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Industry Location, Economic Development Incentives, and Clusters

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Abstract: In his *Presidential Address*, Professor Woodward uses South Carolina's economic development experience as a case study of significant challenges in regional development. The state has re-industrialized and emerged as a leader in attracting capital investment through generous financial incentives, after watching the demise of its major industry cluster (textiles and apparel) since the 1970s. The address argues that regional science research continues to advance our understanding of regional policies promoting industrial location. He urges caution regarding development incentives as a regional strategy. Instead, emerging research suggests that stronger agglomeration and cluster-based strategies are better suited to promote contemporary economic development.

Keywords: economic development, industry location, clusters, incentives
JEL Codes: R10, R11, R58

1. INTRODUCTION

Mark Partridge (2006) stressed in his SRSA presidential address that regional science scholars are more "grounded" than our colleagues in economics or geography. Most members of our association would agree. It is a point of pride that our research is relevant.

In my presidential address, I am going to argue that in terms of 21st century regional policy in the United States (and elsewhere), our research remains highly relevant. In particular, I will highlight the literature on the regional determinants of industrial location decisions, the efficacy of financial incentives, and how cluster development addresses core concerns of state and local policy makers.

I am going to use South Carolina's economic development as a case in point. It is a case that I have studied for more than 25 years, as my academic position involves extensive interaction with state government and businesses. I see how public concerns about development policies overlap with our research interests.

I also present the South Carolina case because it serves as an interesting model of modern economic development strategy. It is now taught worldwide as a Harvard Business School case study of economic development and regional clusters (Porter and Ramirez-Vallejo, 2012).

My theme is that regional research can provide insights into our most pressing regional economic development challenges; yet our findings are not always unambiguous. Despite a

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dramatic improvement in methods, consistent findings for key policy variables still elude us. Two examples that I will cover in this address are the effects of unionization and tax incentives on location decisions. In South Carolina, as in many states, these are core development issues.

If there is a consensus common to regional science research and modern economic development practices, it is that regions benefit from agglomeration economies. In modern practice, as illustrated by South Carolina, this means that understanding and promoting regional clusters is taken seriously by businesses as well as state and local governments. This has opened new questions for regional research investigating agglomeration and clusters.

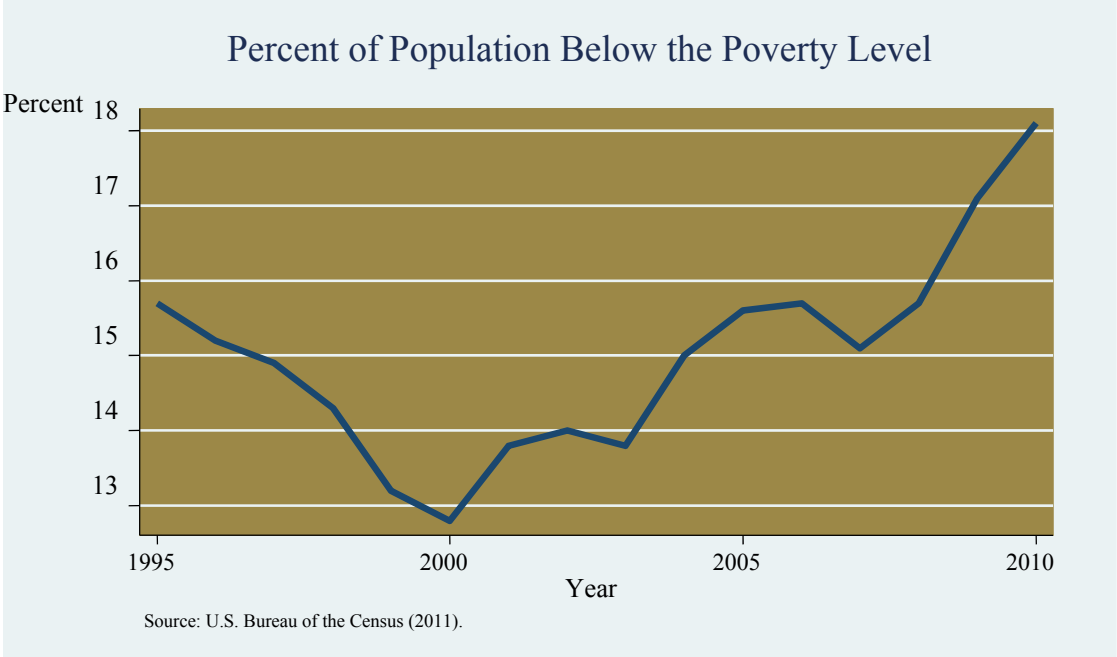
2. THE SOUTH CAROLINA STORY, PART 1

South Carolina is a paradox in many respects. The state ranks at the top of industrial site selection consultant lists for business location (Area Development, 2012) and has been evaluated as the leader in employment creation through attracting foreign direct investment (IBM Institute of Business Value, 2012). Yet South Carolina ranks low in education and per capita income compared with other U.S. states. According to the Bureau of Economic Analysis (2012), the state's per capita income was $33,388 in 2011 (80 percent of the national average; near the bottom at 46th place among the 50 U.S. states). The long-term growth of per capita income (2001-2011) fell below the national average.

The poverty rate, which rose to 18 percent of the population during the Great Recession of 2008-10, poses challenges that are similar to those in struggling regions across the world. The poverty trend is shown in Figure 1. The persistent poverty in the south has been studied extensively. SRSA members like President-Elect (in 2012) Dan Rickman, along with Mark Partridge and many others, have generated some of the best work on poverty anywhere.

Rather than poverty *per se*, I want to focus first on South Carolina's development policy of incentives, which has been the hallmark of the state's industrial policy. The state's generous

Figure 1: The South Carolina Poverty Trend



use of financial incentives results from a hemorrhaging of manufacturing jobs that began with the decline of the textile and apparel industries in the 1970s. South Carolina pioneered regional economic development around target industries and branch plant location, with increasingly generous incentives to lure business.

