

Regional Dominance and Industrial Success: A Productivity-Based Analysis

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Abstract

The links between regional industrial structure, agglomeration economies, and firm performance are investigated through two hypotheses: 1) plants in regional industries dominated by a few relatively large firms are less productive than industry establishments in other regions; 2) dominated establishments are less productive because of limitations in taking advantage of external economies. Cross-sectional plant-level production systems are estimated for three representative manufacturing sectors. **Regional industrial dominance has substantial negative impacts on production, especially for small, dominated establishments, with implications for individual business performance and regional economic adaptability. The diminished productivity does not result from reduced capacity to exploit localized agglomeration economies.**

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Executive Summary

Introduction and Motivation

The relationship between industrial structure and economic performance has long interested researchers in regional science and industrial economics, as well as scholars and practitioners of economic development. Benjamin Chinitz's seminal article in the *American Economic Review* (1961) discussed the effects that industry size, structure, and economic diversification have on the regional availability and price of services and other specialized inputs, spurring considerable attention in the literature on these topics.¹ The article also identified a related but conceptually distinct issue that has been the subject of little empirical work: namely, whether regional industrial dominance—defined here as the extent to which a regional industry is concentrated in a single or small number of firms—affects the performance of other local firms within the same industry. Chinitz suggested that regional concentration may act through input prices, capital accessibility, labor sharing or pooling, and the conduct of entrepreneurial activity to reduce the regional availability of agglomeration economies and ultimately diminish economic performance.

This study focuses on two hypotheses: first, that manufacturing plants located in regions in which their industry is dominated by a few large firms achieve lower levels of performance than plants in the same industry that are situated in less dominated regions; and, second, that

¹ Chinitz, B. 1961. Contrasts in agglomeration: New York and Pittsburgh. *The American Economic Review*, 51 (2): 279-289.

manufacturing establishments in dominated regional industries are less productive because they are less able to capture the benefits of agglomeration, reducing their capacity to deploy workforce, capital, and other factors of production to maximum advantage. The hypotheses are tested by using confidential micro-level data from the United States Census Bureau to estimate productivity at the establishment level for three manufacturing sectors. This approach resolves or avoids many of the theoretical and methodological pitfalls encountered in earlier studies of agglomeration economies.

The hypotheses investigated in this study argue that regional industrial dominance may act as a limiting factor on the ability of local firms to deploy and adjust workforce, capital, and other factors of production to maximum advantage and to engage in entrepreneurship. Because small business growth and entrepreneurial activity are vital for regional adaptability and economic restructuring, industrial concentration may be a crucial determinant of the capacity of regional economies to adapt and restructure in the face of changes in technologies and markets. In effect, regional industrial dominance may lead regional industries to “lock-in” to particular sets of competencies. As markets evolve and technology changes, those competencies—once key regional economic engines—eventually may become economic liabilities. Conversely, negative lock-in effects might be minimized or avoided to the degree that adjustment via new business growth and entrepreneurial activity are maximized.

The issue of the relationship between regional industrial structure and economic adjustment rigidity is especially relevant in the current economic climate, with American regions continuing to face major workforce dislocation as standardized manufacturing and labor-intensive industries migrate to lower cost locations overseas and numerous smaller regions attempt to remake themselves entirely in the face of heightened global competition. At both the

regional and national levels, increasing business concentration in many sectors in the United States may have serious implications for the capacity of regions to adjust to new economic conditions promptly and with a minimum of worker dislocation. To address these challenges, local policymakers require a better understanding of regional capacity to adapt to national and global economic shifts.

This dissertation is part of a larger research project that employs multiple research design strategies. The micro-level productivity analysis constitutes one approach; the project also involves qualitative case study research in order to conduct a complementary exploration of complex contextual and institutional factors as well as aspects of economic performance other than productivity.

Previous Work

Little theoretical or empirical work has been conducted directly on the specific issue of industrial dominance at the regional scale. Although studies of industrial diversity and average establishment size have yielded useful information, these concepts provide only aggregate indications of regional industrial structure and are inadequate to test the two research hypotheses framing this study. In the industrial organization literature, most empirical research does not consider location factors and emphasizes idiosyncratic or sector-specific factors as being behind observed industry differences.

