Increasingly Rank: The Use and Misuse of Rankings in Economic Development

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Debates over the merits of competing schemes for ranking metropolitan areas as high-tech centers shed little light on the important policy questions that should be the core of economic development policy. There are no strong theoretical reasons for preferring one ranking system to others. Rankings often conflate different industries and ignore history, obscuring the varied and often idiosyncratic processes that drive growth in different regions. Although an occupational perspective is a useful one for examining economic activity, it is a supplement to, not a replacement for, a careful understanding of metropolitan industrial specialization. Practitioners should not put too much weight on any ranking system but instead should work to develop detailed knowledge of their region's special economic niche and to develop relationships and strategies that build on established strengths.

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Understanding the processes of knowledge-based growth is essential to setting and implementing policy for economic development in metropolitan areas. The academic and media debates over high-tech rankings unfortunately obscure more than they reveal about these processes. Instead, we need to renew our focus on understanding the role of industry clusters, the dominant fact of industry specialization, and the critical interrelated roles of skilled labor, entrepreneurs, financiers, history, and institutions in shaping the path of metropolitan growth.

Chapple, Markusen, Schrock, Yamamoto, and Yu (2004 [this issue]) argue that we ought to rank metropolitan "high-techness" based on the total employment in industries with high concentrations of science and technology workers. From these rankings and their analysis of variations in employment among sectors, the authors advise policy makers to pursue greater diversity in high-tech industries as a way of buffering regional economies from the effects of cyclical downturns in overrepresented sectors by facilitating flows of workers among different segments of high technology.

Our view is that although comparisons of well-specified industries among metropolitan areas can be a useful part of a regional industrial analysis, most rankings generate more heat than light. Reducing a metropolitan economy's industry structure to a ranking on a one-dimensional index is not useful for policy making because it misrepresents the nature of the development process.

The one-dimensional view implies that high-tech development is a monolithic process, similar from place to place, though perhaps unfolding at different rates and to different degrees. In contrast, a growing body of work points to knowledge-based economic development as a highly

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industry-specific, localized, and path-dependent process. Regional economies differ in their industrial organization and development dynamics. Each region has a different economic history, and a different set of variables shapes its development.

Consequently, regional specialization is at the heart of high-tech growth, however we define the term. Analyzing a regional economy from a multidimensional perspective is more useful for economic developers than a ranking that considers only a single variable. The fact that regional economies specialize has important policy implications, and economic developers ought to analyze the unique strengths of their region.

We develop our case for a multidimensional view of regional economies, emphasizing the industry specialization in five parts. First, we briefly summarize our own analyses of high-tech and biotech industries. Second, we consider the debate over how to define "high technology." Third, we evaluate the utility of rankings. Fourth, we underscore the importance of industry clusters. We conclude with a discussion of what policy makers ought to make of our case.

Our study of high technology examined the size and composition of the computer, electronics, instruments, and software industries in 14 selected metropolitan areas (Cortright & Mayer, 2001). We set out to study a relatively coherent group of industries related to one another by technology, competition, and common sets of worker skills. We selected the industries for our study just as Chapple et al. (2004 [this issue]) selected their occupations, based on interviews with industry experts about what constituted their definition of "high technology."[1] We developed a series of measures of industry activity in each metropolitan area, including employment concentration, patent activity, venture capital flows, and identification of leading firms. Our key finding was that the dominant feature of development at the metropolitan level was strong and persistent specialization in particular industry segments and technologies. Our study did not attempt to present a ranking.[2]

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In subsequent work, we took a similar approach to assess biotechnology industry activity in the principal U.S. metropolitan areas (Cortright & Mayer, 2002). On the basis of a definition of biotechnology widely used by the industry and investors, we compiled a diverse array of data on medical research expenditures, biomedical patents, biotech firms, venture capital investment, and employment. We found that biotech development was driven by a set of industry-specific factors and that metropolitan areas could be grouped into one of four broad categories based on the extent and character of their biotechnology research and commercialization activities.

Taken together, our reports highlight the fact that different metropolitan areas excel in different fields. The Portland, Oregon, metropolitan area is clearly a center of the nation's electronics industry (accounting for about 10% of semiconductor production) but has a negligible biotech industry. Little insight into the processes that produced success in one industry and nothing in another can be gleaned from generalized assertions about how high tech the area is in relation to other metros.

To see oneself—and, more important, to be seen by others—as high tech is the acme of excellence in the 21st century. There is considerable jockeying among firms and communities to receive this accolade and among researchers to bestow it. Chapple et al. (2004 [this issue]) enter this fray, defining high technology as those industries with high proportions of workers in science and technology occupations. They argue that this measure of high-techness is superior to that used in other studies, including those by the Milken Institute (DeVol, 1999), the Progressive Policy Institute (Atkinson & Gottlieb, 2001), the American Electronics Association and NASDAQ (2000), and our own (Cortright & Mayer, 2001).