Steering location decisions has been a major objective of South Carolina economic policy. The state's proclivity to beguile companies with financial and other incentives could be called promiscuous. The reason for this behavior is simple: jobs. Employment creation is the major policy objective, as it is in most states. Thus, a better understanding of the dynamics of industry location is crucial to policy makers.

From a policy perspective, South Carolina is in the vanguard of creating targeted manufacturing strategies that attempt to orchestrate private capital decisions with financial incentives. Economic development leadership in South Carolina originates with the Governor, the Department of Commerce, and the Coordinating Council for Economic Development, which encompasses ten governmental agencies concerned with state economic development. These organizations allocate incentives to firms and they also finance public development projects. With local (county and municipal) involvement, the government offers a myriad of incentives when recruiting companies. Among the business-friendly incentives and favorable tax treatment identified by the South Carolina Department of Commerce are the following:

- A general fund that provides the additional dollars needed to recruit industry;
- Job development credits that give a cash refund to new or expanding companies;
- A five percent corporate income tax rate;
- No state property tax;
- No local income tax;
- No inventory tax;
- No sales tax on manufacturing equipment, industrial power or materials for finished products;
- No wholesale tax; and
- No unitary tax on worldwide profits

South Carolina also provides a variety of customized incentive programs, including:

- Corporate income tax credits: job tax, corporate headquarters relocation, research and development, investment, biomass resources and ethanol or biodiesel;
- Discretionary income, license or withholding tax incentives; and
- Discretionary property tax incentives: negotiated as a fee-in-lieu of property tax.

In part, this leading role in the creative and discretionary financing of economic development was born out of necessity and paranoia. Textiles and apparel, the state's predominant industries by far, began a long-term decline in employment and de-clustering in the 1970s. This decay was a huge problem because it affected so many communities across the state.

In turn, manufacturing location is widely discussed and debated in South Carolina. Not to be outdone by any other state, South Carolina has stridently promoted itself to industry as business friendly, low cost, and anti-union in order to sell itself to private companies. As for the industries targeted, there have been many. In South Carolina, it was a "shoot anything that flies/claim anything that falls" approach to getting trophies (Rubin, 1988); but to some extent, this scattershot targeting strategy worked. One of the apparent successes has been the surge of

foreign direct investment in South Carolina. In the late 1960s and 1970s, the state targeted European firms and offered generous incentives.

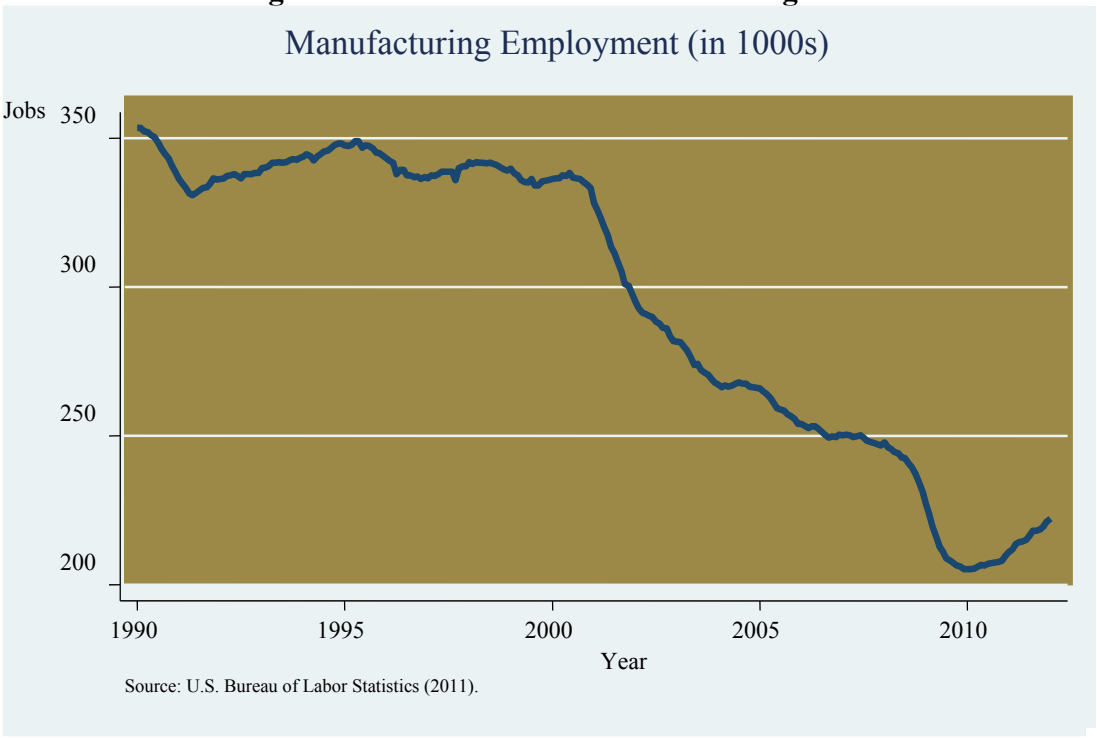
Foreign direct investment plays a prominent role in reindustrialization. The first large investments were from the big German chemical companies that largely served what would later be the moribund textile industry. Next came the competitive European automotive companies in the 1980s and 1990s. Bosch, the German automotive parts supplier, was also an early entrant, as was Michelin, which put its North American headquarters and invested substantial capital into the state.

BMW represents the crown jewel of this strategy. During 1992, as the U.S. economy was emerging from recession, BMW announced it would build a modestly-sized branch plant that would hire 1,900 workers. After 20 years in operation, it employs more than 6,000 workers directly and many more though indirect and induced impacts (Schunk and Woodward, 2004; Woodward and Guimarães, 2008). The company has invested billions in the upstate region, visibly transforming the former textile-apparel communities surrounding the plant.

