

4 Human versus physical capital

Government's role in regional development

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Introduction

Concern with unbalanced regional development remains robust in a time of rapidly integrating world markets and production systems. In some countries, the United States for instance, responsibility for economic development has been pushed down to the state and local level, where competition with other jurisdictions is fierce, fiscal constraints are binding, and labor, goods and capital flow freely across political borders. A growing movement challenges the incentive give-aways that have been used to lure and retain firms. Although regional policy is still practiced on the national level in many other countries, the funds available to finance it are likewise restricted. Research scrutiny of past regional development investments and programs has produced a complex record of mixed success and sometimes, badly wasted resources. For all these reasons, the pressure on governments at all levels to shepherd regional development in ways that are effective and cost-efficient has never been greater.

In this chapter, I explore the difference between government programs that focus on physical capital (both for public infrastructure and private sector plants and equipment) versus those that target human capital, through education, training, entrepreneurial and related interventions. I argue that regional development has been seen almost entirely as product of physical capital investments, so that the bulk of public spending has been sunk into these while very small amounts are spent, in contrast, on human capital, despite sound economic analyses that underscore the significance of the latter. A hallmark of this bias is the prominence of industry analysis and targeting in regional development. I argue for a co-equal emphasis on occupational analysis and targeting, bringing 'stereo vision' to regional economic development.

In the first section of the chapter, I reflect on the physical versus human capital debate in regional economic development and conclude that the latter is woefully underdeveloped, given its demonstrated importance. In the second section, I contrast the physical capital approach to regional development, using an industrial lens, with a human capital approach, using an occupational lens. I show, for several regions in California including one rural region, how each depicts the regional economy and the major actors with whom government policymakers conceive

of themselves as working. In the third section of the chapter, I explore existing and new elements of a human capital/occupationally targeted policymaking approach.

Physical and human capital in regional development

Regional economists working in the second half of the twentieth century largely adopted traditional economic growth theories to the regional terrain. These models posit that output (or income) growth is a function of physical capital and labor, the former consisting of land, plants, and equipment that were used over longer periods of time and could be augmented by investment, and the latter consisting of the man-hours harnessed to physical capital. In general, since there were constraints on the size of the labor force, nations and regions could only increase output by making investments in physical capital, either in the public sector or by firms. A series of challenges to this view has led to greater appreciation for the role of labor, especially skilled labor. In the 1950s, Wassily Leontieff (1953) demonstrated in his famous paradox that the American economy as a whole relied upon skilled labor, not physical capital, for its success (Leamer, 1960). Robert Solow (1956) articulated the role of technology as a third, exogenous force, and in the debate that followed, economists began to analyze technological change as partly embedded in physical capital and partly in labor. A decade later, Harvey Leibenstein (1968) developed the notion of 'x-efficiency,' attributing additional output to the role of entrepreneurs, a decidedly human capital/labor phenomenon. More recently, Romer (1986) argued that social externalities may account for aggregate growth even when there are diminishing returns to capital and no technological change, and Lucas (1988) made a similar argument about the external effects of human capital (Malizia and Feser, 1999, Chapter 6). These developments in the theory of growth, along with disenchantment with physical capital growth measures, have prompted regional economists, political scientists and planners to call for a more explicit human capital approach to regional development (Reich, 1991; Clarke and Gaile, 1998; Mather, 1999; Markusen, 2004).

Regional policies have been heavily skewed towards physical capital investments with only very modest investments in the fostering of human capital and skill. In the making of the American continent, huge investments in land (much of it taken from Native Americans), canals, railroads, ports and highways helped to drive and integrate the American and Canadian economies in the 19th and 20th centuries. These investments enabled a boom in internal trade, tying agriculture and industry together across the regions, and, since labor was relatively scarce given the land to exploit, prompted large investments in private capital (Markusen, 1987, Chapter 4). Similarly, public and private investments in power and electricity generation and transmission, water and sewer systems and recently, internet connectivity have been heralded as powerful growth engines. Many developing countries have mimicked the capital intensive strategies of the U.S., Europe and Japan, making large transportation investments to facilitate exports and reach internal markets and building huge dams and power plants to fuel industrialization.

What are the downsides of government investments in physical capital, whether directly publicly-built or induced through subsidies and tax holidays? First, many physical infrastructure investments simply favor one place over another, often undermining existing production complexes and causing underutilization of capacity. Isserman *et al.* (1989) show that towns situated on the American interstate freeway system have done better in the longer term than similar towns that are not. Furthermore, in calculating the return on investment, the negative consequences for other regions and cities is not taken into account. A factor in the South's losing the Civil War was its squandering of infrastructure dollars in extending canals a few miles more up each of the tidal rivers to reach additional plantations; in contrast, the North used its infrastructure dollars to knit together its eastern manufacturing cities with its rich agricultural hinterland (Markusen, 1987: Chapter 4).