How should the discerning reader choose among these various definitions? Whose definition of high tech is correct? Defining high technology as Chapple et al. (2004 [this issue]) do, by looking at data on a single dimension (i.e., employment in industries with high concentrations of science and technology occupations) misses the opportunity to consider a series of other dimensions. Conceptually, a broad array of factors relates to high technology. Plausible arguments can be made for selecting industries based on innovativeness (patenting), research intensity (research and development spending), or productivity (value added per worker). No one, especially researchers, should put too much weight on any single measure.

The competing definitions developed by various researchers may be equally artful but are all ultimately arbitrary. Because there is no strong theoretical reason to select one over another, competing claims of intellectual hegemony over the term "high technology" will never be resolved.

The value of alternative definitions might better be judged by their usefulness in helping practitioners grasp the salient characteristics of high-tech growth. Indeed, our objective should be illuminating the process by which innovative industries arise, grow, and prosper, even if we must tolerate some ambiguity as to exactly what the term "high tech" encompasses. We urge practitioners and academicians alike to triangulate their analyses by using a series of complementary metrics of high-tech development, rather than by looking only at one dimension.

Top 10 lists have become a cultural commonplace, and academicians, as well as journalists, indulge the temptation to reduce complex realities to seemingly clear-cut up-and-down rankings. Rankings attract media attention and provoke public debate. High-ranked areas celebrate their success; low-ranked areas dispute the methodology. But do rankings provide any practical insight for policy makers or practitioners?

The trouble with rankings is that they tend to combine unlike industries into aggregates that obscure important differences and they are snapshots in time that ignore historical processes.

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Rankings conceal more than they reveal when they conflate a disparate set of industry sectors into a single amorphous category. Highly aggregated measures imply that high-tech firms and workers are homogenous and interchangeable and that differences among metropolitan areas are only in degree, not in kind. The disparate group of industries included in Chapple et al. (2004 [this issue])—including cigarettes, aircraft, computers, drugs, life insurance, and petroleum—have little in common with one another: They share neither common markets, technologies, suppliers, labor pools, or other essential characteristics.

Rankings tend to be snapshots frozen in time. This is ahistorical, ignoring and overlooking the role that prior industry development plays in setting the technological, institutional, entrepreneurial, and labor market stage for subsequent high-tech development. History frequently plays a decisive role in arranging the patterns of economic growth (David, 1985).

Providing that we compare like with like, consider a range of indicators, and measure changes over time, metropolitan comparisons can be useful in assessing whether industries are thriving or languishing. Such comparisons can help researchers and economic developers understand which industry clusters form the basis of their local economy. They can, and should, use a variety of measures, including employment data (classified by industry and occupation), patents, venture capital investment, and industry-specific data, coupled with qualitative work to build a sound basis for regional action.

If rankings were merely flawed, we could simply ignore them. But rankings are pernicious because they distract attention from more useful analytic frameworks. High-technology development, regardless of how it is defined, is characterized by industry clustering—the agglomeration of similar and related industries in specific geographic areas, driven by the advantages proximity provides for the pooling of skilled labor, the development of specialized suppliers, and the spillover of knowledge.

Our study contributes to a growing literature aimed at exploring the processes that drive and sustain clustering, particularly in knowledge-based industries. Although Chapple et al. (2004 [this issue]) disclaim our collective ability to "resolve fundamental questions as to differential high-tech location and performance," (p. 26) our research and that of others say a good deal about what causes clustering. Important for practitioners, our work identifies the critical role that specialization plays in technology-related growth and identifies an interrelated set of complementary measures, as mentioned earlier, that can be used to assess the presence, growth, and competitiveness of particular clusters.

This work builds on a wealth of knowledge, beginning with Marshall (1920), noting the importance of agglomeration economies to metropolitan growth. The field has enjoyed a remarkable scholarly revival for more than a decade (Krugman, 1991; Porter, 1990). Clusters are now widely recognized by practitioners. Indeed, Chapple et al. (2004 [this issue]) have made important contributions to our understanding in this area, including taxonomy of industrial districts (Markusen, 1996) and persuasive arguments about the localization of knowledge-based economic activity (Chapple, 2001). Academics and practitioners should build on this foundation, not abandon it.

To be sure, the role of skilled labor and the use of occupational data have not been as central to cluster analysis as they deserve. As Chapple et al. (2004 [this issue]) argue, human capital is an

important part of high-tech development. But it is only one part. Clusters draw on technological innovation, private sector investment, a network of similar and related firms, as well as specialized human capital. Together, these aspects form particular cluster dynamics that economic developers could recognize and strategically use in their work. The occupational dimension is an important addition to our analytical tool kit.

Diversification has long been a buzzword in economic development. The prevalence of clustering and specialization in high-tech development implies, however, that communities should be cautious about taking advice to always pursue greater diversification. Chapple et al. (2004 [this issue]) conjecture that excessive high-tech specialization leaves metropolitan areas vulnerable to cyclical downturns in the industries in which they specialize.[3] They argue that "the most resilient strategy may be to diversify across sectors" (p. 26), because, in a downturn, laid-off science and technology workers might more easily find employment in other high-tech industries.