Overall, however, the state has seen manufacturing employment erode, despite growth in durables manufacturing (see Figure 2). The auto cluster reached 30,000 jobs by 2008, but the textile- apparel cluster lost more than 200,000 jobs. The real decline only started when textile plants closed in the late 1990s and early 2000s.

South Carolina's strategy of re-industrialization through targeted incentives lasted into the early 21st century. In 2010, Boeing announced that it would open a new assembly plant for its Dreamliner aircraft in North Charleston, South Carolina. The facility was one the largest U.S. capital expansions in years. It was notable because for the first time it moved large-scale assembly production away from the strong aircraft agglomeration in and around Everett,

Figure 2: South Carolina Manufacturing Jobs



Washington. Moreover, the site selection was controversial because it was alleged to have been the result of the Chicago-based management's decision to counter organized labor by re-locating production to the non-union (right-to-work) state of South Carolina. The $500 million-plus incentive package offered by the state, including direct subsidies, also stirred controversy. It is the first time the state has issued a special $270 million bond to support the branch plant. Thus, state taxpayers are significantly subsidizing capital construction of the private facility.

3. WHAT WE KNOW ABOUT UNIONS AND INCENTIVES

Clearly, understanding the determinants of facility location, notably the role of incentives and unionization, is a relevant issue for regional science. In the last 25 years, regional science has produced considerable research that helps us understand firm location decisions. I will briefly cover the recent work. A good review can be found in the *Journal of Regional Science* by Arauzo-Carod et al. (2010). The article highlights the recent progress in analytical foundations, statistical techniques and econometric modeling in location.

Generally, industrial location research has improved considerably with better data and statistical techniques. Indeed, most of the research over the past 25 years has been devoted to improving the empirical modeling of industrial location. Much of the new empirical location research includes the use of discrete choice techniques, employing the multinomial (conditional) logit model associated with the statistical techniques developed by Nobel Laureate Daniel McFadden in 1974. Bartik (1985) wrote the seminal paper applying conditional logit to location, testing choices among U.S. states. Count data models such as the Poisson and negative binomial are also prevalent in recent location research.

Since this literature investigates branch plant location, it should provide some guidance on the tools used in industrial policy by South Carolina and other states. Two major policy instruments under state-level control are incentives and the business climate. As a measure of business climate, unionization stands out as an important factor. Despite the long-term, downward trend in the share of the U.S. workforce belonging to unions, there is still substantial state variation in the openness to organized labor because of right-to-work laws. In recent years, South Carolina has highlighted its anti-union (right-to-work) business climate to companies like Boeing in its promotion efforts even more than incentives.

Yet, what does the literature say about unionization? In the location studies conducted in U.S. regions, the effect of this measure of "business climate" is mixed. It has even been found to counter expectations that it would diminish the probability of location, while holding other variables constant (Bartik, 1985). For foreign direct investment (like BMW in South Carolina), unionization has been found to be negative and statistically significant (Coughlin et al. 1991; Friedman et al., 1992; Woodward, 1992).

While methods continue to improve, the specifications of location models are typically *ad hoc*. At the state level, the independent variables may include wages, human capital, market potential and state population, infrastructure quality, taxes, and agglomeration (localization and urbanization).

There has been a notable drop off since the 2000s in location studies that test unionization as a location determinant. This is unfortunate. Judging by what has happened in industrial "heartland" states like Indiana and Michigan, which recently passed anti-union, right-to-work laws, there are more policy makers convinced that lower unionization means more

manufacturing investment and employment. The effects of the stepped-up interstate competition over a non-union workforce, following South Carolina's lead, need to be better understood. We still have not settled the statistical significance, much less the marginal impact of unionization on location decisions and economic growth.

In contrast with studies of location and unionization, the work on tax incentives as a location determinant is proliferating. As Peters and Fisher (2004, p. 29) wrote in their comprehensive meta-review of state and local incentives, the "scholarly literature is massive." They contend that "the most important question is: Does economic development induce jobs or investment?" Confirming earlier work (Fisher and Peters, 1998), they again found that there was a pronounced shift in the 1990s regarding the findings on taxes and incentive effects on state location decisions, jobs, and investment. Previously, most studies were skeptical. The new view after the mid-1990s was that a low tax, high-incentive state like South Carolina may benefit in terms of location decisions, jobs, and investment. Lower taxation has been shown to have an especially large effect on the location of foreign direct investment; above all, for investors from countries that exempt foreign income (Hines, 1996). To some degree, these findings corroborate South Carolina's low tax and FDI-led re-industrialization strategy.

It is notoriously difficult, however, to assess state-level taxes with any accuracy, even with modern discrete choice techniques. Discretionary tax policy, as practiced by South Carolina, masks the tax burdens facing individual firms as they make location decisions. The statutory rates for state taxation differ from the rates companies actually pay. Accordingly, aggregate empirical analyses of state location decisions, even using more refined statistical methods, tend to oversimplify the messy reality of tax rivalry. One sophisticated paper in the recent stream of literature uses a tax-related variable for the state user cost of capital (Chirinko and Wilson, 2008). The user cost of capital is an attempt to capture the actual corporate tax levy, accounting for differences in tax schedules and exemptions. State taxes are considered fundamental in this analysis, and could make a difference at the margin (after controlling for fundamental location factors). Yet, in South Carolina and elsewhere, this user cost of capital would be a rough approximation of the actual tax burden. As Barkley (2008) argued in his SRSA presidential address regarding assessing regional competitiveness, there is a strong case to be made for case studies of tax incentives and location.