Second, while transportation infrastructure may facilitate exports, it also enables import penetration, as every American city and small town now ringed with Walmarts has come to understand. The interstate freeway system in the U.S. along with container port facilities on east and west coasts has enabled manufactured goods made in China, often by U.S. companies, to reach dispersed small settlements cheaply, undercutting domestic production.

A third problem with public and private physical infrastructure projects, often celebrated as job creators, is that many of them employ as many as ten times the number of workers to construct them as to operate them. This creates a boom and bust cycle that can be debilitating to smaller towns on both the up and down-swing (Markusen, 1978). Capital-intensive projects also nourish a large construction sector that can become a powerful political actor, a fourth problem. In many countries and regions, many more roads and buildings are built than is justified by their future returns, simply because the combined lobby of the construction, real estate, auto and other sectors is so powerful in legislatures and parliaments. Japan has tried for more than a decade to deal with its stagnation by spending lavishly on public infrastructure without clear returns. In one extremely expensive project, the central government in conjunction with the local prefecture has recently built a multi-billion dollar new container and transfer point in Fukuoka for trans-Pacific mega-ships carrying Chinese goods to the U.S... The project, using capital-intensive construction techniques, employs limited numbers of workers to build it and many fewer to operate it when done. It is unclear whether the port will successfully compete with Pusan, in South Korea, its rival.

In contrast, only small portions of regional development moneys go towards human capital investments. In many of the \$100 million plus packages offered by states to woo large plants, up to 5 percent may be used for training new workers, but this is still a tiny fraction. Some governments have created entrepreneurship training programs and built business incubators to foster new firm formation, but the amounts devoted to them are small. Workforce development programs exist at subnational levels in the U.S., but are funded at only a fraction of physical capital-related outlays, especially when tax expenditures are included. To the extent that states or localities own and fund elementary, secondary, technical and university

educational systems, human capital is fostered; though generally not under the rubric of regional development, these are large public investments. The presence of universities is closely correlated with favorable regional growth, although empirical studies show that universities' impact is more important in educating labor than in underwriting R&D and prompting regional innovation (Markusen *et al.*, 1986).

In the past decade, academic critiques and organized protests on the part of regional governments, planners, workers and citizens have grown in volume against the excesses of state and local government subsidies for private sector physical capital projects in the U.S. (Thomas, 2002; Leroy, 2005). Often given without performance requirements and not enforced in cases of failure to perform, companies increasingly bargain their way out of years of future tax payments while receiving huge grants of infrastructure and land on the promise of job creation. A market has grown up in which international consulting firms pit one mayor against another and one state or province against those on another continent, controlling information about actual prospects and extracting enormous concessionary packages. The European Union has a much better regulatory process that restrains such competition, but countries outside the EU face formidable problems in implementing such a system (Sinnaeve, 2004). In this environment, interest in labor-oriented regional development strategies and in using occupational analysis in addition to industrial analysis has grown stronger, for reasons I explore in the following section.

The brain drain constitutes a serious concern about human capital strategies at the regional level. In Gunnar Myrdal's (1957) famous 'cumulative causation' model of inter-regional development, he posited that higher wage-seeking skilled labor moves from rural places and smaller towns to larger agglomerations more quickly than lower-cost seeking firms move to the former. In recent years, analysts have hypothesized that it is not simply wages and work opportunities but also amenities that draw mobile workers from the countryside. However, not all educated individuals will choose to leave their communities, and education will particularly quicken the level of local entrepreneurship. Even those who leave may choose to return later in their work lives. Even if they don't, it is increasingly understood that skilled migrants to richer regions may act as bridges back to their communities, transferring know-how and sometimes mobilizing resources there for export-based activities (Saxenian, 1999).

Envisioning regions by industry and occupation

Industries dominate the regional economic mental map of geographers, regional scientists, planners and policymakers. But industrial categories are not the only way to describe and disaggregate regional economic structure. Occupations offer an alternative. Employment, for instance, can be analyzed either on the basis of industries or occupations. In most countries of the world, data are collected on each. In this initial section, I compare the two lenses and the regional economic traits and actors emphasized in each.