But is it really the case that workers will be better in the short run (cyclical downturns) and that communities will be better in the long run (overall economic growth) if they pursue greater diversity? The most persuasive evidence about skilled workers is to the contrary. Specialized science and technology workers will maximize their employment opportunities by locating in an area with a concentration of firms with demand for their skills. This is the essence of Marshall's (1920) first argument for industrial districts: labor market pooling. Although some science and technology workers have generalizable skills (e.g., network administrator), most are highly specialized in a particular industry segment (e.g., petroleum geologist). The easy interfirm mobility of such specialized workers is one of the chief advantages—to firms and workers—of locating in industrial districts such as Silicon Valley (Saxenian, 1994). Similarly, these concentrations of talent are important generators of new enterprises, as illustrated by the continuing vitality of Silicon Valley in successive generations of technology.

It is far from clear that specialization is detrimental to economic growth, especially in the long run. Although more diverse economies may, by definition, be less cyclical, is the injunction to always pursue diversity a useful or possible policy prescription? Arguments for diversification rest on an implied analogy to portfolio theory, but unlike individual investors, communities cannot readily buy and sell pieces of their industrial base. And unlike stock ownership, the scale of one's holdings affects their performance. Take Seattle, for example, which has the least diversified high-tech sector according to Chapple et al. (2004 [this issue], Table 6). Seattle's high-tech industry is dominated by two large firms—Boeing and Microsoft. Would Seattle be better off if both of these firms were smaller? Would other firms in the aerospace and software industries be more competitive if these two firms were smaller? Seattle has an unusual endowment of technical knowledge and worker skill in aerospace and software: Should Seattle eschew these advantages and pursue other industries in which it does not have any special qualification?

If economic developers take the advice of Chapple et al. (2004 [this issue]) literally, they are to abandon their city's historic base. Our research and that of others (Sturgeon, 2000) show, in contrast, that a region's present high-technology specializations frequently trace their roots to technological advantages established decades ago. A study of more than 300 firms in metropolitan Portland showed that most traced either their founders or their technology to a handful of firms established in the region two to five decades earlier (Mayer, 2003). The most common path for high-tech development is refining, extending, and recombining existing technology specializations into new ones, not abandoning them and trying to develop hitherto unknown competencies. Ignoring the path-dependent quality of development is likely to be a recipe for failure.

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Academics and practitioners can understand high-tech development only by digging deep into the specializations of local economies. Good quantitative industry analysis is a start but must be complemented by qualitative research that engages firms in a detailed discussion of their industry. Our work has benefited from extensive interviews with participants in local industry clusters. They have helped us understand the contours of their industry, the processes by which it has grown, and the role of local factors in its success. Our methodological road map comes from Markusen's (1994) own thoughtful guide to studying regions by studying firms. Other leading economic development researchers refined the use of these qualitative tools for analyzing industry clusters (Austrian, 2000).

Interviewing, understanding, and even organizing the firms in industry clusters are more than just academic work. These activities can be fundamental ingredients in effective local development efforts. As Chapple (2001) argued in previous work, economic developers need to become "place professionals," developing a detailed understanding of the specific characteristics of their regional economies. As well-informed place professionals, they can customize their programs and respond more effectively to the needs of local clusters.

Such customization contributes to a region's competitive advantage by helping upgrade factor inputs, for example, through specialized training and education programs (Porter, 2000). Many case studies of successful regional development present evidence for strengthening local specializations through a range of services, including training, technology diffusion, marketing, and quality improvement. Regions like Baden-Württemberg and Emilia-Romagna, for example, have tailored such programs to the needs of their regions' core industry clusters (Cooke & Morgan, 1998). This contrasts with Chapple et al.'s (2004 [this issue]) policy recommendation to make science and technology training more general.

Local practitioners should therefore focus on understanding their region's own special economic niche and its strengths and weaknesses, and build relationships with local industry clusters, rather than spend their time worrying about where their city ranks in terms of high-techness. Academics can be helpful by providing economic developers with in-depth analyses of regional economies that illuminate local specializations and trace their historical development. If these analyses employ a multidimensional approach—embracing the rich variety of factors that shape the growth of industry clusters—communities and regions will be much better positioned to pursue their high-tech dreams.

NOTES

1. References to our interviews can be found in our earlier working paper (Cortright & Mayer, 2000). This definition was generally similar to the definition developed by the American Electronics Association.

2. In our report, we stated (Cortright & Mayer, 2001), "We did not attempt to produce an overall ranking of high tech hot spots" (p. 2). Instead, we studied the differences among metro areas to better understand the dynamics of high-tech development. We concluded, "Rankings that group inherently disparate firms such as medical devices, semiconductors, telecommunications, and software together into a single category of 'high technology' and attempt to explain their behavior as if they were homogenous units driven by a common set of factors, are likely to be substantially misleading and incomplete" (p. 3).

3. The notion that specialization is a detriment to a regional economy's long-term growth (as opposed to its vulnerability to short-term dislocations) is frequently asserted but has seen little empirical investigation. A snapshot in time ranking tells us nothing about this issue. This is one area that clearly needs further time-series analysis. Moreover, our case studies show that there is often considerable heterogeneity in firm size, strategy, technology, and markets within three-digit standard industrial classification industries, making them an inconclusive basis for statistical analysis of whether an economy is specialized or diversified.

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