Discrete-choice regression analysis when applied to aggregate state data can, however, help us understand the increasingly aggressive competition among states to attract mobile capital. The question remains: Even if South Carolina succeeds in luring more investment through incentives, is this a zero-sum game among states? Schmidheiny and Brülhart (2011) show how empirical techniques affect our interpretation of tax implications on these issues. The paper contributes to a series of recent advances in discrete choice approaches to empirical location modeling that provide more reliable results. It appears that the most commonly employed statistical methods in location (conditional logit and Poisson regressions) have different economic implications. Essentially, the authors demonstrate that different approaches to location modeling (and the potential influence of taxes) provide alternative interpretations of the estimates. With this new technique, researchers will be able to discriminate between zero sum (conditional logit regression) and positive sum (Poisson regression) outcomes, depending on the empirical technique. With conditional logit, the authors show that aggregate investment is fixed and the regional rivalry through incentives would affect the distribution of plant

investment. With Poisson, they suggest that total investment is tied to the location factors across regions and does not come at the expense of other regions in the choice set.

A stellar illustration of pertinent, path-breaking research on state incentives is the paper by Carlianne Patrick which was awarded the 2011 SRSA Moriarity Prize at the 50th Anniversary of the Meetings in New Orleans. This paper suggests that the South overall, and specifically South Carolina, has a much greater constitutional ability to offer direct financial assistance to firms—some states have constitutional provisions for aid to private entities that constrain the ability to offer financial incentives.

It turns out that the kind of direct subsidies through special purpose bonds issued as a result of Boeing's investment in South Carolina are not possible everywhere. Patrick (2011) assessed all state constitutions in the United States and generated an Incentives Environment Index (IEI). It shows which states have the greatest ability to subsidize industry. The index reveals that states that have the greatest ability to offer capital subsidies are also extremely heterogeneous. The focus on constitutional provisions proved insightful. In terms of the index, South Carolina is a leader. Now we know that South Carolina's incentive strategy is driven by more than just mere desperation from the de-clustering of textiles and weak development since the 1970s.

The paper argues that incentives enter into the second stage in the location decision, where in the first stage similar profit-maximizing locations are screened by site consultants. Through sophisticated empirical work that is grounded in theory, Patrick finds that government financial assistance to private sector firms has either no effect on state jobs or negative medium-term effect on rural county employment.

Thus, current research fundamentally challenges incentive policy of capital subsides in the interest of job creation. It seems that incentives may increase capital, but not create jobs. That is relevant to South Carolina, which has witnessed a large amount of capital investment without commensurate job growth.

4. THE SOUTH CAROLINA STORY, PART 2

Given the stagnation in per capita income, huge losses in manufacturing employment, and growing poverty, it would appear that South Carolina's industrial strategy to entice branch plants with incentives and "friendly business climate" is not working. In the first decade of the 21st century, South Carolina business leaders began to recognize the limits of incentives and low-cost "race-to-the bottom" strategies and called for a new approach (Porter and Ramirez-Vallejo, 2012). Mark Sanford, the Governor when Boeing came to South Carolina in 2010, is an economic libertarian and openly opposed incentives during his eight years in office. Rather than incentives, he argued that the state needed to develop the "soil conditions" where private businesses could grow and thrive. As for incentives, Sanford might have vetoed the Boeing bill had he not been enmeshed in a personal scandal. The next Governor, Nikki Haley, was also an economic libertarian. She campaigned against targeted incentives (including Boeing) and won election in 2010. In one of her first acts, she did veto a bill to provide Amazon with a sales tax exemption for a distribution facility. In lieu of incentives, she sought to revitalize industry through staunch opposition to unionized labor. Her message is that South Carolina needs a pro-business, anti-union regional economic climate to attract industry.

As another alternative to the state's traditional policies of incentives, some South Carolina development leaders began to advocate cluster strategies. The cluster approach took hold around the world in the early 2000s. The difference in South Carolina was that cluster initiatives were largely driven by the private sector, which was the catalyst for South Carolina's cluster-based competitiveness council called "New Carolina," which began in 2003 (Porter and Ramirez-Vallejo, 2012).

The state provides a strong case for how industrial clusters can foment economic growth and how subsequent de-clustering can have devastating consequences. In the early 20th century, the textiles and apparel investment brought the industrial revolution to the South Carolina. Dirt-poor sharecroppers turned into factory workers and transformed agrarian-based communities into mill villages. Throughout most of the 20th century, industrialization largely took place in this one cluster with little diversification. In raising per capita income, the state progressed through the 1950s. The manufacturing belt is found southwest of Charlotte, North Carolina toward Atlanta, Georgia and mostly along Interstate 85.

In terms of location, this region is commonly expected to abound in low cost, cheap labor. Unions never were established here to the extent that they were in other regions due to right-to-work laws. More important to location, however, was the fact that South Carolina's upstate region had a comparative or natural advantage favoring textiles and apparel because of cheap hydro power, which explains the proliferation of mill villages along the falls and streams of the Piedmont. In other words, it was largely *not* low labor costs alone that attracted industry to this region over a century ago.

Over time, though, cheap power would no longer serve as a significant comparative advantage. Cheap power found itself to be as fleeting a location advantage as the state's low labor costs and low unionization. The cluster began a long-term process of erosion. Relocation of apparel manufacturing lured by even lower labor costs in the developing world put an end to labor-intensive production across South Carolina in the 1970s. At the same time, textiles—a capital-intensive industry—remained in the state through the late 1990s. Although the industry became more productive, it was no longer part of a strong cluster, having lost its local apparel customers to the developing world manufacturers.

As South Carolina watched its major industry collapse, Asian companies (especially those in China) built up huge competitive advantages in textiles and apparel. The Chinese industrial complexes gained significant cost advantages through economies of scale and scope (the variety of textiles is a unique advantage of sourcing in China). Even the textile quota system that continued after China joined the World Trade Organization in 2001 could not prevent the inexorable downfall of U.S. textiles and apparel production.

2001 was a watershed year for South Carolina's industrial policy. Figure 2, shown earlier, depicts the precipitous decline in the state's manufacturing employment base after 2001. Increased manufacturing employment, the goal of policymakers with targeted incentives since the 1970s, was obviously not working.

