saxenian, 1994;

Görg and Ruane, 2000). Studies of mature and declining industries, in contrast, have produced less supportive evidence (Glaeser et al., 1992; Appold, 1995; Staber, 2001).

The results of our empirical analyses offer some insight into the mixed findings of agglomeration studies. As in other studies situated in mature and declining industries, we find evidence that ecological competition dominates the beneficial effects of agglomeration economies. We do find, however, that the presence of locally headquartered organizations attenuates the harmful effect of agglomeration on co-located organizations and at very high densities even reverses the harmful effect of agglomeration into a beneficial one. This finding therefore suggests a qualification consistent with one of the most prolific lines of inquiry undertaken in recent years by agglomeration researchers (Rosenthal and Strange, 2003; Owen-Smith and Powell, 2004; Aharonson et al., 2007, 2008; Whittington et al., 2009): whether agglomeration economies materialize in a declining industry may depend on the degree of interaction of the co-located organizations with other local actors.

Although, as much research on agglomerations (Rosenthal and Strange, 2004), our analysis does not allow us to isolate mechanisms or to distinguish between sources of agglomeration economies, we formulated arguments for why under conditions of industrial decline locally headquartered organizations may be best positioned to gain access to knowledge spillovers but also to lower coordination costs in market exchanges with local suppliers. In addition, drawing on the literature contrasting locally headquartered and remotely headquartered organizations, we suggested that an additional source of advantage for agglomerations populated with locally headquartered organizations may be the greater commitment to the locale of local entrepreneurs and the concomitant greater material support they receive from local actors. So whereas in an expanding industry, organizations' degrees of interaction with other local actors may help explain why agglomeration economies are stronger in one region as opposed to another (Saxenian, 1994), in a declining industry, as our results indicate, the presence of a strong cadre of organizations involved in the locale may be necessary for agglomeration economies to materialize at all.

Our second contribution to the literature on agglomerations is that our empirical analyses reveal a potential trade-off at the community level. Prior work tends to focus solely on organizations within the agglomerated industry or local employment within the agglomerated industry. The consequences of agglomerated industries for other local industries have largely eluded consideration. Some relevant evidence comes from a study of instruments manufacturing in which the impact of the dominant industry (i.e., the greatest provider of local wages) on the birth of instrument manufacturing is examined (Audia et al., 2006). In most cases in which a locale hosts an agglomeration, the dominant industry and the agglomeration coincide. Mindful of the distinction between these two concepts, Audia et al. find that the presence in a locale of a dominant industry unrelated to instruments manufacturing depresses the birth of instruments organizations. Similarly, our results indicate that high levels of geographic concentration of footwear production and a greater presence of locally headquartered organizations combine to suppress job growth in other manufacturing industries. We describe this as a *potential* downside because concentrating local resources in the agglomerated industry may not necessarily harm a locale's prosperity. We simply note that in the case of a declining industry, like footwear manufacturing between 1975 and 1991, a narrow focus on the agglomerated industry may reduce the speed with which a locale renews its industrial base (Safford, 2009).

A few additional points warrant discussion. Our distinction between locally and remotely headquartered organizations partially overlaps with the distinction between non-subsidiaries and subsidiaries. Therefore, it is helpful to consider how our results and analyses differ from Rosenthal and Strange's analysis of the agglomerative effects of non-subsidiaries and subsidiaries in eight industries. Recall that non-subsidiaries are treated in our analysis as locally headquartered organizations but that the classification of subsidiaries depends on whether the headquarters reside in the same locale or reside elsewhere. Specifically, in our taxonomy, some subsidiary units would be classified as locally headquartered while others would be classified as remotely headquartered. The crucial determinant is the subsidiary unit's proximity to corporate headquarters. Rosenthal and Strange (2003, p. 387) do not find a clear pattern of results and note that "the mixed results may suggest that subsidiary status is too rough a measure to capture the influence of a hierarchical corporate structure."

It is tempting to infer, based on this comparison of our results against those of Rosenthal and Strange, that the locally headquartered versus remotely headquartered distinction is more meaningful than the non-subsidiary versus subsidiary distinction. But, there are several differences between these studies that may account for the different results and suggest caution. The independent variables differ because we use counts of locally and remotely headquartered organizations, whereas they use employment in subsidiaries and non-subsidiaries. Further, we examine failure rates and aggregate employment whereas they examine openings of new establishments and new-establishment employment. These differences warrant caution regarding the generalizability of our results to outcomes other than organizational failure rates. More generally, these findings suggest the need to conduct additional research on the agglomerative effects of locally headquartered organizations.

Last, Sorenson and Audia (2000, p. 450), in their analysis of the forces underlying the persistence of agglomerations in the footwear industry, found that locales with dense population of footwear producers experienced higher failure rates and higher founding rates and concluded that "higher founding rates, not lower failure rates, sustain agglomerations." Our analysis confirms their results regarding the higher failure rate of agglomerated producers. Residing in an agglomeration was harmful for the average footwear producer. However, when the distinction between locally headquartered and remotely headquartered plants is taken into account, it appears that agglomerations varied in their effects on the failure rate of existing organizations. Locales with the right mix of agglomeration and locally headquartered organizations continued to be important industry centers also because their plants failed at a significantly slower rate than plants in other agglomerated locales. The irony is that this greater resilience did not necessarily benefit the long-term prosperity of the locale.

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