The industry lens

No economist, citizen or policymaker ever ‘sees’ a regional economy. Instead, we develop mental maps for it, based on conceptual categories that frame its spatial, structural and organization dimensions. Such mental maps showcase certain decision-makers, or actors, as key to economic development. Most Californians, for instance, including daily newspaper readers, think of California’s economy as big and diverse and as producing goods and services such as lumber, fruit and nuts, wines, electronics, software, aircraft, biotech substances, shipping services and so on. Generically, we can organize these productive outcomes as sectors or ‘industries.’ Industries are conceptual groupings of organizations (firms, trade associations), establishments, and decision-makers (owners, managers) who are bundled together by what they make and produce – by the resulting goods and services. Since the mid-eighteenth century, American federal and state governments have delineated these groupings in industrial codes and collected data on a few metrics such as output and employment on the basis of individual, single-site establishments (Rhode, 2001). These codes are quite similar to those used by most countries world-wide.

Scholars of regional science, economic geography and economic development work with industry groupings to map regional economic activity and analyze past and projected change. In doing so, they model the behavior of key decision-makers within each industry, introducing the notions of ‘firm’ and ‘establishment’ into the framework. A firm is a legally-constituted business organization with a decision-making structure – a board of Directors, CEOs and other key managers – that decides what and how much to produce, how to market it, whom to hire and fire and train and where to locate its operations. It may operate in several industries and in multiple locations. An establishment is a spatial unit of production that may comprise an entire firm or form only one unit in a far-flung empire. Managers of establishments make decisions within the hierarchy of the larger firm to which they belong.

In rural northern California, for instance, a regional analysis might highlight the lumber industry and probe the behavior and economic viability of firms (for example, Georgia Pacific) and establishments (a particular Georgia Pacific mill, small family-run sawmills, small firms in the woodworking business). In Silicon Valley, it would focus on the electronics, computing, aerospace and software sectors, including large firms such as Sun, Lockheed Martin, and IBM, and the many small and oft-mutating entrepreneurial firms (Gray, et al, 1999; Saxenian, 1994). In the Los Angeles area, it might center on a set of disparate industries – filmmaking, apparel, electronics and aerospace among them – with their mixes of large and small, locally and externally owned firms (Storper and Christopherson, 1987; Scott, 1984; Scott and Angel, 1987). Such intelligence has informed economic development interventions, such as incentives and regulatory changes to attract new establishments (for example, design firms to Los Angeles), engender new firm start-ups (for example, biotech in Silicon Valley), or forestall closings or relocations away from a region (for example, lumber in northern counties).

Such a depiction of a regional economy, its components and its key actors, however, constrains the vision of possible economic development initiatives. Industries are not real entities but are conceptualizations made operational through the coding and data collection efforts of the U.S. Department of Commerce and its state-level equivalents. To be sure, industries are useful groupings. Firms within industries often share information and exercise political power in the guise of trade associations. But industry definitions do not map neatly onto firms, and not all firms join relevant trade associations or actively shape their priorities. Furthermore, firms routinely migrate into new product offerings that may shift the assignment of their plants and labs into unrelated industries.

Economic development practice is also muddled by the tendency to conflate firms, which are the key decision-making unit in place-indifferent economic theory, with establishments, which are the key location target for economic developers. Firms are non-spatial legal entities, while establishments are site-based operations of individual firms. Entire bodies of theory have emerged to explain the location calculus that firms use to site their facilities in various regions (Losch, 1954; Isard, 1956). Excellent studies have been done of the relative strength and significance of causal factors such as resources, labor quality, wages, infrastructure, taxes, and so on in explaining the distribution of employment, often disaggregated by industry (see for instance the studies in Herzog and Schlottmann, 1991, and Hekman, 1978).

But as firm headquarters increasingly locate separately from other firm functions, state and local economic developers relying solely on industry categories are left with weaker tools to increase good jobs and expand the tax base. Establishments within the same industry and especially within the same firm often perform starkly different functions. Some conduct only R&D, while others engage in management, production or distribution. A large California coastal city, for instance, might host a firm's food scientists, market researchers and managers, while its agricultural product is grown, processed and packaged in smaller Central Valley towns. The industry to which an establishment belongs may thus be a weak indicator of the functional strengths of its host community.

Accepting the industry/firm/establishment framework as the skeleton of a regional economy means shaping economic development practice around firm priorities. Implicit in this approach is a vision of economic growth that favors physical capital as the key input, rather than technology or human ingenuity and labor. A great deal of state and local economic development effort, as a consequence, has gone into facilitating the acquisition, building, maintenance and refurbishing of physical capital, including land and infrastructure. Very modest amounts, in contrast, have gone to train workers or encourage entrepreneurs. Underwriting physical capital is an expensive proposition. Increasingly, local governments find themselves indentured to paying off bonds and foregoing tax base with funds that might better be used elsewhere. Many communities have a tough time holding recipients of economic development incentives to performance criteria.