The New Carolina cluster policy staked out its goal as raising per capita income and this became a state development mantra (New Carolina, 2012). The way forward was to implement (or "activate") and promote industrial clusters as the core economic driver. A strong cadre of private sector leaders now embraces regional cluster policy as an alternative to industrial targeting. They are primarily influenced by the writings of Michael Porter, the prolific and influential Harvard Business School professor. In a major 2003 address to the state's leaders,

Porter was critical of targeted incentives and pushed clusters as a new strategy. His major point—the old model is wrong—made sense in a region witnessing de-clustering through globalization. For many observers of economic development, the discovery of clusters was a pivotal moment in the state's economic history.

Without a doubt, Porter has become the most well-known advocate of an alternative approach to economic development the early 21st century. In theory, any area can develop a myriad of competitive clusters. As the Napa Valley, California wine region suggests, clusters do not need to be the emerging "industries of the future." Regions can prosper by upgrading existing industries and clusters, not by searching for new targets such as biotech and other high-technology saviors. Indeed, all industries and clusters matter, including agriculture. Driving home this point, Porter (1998) asserts that "there are no low-tech industries, only low-tech firms." Accordingly, it would appear that there is no need for industrial targeting. Instead, Porter argues for private sector institutional collaboration that promotes regional cluster externalities—which he believes exist everywhere from inner cities to rural communities. Even with the decline of the textile-apparel cluster in South Carolina, its cluster activation organization (New Carolina) rallied the remnants of the local industry and formed a cluster committee. When China joined the World Trade Organization in 2001, only a few major textile mills remained. This appeared to be "clusters' last stand" for textiles and apparel in South Carolina. Nevertheless, with the advent of the cluster committee, the industry became more focused, upgraded technology, and survived for another decade.

At the same time, the South Carolina automotive sector emerged as a prominent exemplar of successful new "traded" cluster development. In the Porter theory, traded clusters are similar to the familiar basic, or export sectors that are well known in regional science. In the early 2000s, the automotive industry was emerging from its origins in incentive-based, branch-plant location to become a developing, even thriving, cluster (Woodward et al., 2011).

Figure 3 depicts standard, county-level employment location quotients for transportation equipment manufacturing from the Census Bureau's County Business Patterns online database. The maps show how regional specialization of the industry has migrated from Michigan to southern regions from the mid-1980s to 2010. They give a sense of how the U.S. industry has de-clustered, providing an opportunity for southern states (see Klier and Rubenstein, 2010).

The steady growth of South Carolina's transportation equipment industry is shown in terms of sales and employment in Figure 4. Few other sectors of the economy have the potential to scale up employment in South Carolina, which remains the most pressing economic development imperative in South Carolina. Using the 2009 IMPLAN input-output model (four-digit industry level), the automotive-related employment multipliers are higher than are employment multipliers for any other industry in the state. The job multiplier for South Carolina's Light Truck Manufacturing industry is 4.6, while Automotive Manufacturing is 4.1 (Woodward et al., 2011). Employment multipliers reflect the ratio of total jobs supported in South Carolina to direct jobs in South Carolina automotive establishments; that is, each direct job supports on average an additional 3.6 jobs and 3.1 jobs, respectively. These compare favorably to their equivalents in textile fabric mills (1.9), cotton farming (1.4), retail stores (1.2), performing arts complexes (1.2), and any other industry in the state. Contrary to what Michael Porter preaches, it would appear that some economic sectors do matter more than others, at least in terms of their job implications. It is also interesting to note that separate regional sub-clusters have taken root across the state, as indicated by the map in Figure 5.

Figure 3: U.S. County Location Quotients for Transportation Equipment Manufacturing, 1986 (top) and 2010 (bottom) (NAICS 336)