The theory of agglomeration offers the most suitable theoretical foundation for studying regional industrial dominance. The most common empirical approach to investigating the influences of agglomeration economies is to examine productivity across a range of business environments, relating differences in measured or estimated productivity to indicators of local or

regional agglomeration. Alternate outcome measures such as employment growth, firm start-ups, the pace of innovation or technology adoption, or export intensity represent variations on the theme. Until the early 1990s or so, secondary data were rarely available at the firm level, so most agglomeration studies used city and industry size or density as a crude proxies for urbanization and localization economies or else concentrated specifically on knowledge spillovers. Recently, studies have developed more refined constructs in order to measure various sources of agglomeration externalities directly.

The body of empirical research on agglomeration economies varies widely in terms of the specific hypotheses investigated and the results obtained. Much of the work is encumbered by poor data and persistent methodological impediments. The preponderance of evidence indicates that agglomeration substantially enhances economic performance, whether measured via productivity, employment growth, innovation, or firm formation. Beyond this general affirmation it is not easy to draw broad conclusions. The range of empirical results across industry sectors and geographic contexts underscores the importance of regional and industry-specific conditions in shaping the influence of agglomeration. Establishment-level analyses verify the significance of firm- and plant-level characteristics as well.

Methodology

The second research hypothesis posits that regional industrial dominance limits the ability of firms to deploy and adjust factors of production to maximum advantage. Following Chinitz, there are at least three pathways by which these limitations may occur: by reducing the propensity for taking risks such as engaging in innovation or establishing entrepreneurial

ventures, by diminishing the accessibility of specialized inputs and services, and by curtailing the availability of capital.

This study estimates transcendental logarithmic (translog) production function systems to model the relationships between regional factors, including industrial structure and agglomeration economies, and establishment-level productivity. The approach is cross-sectional: each industry-year pair in the analysis is modeled separately. Measures of potential regional agglomeration economies are included in the production model to examine the extent to which regional industrial dominance affects the abilities of firms to improve their productivity by taking advantage of local and regional agglomeration economy opportunities. Three manufacturing industries are analyzed: rubber and plastics (SIC 30), metalworking machinery (SIC 354), and measuring and controlling devices (SIC 382). These industries supply adequate sample variation and offer a contrast between the two traditional, established industries and the more technology- and innovation-intensive measuring and controlling devices industry.

The primary data source is confidential establishment-level records from three years (1992, 1997, and 2002) of the *Longitudinal Research Database* (LRD) of the United States Census Bureau. The LRD offers detailed information on inputs, outputs, locations, and key establishment characteristics for nearly all manufacturing plants across the United States. Data from the LRD are combined with publicly available information to create establishment- and regional-level indicator and control variables. Regional industrial dominance is operationalized as a five-firm sales concentration ratio—the percentage of total regional industry shipment value that is accounted for by the five largest firms. Five agglomeration economy variables, together measuring potential labor pooling, input and supply pooling, and knowledge spillovers, are constructed for each establishment. Unfortunately, there are no adequate data available both at

the regional scale and on a nationwide basis that indicate capital or financing availability. Four of the agglomeration variables incorporate spatial attenuation with distance, modeled with an exponential term. The production function equation also includes indicators for the largest (dominator) and smallest (dominated) regional industry firms, along with numerous regional and establishment-level controls that account for additional characteristics that may impact available agglomeration economies and plant productivity.

Principal Findings

The empirical results uphold the first but largely falsify the second research hypothesis. All else being equal, manufacturing plants are less productive in regions in which the industry is locally dominated. Because the production function includes indicators for relatively large and small regional industry firms, the results indicate that regional industrial dominance affects the production of a plant independently of its status as part of a dominator or a dominated firm. The marginal effect of regional industrial dominance on productivity tends to be greater in magnitude (i.e., a larger negative influence) for smaller establishments. Among the three industries studied, regional industrial dominance has the largest negative impact on measuring and controlling devices plants and the smallest for rubber and plastics establishments, suggesting that dominance may be more of a factor in technology-intensive sectors.