The occupational lens

Think now of a regional economy as consisting in the first instance of people as decision-makers and workers. They are starting up and closing down firms, buying and using resources, building plants and equipment, hiring others and configuring work to generate marketable goods and services. In this conception, we visualize and characterize economies by ‘what workers do, not what they make’ (Thompson and Thompson, 1985; Feser, 2003). These activities are captured in the notion of ‘occupation.’ Some workers manage entire chains of conceptualization, production and marketing processes (managers). Some create, implement and monitor technologies (scientists and engineers). Some develop, write, adapt and trouble-shoot information systems (systems analysts and software programmers). Some educate (teachers, trainers, parents, coaches). Some adjudicate, advocate and make law (judges, lawyers, legislators). Some run, interact with and maintain machines (assembly line workers). Others build structures and repair them (craft workers). Others move commodities and services across space and out to consumers and other users (longshoremen, truckers, retail and wholesale and warehousing clerks). Yet others care for the sick, elderly, children (nurses, home care and child care workers). Yet others entertain us (musicians, athletes). And so on.

Imagine a mental map of a regional economy based primarily on occupation. Each occupation – like industry, a conceptual category – is distinguished by its skill, educational content and work tasks. Individual workers are key decision-makers in an occupational framework, because they decide whether to acquire skills and how to deploy them, given their options in labor markets (another conceptualization). But other decision-makers are also important – those who supply skills and training, including schools and colleges and private sector firms. As an analogue to firm location theory, we might imagine a whole body of occupational location theory that explores why certain occupational groups migrate more frequently than others and why members of each choose to enter, leave or remain in specific regions.

With the occupational lens, we might picture northern California as a region of foresters, sawyers, truckers, farmers, and B&B operators, among others. Silicon Valley would emerge as a region of technology managers, venture capitalists, aeronautical and electrical engineers, inspectors and testers, and commercial artists. Los Angeles would be a showcase of aircraft assemblers and engineers, sewing machine operators, broadcast technicians, camera operators, and musical instrument repairers. The occupational lens helps us to see the relatively unique pools of talent possessed by a region.

Until the 1940s, the Census Bureau, which belonged to the Department of Commerce, did not classify occupations on the basis of what workers did but rather on the basis of industry, as in ‘forestry workers,’ ‘bank workers,’ and so on. Up to that time, the conception of regional economy was dominated, then, by industries. In the 1940s, the Bureau began to use occupational categories, long used by the Bureau of Labor Statistics in the Department of Labor, to characterize

employment on the basis of what workers did rather than what they produced. Meanwhile, State Departments of Employment Security using the occupational categories and Departments of Economic Development using the industrial categories began to work together on some specific projects and data series. Both approaches are now operational, although the industry data is somewhat more friendly to regional economic researchers, largely as a result of long term demands and petitions from the research community.

Approaching economic development as an occupational rather than an industrial phenomenon opens up alternative paths for economic developers. For instance, when an industry is in structural decline because it is just simply cheaper to produce elsewhere or because substitutes are destroying its market or because defense spending plummets, working with occupational groups offers an alternative to simply trying to prevent plant closings or convincing firms to convert. Rather than approach the problem of huge layoffs among aerospace workers as synonymous with an imploding aerospace industry, as southern Californians did in the 1990s, an occupational approach might have enabled a more creative and less expensive economic development approach. Engineers exiting aerospace, for instance, brought exotic substances developed with military research dollars into sports and sportswear lines like golfing and athletic clothing.

Given their evolved industry orientation, economic development practitioners in the past few decades have worked extensively with firms, industries and business associations, seeing them as their customers. In contrast, a practice re-oriented around occupations would seek occupational and occupation-shaping partners. Prominent among these would be membership associations based on occupational lines, from trade and craft unions (electricians, machinists, writers, musicians, operating engineers, nurses, actors, janitors) to professional associations (mechanical engineers, economists, doctors, accountants). Strong ties would also be forged with institutions and organizations that recruit, educate, train, and retrain workers.

Why an occupational lens?

The occupational lens gives priority to human rather than physical capital as the key to regional development. The generic unitary actor in an occupational analysis is the worker, meaning the individual who exchanges his or her time and skills for a wage or salary, whether he or she is a manager, scientist, blue collar or home care worker. We aggregate these workers on the basis of occupations.