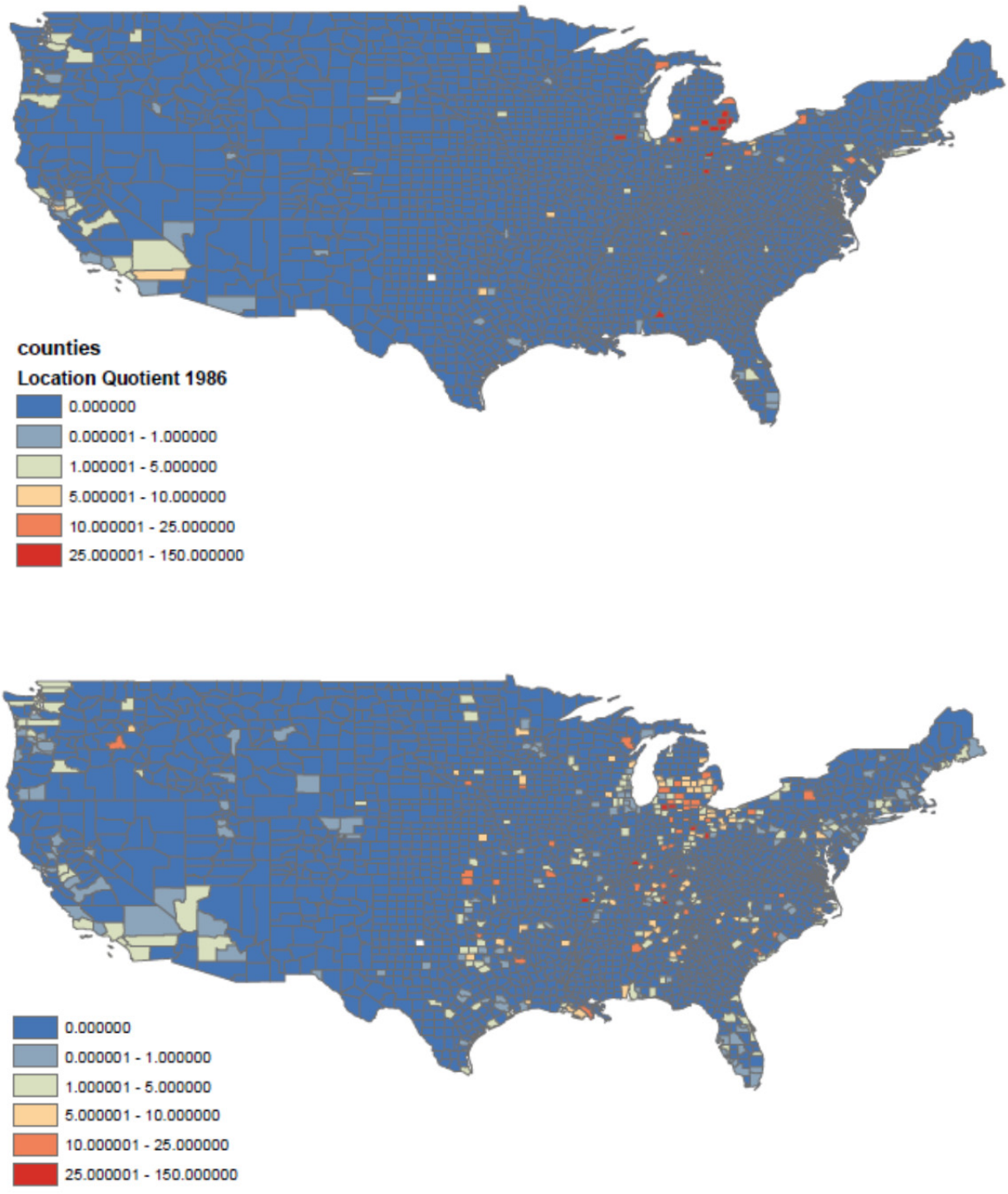


Figure 4: The Growth of the Ground Transportation Industry in South Carolina

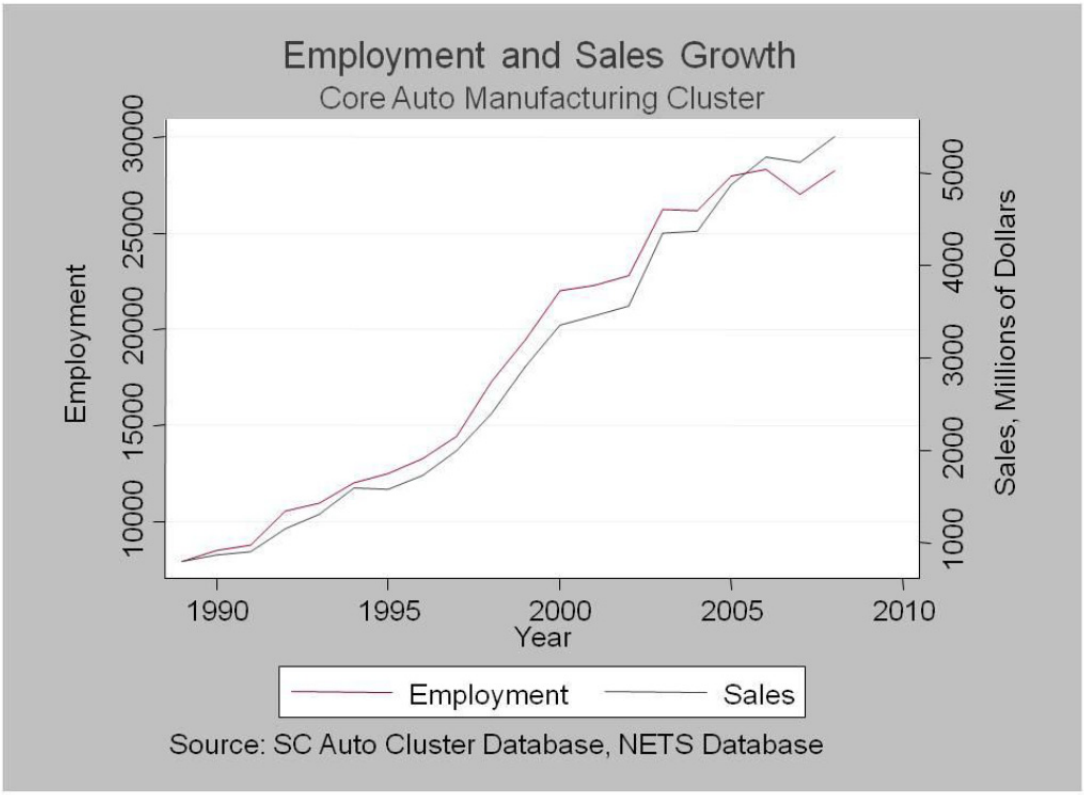
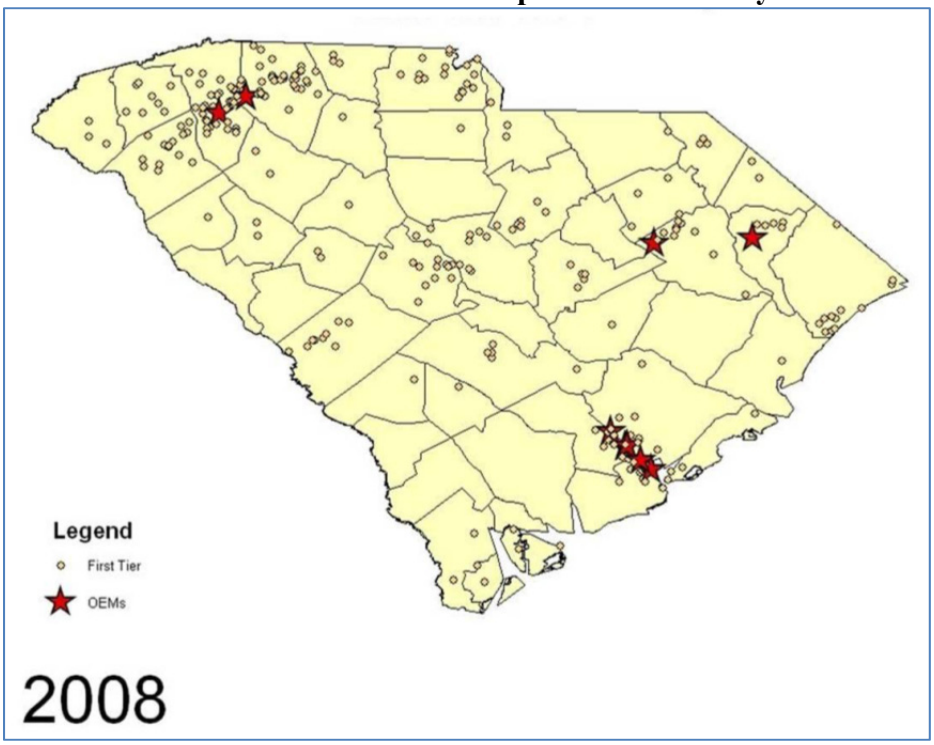