There is little interaction uncovered between dominance and agglomeration. The estimated impacts of regional industrial dominance vary relatively little across regional agglomeration economy regimes. In most of the nine industry-year cross sections, different levels of potential agglomeration economies do not alter substantially the effects of dominance on plant productivity. These findings contradict the second research hypothesis: it does not

seem to be the case that small establishments in regionally dominated industries are less productive because they cannot realize benefits from potential localized agglomeration economies. While it is possible that the samples are too small, the production model too complex, or the sought-after effects too subtle to be perceptible, the most direct conclusion is that dominance reduces establishment-level productivity by a different set of mechanisms than those hypothesized.

With respect to the agglomeration economies, the potential labor and supply pooling variables display weak and inconsistent effects on output. The knowledge spillover measures, however, reveal substantial beneficial productivity impacts. These effects are strongest in the measuring and controlling device industry, perhaps because more technology-intensive sectors have more to gain from localized knowledge and information spillovers.

Three extensions of the main analyses provide further detail and support the robustness of the primary findings. Alternate spatial decay profiles applied in the construction of the agglomeration economy variables demonstrate that the labor pooling and knowledge spillover agglomeration economies tend to have the greatest influence on establishment production when measured at broad spatial scales. The estimated effects of regional industrial dominance are not diminished by the inclusion of economy-wide dominance measures. In other words, overall regional economic dominance—the concentration of an entire regional economy in a relatively small number of large firms—does influence plant productivity in the study industries, but does so independently of the industry-specific dominance concept that forms the main focus of the study. Finally, the influences of regional industrial dominance and potential agglomeration economies on production are investigated as disaggregated by establishment size categories. Greater size relative to other regional industry firms benefits plant production, and both large and

very small establishments as measured on an absolute size basis are more productive than industry averages. Yet it appears that these disparities are an intrinsic outcome of size, perhaps due to discrepancies in production technology rather than the result of the differential influences of external factors.

Implications

This study highlights the importance of regional industrial structure and also raises additional questions for economic development practitioners and policymakers. Regional industrial dominance does restrain the productivity of manufacturing plants. It would behoove regional economic analysts and economic development practitioners that currently examine overall regional concentration, and sometimes industrial concentration at the national level, to pay attention to concentration and dominance at the level of regional industries. Small and entrepreneurial businesses in particular are less productive when their industry is dominated within the regional economy by a single or small group of manufacturers and thus may require extra attention and support.

The findings regarding the second research hypothesis underscore the challenge of devising appropriate and effective economic development policy with respect to regional industrial dominance. By its nature, dominance is likely to endure over time and is difficult to alter directly with the policy tools available at the local and regional levels. Because the mechanism by which regional industrial dominance hinders productivity does not seem to be through preventing plants from taking advantage of regional agglomeration economies, policies that intervene to shape the sources of agglomeration economies likely will not be effectual in countering the influence of regional industrial dominance. More research on the specific linkage

between dominance and economic performance is needed to provide the knowledge necessary to devise programs to help small businesses counter the negative effects of a non-competitive regional corporate structure.

Despite the uncertainty of the pathway between dominance and establishment production, the study outcomes suggest that local dominance restricts the economic adaptability of regions. Regional industrial dominance is associated with diminished small business productivity, and the growth and dynamism of small businesses is a crucial element in fostering regional adjustment capacity. To the extent that industrial dominance hinders the productivity and expansion of fledgling businesses, and perhaps local innovation and entrepreneurial activity as well, the local economy possesses less flexibility to react to changing economic conditions. Restructuring in the face of a major technological advance or an economic upheaval may be slower or altogether unsuccessful. The goal of developing policies to address the issues that arise from disadvantageous regional industrial structures should provide further impetus for research on the question of how regional industrial dominance acts to influence economic performance.

The agglomeration economy results provide information useful to economic development policymakers. Potential labor and supply pools have relatively little effect on manufacturing output, but knowledge and information spillovers do benefit production substantially. Therefore, economic development efforts to support and assist research may be more effective than establishing or mediating local supplier and purchaser relationships. Programs ranging from technology grants and research and development tax subsidies to developing networks among regional knowledge producers and manufacturers will pay back in terms of regional productivity and competitive advantage.