Figure 5: The Location of the Ground Transportation Industry in South Carolina



Moreover, the incentives spent by the state to seed this cluster seem to be justified. According to 2008 data, there were 305 manufacturing establishments (separate plants or facilities) in the auto cluster of South Carolina, supporting more than 84,000 jobs (Woodward et al., 2011). Automotive and ground transportation-related businesses contribute to approximately 5.4 percent of the state's employment (Woodward et al., 2011). A continual stream of newly announced investments came in 2011 and 2012 as the U.S. economy recovered. Among other large-scale capital investments, the German transmission maker ZF Group invested $350 million in building a transmission plant in Laurens County in 2012, creating 900 additional jobs in the nascent transportation cluster.

Local research and development (R&D) activity distinguishes an advanced regional cluster, according to the Porter (1996; 1998; 2003) theory. Michelin has placed their North American headquarters in South Carolina, along with separate research facilities. The company devotes approximately 13 percent of their regional workforce exclusively to research. R&D activities in South Carolina received a substantial boost when Clemson University established the International Center for Automotive Research (CU-ICAR) in 2004. The research park is a public-private partnership and companies like BMW and Koyo Bearings USA have set up research centers.

The ground transportation cluster offered hope and an answer to stagnant income, rising poverty, and the inexorable employment collapse in the textile-apparel cluster. The hope is that stronger traded clusters would reduce the need to sell the state to targeted companies through financial inducements. Instead, firms would be drawn by the regional external economies engendered by the growing concentration of the industry. By embracing the deepening of the automotive cluster and declaring a manufacturing renaissance, the state's development leaders discovered the power of regional agglomeration.

5. WHAT WE KNOW ABOUT CLUSTERS AND AGGLOMERATION

Typically, regional science sees agglomeration as a determinant of industrial location and economic growth, but not as a policy variable like tax incentives or the business climate (unionization). Unequivocally, agglomeration is the one factor that stands out in recent empirical location studies. In terms of location, agglomeration matters across regions, countries, and units of analysis (Friedman et al., 1992; Figueiredo et al., 2000; Head et al., 1995, 1999; Woodward, 1992; Woodward et al., 2006).

There is new evidence on the characteristics of the external economies that make agglomeration economies gel: deep supply linkages, knowledge transfer, labor pooling. These are the basic tenets of agglomeration advanced by Alfred Marshall (1890): (1) the presence of denser linkages between suppliers and buyers, allowing for productivity gains resulting from vertical disintegration and specialization; (2) the ability to capture industry-specific knowledge spillovers resulting from more intense interactions between economic agents; and (3) labor market pooling, where agglomeration improves productivity because it increases the quality of the worker matching process.

Long after Marshall, the agglomeration literature remains central to regional science (Henderson 2003). The basic concept of positive economic spillovers from industry concentration is the foundation for the new economic geography (Krugman, 1991; Venables, 1996; Hanson, 1996). As for the empirical research on agglomeration, new measures show the existence and extent of external economies across the world (Ellison and Glaeser, 1997; Maurel

and Sedillot, 1999, Devereux et al., 2004; Duranton and Overman, 2005; Guimarães et al., 2007; Puga, 2010; Rosenthal and Strange, 2004). Recent contributions to the agglomeration literature reveal that firm concentration in regions leads to higher wages (Mion and Naticchioni, 2009). As regional science continues to generate research on agglomeration, labor economics and industrial organization have also made important contributions. This research is obviously germane to cluster policy initiatives aimed at raising regional productivity, employment, and income.

The related regional policy dialogue centers on clusters, not agglomeration. When I mention clusters to business leaders at conferences in South Carolina, I always hear cheers; to academics in regional science conferences, I often hear groans. While many of us would not embrace the cluster concept as branded by Michael Porter, many would agree that clusters represent a "pervasive aspect of modern economies" (Bergman and Feser, 1999). Outside of South Carolina, cluster initiatives form the basis for much of regional policy around the world (Sölvell, 2008).

How is regional clustering different from Marshallian external economies? As distinct from agglomeration, Porter (1998) defines clusters as geographic concentrations of firms in particular fields that *compete* but also *cooperate*; specialized suppliers; service providers; firms in related industries; and associated institutions (above all, universities). Thus, the cluster competitive advantage is not just the result of spatial externalities and agglomeration advantages—it is the result of regional collaboration among various interconnected organizations and companies.

With this expansive definition, a major problem facing regional science is defining clusters. Agglomeration has an empirical counterpart. Clusters, on the other hand, have mostly been studied through case analysis rather than with consistent measures across regions. The Harvard University cluster mapping project proposes to address this issue. In 2012, this cluster mapping initiative was launched by Harvard Business School's Institute for Strategy and Competitiveness and funded by the U.S. Economic Development Administration.

The vexing empirical problem is that (as defined) clusters are hard to identify and track across regions. Asserting that clusters are essential to regional policy without a clear empirical basis is like an economist advancing a monetary rule for central bank policy without offering a clear definition of money.

In the cluster mapping website by Harvard, cluster strengths are given by high location quotients (Institute for Strategy and Competitiveness, 2012). But with location quotients, we measure regional specialization of industries, not clusters. Moreover, location quotients set up varying rules for identifying specialization (Isaksen, 1996; Malmberg and Maskell, 2002). In all cases, the location quotients should be subjected to statistical tests (Guimarães et al., 2009).

To be sure, serious regional science work has already been done long ago in terms of defining clusters, co-location, and related topics (Latham, 1976; Doeringer and Terkla, 1996; Feser, 1998; Hewings et al., 1998; Gordon and McCann, 2000). Regional science has looked at interdependence across sectors and attempted to measure the patterns of co-location of the industries, along with spillovers. This research, however, does not seem to have had a significant effect on establishing a strict definition that can be used for policy.

The problem for the latest, large-scale project on cluster mapping for U.S. regions is that analysts rarely have detailed regional information about firm and establishment (plant-level) characteristics. Many firms and their individual establishments have activities that span across

sectors. They may not fit neatly into any one cluster. The Harvard location-quotient cluster mapping is based on state, county, or metropolitan employment data. This is not because employment concentration can accurately categorize clusters, but apparently because it is the only detailed information available. In all cases, the location quotient data are contained with bounded (areal) spatial units. As such, they cannot account for the impact of clusters that spill over from neighboring spatial units. In real life, economic clustering does not necessarily recognize political boundaries such as states and counties.

If we want to be relevant, we should continue to advance analytics of cluster identification and strength. We should insist on rigorous measures used in policy. Location quotient approaches have been applied to regional analysis for many years (e.g., Florence, 1939; Isserman, 1977). Still, the employment location quotients found in the cluster mapping project appear rudimentary, and traded cluster identification remains ill-defined. This is not a trivial issue. Based on my experience with South Carolina, the cluster approach is at the forefront of regional policy. It is no fad. Indeed, it has become an instrument included in state and local economic development toolboxes.

The empirical cluster definition problem is also troubling because it is necessary that regional research better evaluate cluster theory by testing its basic hypotheses. The cluster measures should be compared with traditional agglomeration measures (industry employment and establishment concentration). For example, like agglomeration, strong clusters should affect key variables that have been at the forefront of regional policy: productivity, employment growth, and innovation. Using mapping data, Delgado, Stern, and Porter (2011) find that industries participating in strong clusters exhibit higher employment growth, as well as higher growth of wages, number of establishments, and patenting.

We need to know more about whether firms within regional clusters have a higher propensity to start up and ultimately survive compared with firms outside of clusters. We also need empirical studies that relate clusters to the entry and survival of firms. Our preliminary research using the Harvard cluster mapping definitions for South Carolina suggests that they do not do any better explaining firm survival than simple agglomeration measures (Woodward et al., 2012).

6. CONCLUSION

It has been an honor and pleasure to serve as President of the Southern Regional Science Association. As it turns out, there are now more ex-Presidents hailing from South Carolina than from any other state. I share these bragging rights with colleagues from Clemson University and the College of Charleston.

While I step down as President at the end of 2012, I will continue to travel, along with you on the scholarly journey that SRSA Fellow Andy Isserman (2010) called our "space odyssey" in regional science. It is inspiring to see original scholarship emerging from a new generation of scholars. After 50 years, the SRSA remains vibrant and relevant. We have more than enough pressing and pertinent topics to explore for the next 50 years.

I fully expect that location, incentives, and cluster/agglomeration research will continue to progress and improve with more collaboration among similarly grounded academics. Regarding these issues, I contend that the South Carolina story provides important lessons for development across many regions. In terms of policy, South Carolina should serve as a

cautionary tale about incentives as a strategy. The approach is not producing any measurable results in terms of aggregate employment, income growth, or poverty alleviation.

So why does the state persist with its promiscuous incentive strategy? In my experience, incentives attempt to compensate for weak agglomeration economies. Publicly funded tax breaks and other market distortions arose out of fear: for two decades, the state faced de-clustering in its traditional sectors, largely the result of globalization. To counter the outsourcing of jobs to China and elsewhere, the state needs new sectors, which by definition start without the economic advantages (positive externalities) that agglomeration would entail. For example, enormous state and local financial incentives were offered to help tilt the location choice for Boeing's new Dreamliner aircraft assembly plant. South Carolina competed without an existing supplier base, a skilled labor pool, or local knowledge spillovers from existing companies in an aerospace cluster, with a region that has all these agglomeration advantages (the Puget Sound region surrounding Seattle, Washington). State governors win elections in South Carolina by criticizing incentives and calling for new approaches during elections. Interestingly, they wind up applying such traditional policy once in power. With other states offering more generous incentives, this approach could be fiscal fratricide.

New Carolina, the South Carolina cluster organization, is dedicated to enhancing regional development across all sectors and navigating the state away from the old targeted industry policy. Over time, this collaboration between the public and private sectors to activate and cultivate the state's industry clusters may yield results. As Porter often proclaims, "economic development is a marathon, not a sprint" (as quoted by Huguley, 2011). While I recognize that the research is not settled and that we still can only crudely measure cluster strength, I endorse New Carolina's experiment to rally the public and private sectors around a long-run goal of employment and income growth through traded cluster development.

As a future research project, it would be interesting to compare the two Carolinas, North and South. Traditionally, the two states have pursued very different approaches to economic development. North Carolina has relied less on incentives and branch-plant recruitment and instead has successfully established a world-renowned, innovation-driven region around the Research Triangle Park. I would welcome a collaborative effort with my colleagues in regional science to study the relative achievement and policy implications of these two development models.

For all of us, there is ample terrain to cover in our quest to understand regional economic dynamics and their policy implications. Location decisions, along with related work on agglomeration and fiscal incentives, will no doubt remain among the most active and relevant topics in regional science research.

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