Our central theoretical contention is that the education, training, placement, location and migration of individuals with particular skills, proxied by occupation, may be as important in explaining economic development as the location and migration of establishments, firms and industries (Mather, 1999). The two are related, but the 'chicken-egg' problem here is conceptualized as one in which skilled workers' location choices are independent of firms' choices to some extent and in which workers' preferences are different from those of firms. Certainly workers follow jobs, but our argument is that jobs also follow workers, perhaps

increasingly so. Workers choose locations based on amenities and personal preferences and firms then follow workers (see also Florida, 2002).

Markusen (2004) has made several theoretical arguments for an occupational, or worker-centered, approach to economic development, invoking the following points. First, decreasing commitment of both firms and workers to each other and to regions, due to global integration and the ability to work from remote sites via the Internet, makes the decisions of where workers want to live and work increasingly more important. Second, occupations that might otherwise be considered purely local-serving – artists, for example – enhance productivity and livability for other, export-based activity and thus should be investigated in their own right. Third, job creation may be more successfully nurtured by searching for patterns of entrepreneurial success by occupation rather than by industry. Fourth, an occupational focus may be tailored to particular neighborhoods and under-employed socio-economic groups, thus facilitating equity goals, in ways that an industrial focus, for operational reasons, cannot.

I hypothesize that regions are distinguished by relatively unique occupational mixes. Over the long term, a significant number of occupations are ‘footloose,’ meaning that they are inter-regionally moveable or capable of being engendered locally through education and training. Their presence in a regional economy will be less well predicted by their presence in the past. Industries, in contrast, are less mobile, since they consist of establishments with physical plant and equipment with greater inertia.

How different are the results from using one lens or the other? Two recent studies offer some insight into this question. A recent article by Renski *et al.* (2007) shows that industrial clusters chosen by traditional value chain or input-output relationships differ quite substantially from clusters built up from a skill-based occupational matrix. Another by Barbour and Markusen (2007), using data on eleven California metropolitan areas, finds that although occupational structure can be fairly well proxied in the aggregate by using national industry-by-occupational matrices applied to regional industrial structure, employment totals for key occupations such as high tech professionals, business service professionals and blue collar workers deviate substantially from the norm across metro areas. These studies suggest that important regional economic intelligence can be gained by probing occupational structure in its own right and not as an exercise subsidiary to industrial analysis.

Human capital-centered regional development

An occupational approach offers new options for practitioners in developing their regions’ economic base. It is built on the growing recognition that human skill is an essential ingredient in regional economies and may be more tractable and less expensive to attract, nurture and retain than physical capital. For national government regional policymakers, an occupational approach can help inform what types of human capital expenditures and training programs might work best in distinctive regions. At the provincial and local levels, targeting occupations

enables planners and policymakers to combat the proliferation of 'poor jobs' or the filling of new jobs by outsiders associated with some types of development incentives and to fashion a strategy more closely tied to the skills and character of current regional populations.

Support for education and training is the single most important thing a government at any level can do for its stock of human skills. Angel de la Fuentes' work on Andalusia, elsewhere in this volume, finds that investments in elementary and secondary education can make a huge difference to a region's development and that these returns are greatest in the poorest regions. In federalist countries like the U.S., local control offers considerable choice and community involvement in the schools, while state level standards and fiscal equalization programs level eliminate large differences in local capacity. Currently, a movement is growing to extend public funding into universal early childhood education, also to be managed locally.

Although the United States no longer pursues explicit regional policy, its federalist experience with decentralized higher education systems could be considered a *de facto* regional human capital strategy. Competitive state-run public university systems, originally funded federally by land grants and today benefiting from a federal student loan system, are quite spread out in the U.S... For more than a century, they have been producing considerable human capital at the regional level that is available to businesses and policymakers and helps to broaden the ranks of regional entrepreneurs. Brazil, too, has a federal governance structure that enables states to raise revenue to support their own public universities, which in turn become human capital generators for regional development. Campinas, in the state of São Paulo is an excellent example, a high tech pole outside the major metropolis (Diniz and Razavi, 1999). Highly centralized governments have tried to build and support university campuses outside the major primate cities as ways of decentralizing skill and talent. South Korea has done so most recently with its Korea Institute of Technology in Taejon (Jeong and Park, 1999).

Similarly, good training programs for entry level and displaced workers, funded by central government but administered locally in tandem with industrial policies, constitute a human capital approach of major significance. In a world market that is rapidly integrating, skilled workers thrown out of work need specialized training or further education to match them with new occupations and industries. A system that sets standards centrally and shares revenue but enables regions to adopt training programs to their unique circumstances can operate as a powerful regional development strategy at a more modest cost than physical infrastructure programs.

At the state and local levels, where almost all economic development policy is currently funded and implemented in the U.S., regional policymakers can tailor economic development programs to target occupations as much as industries, human skill as well as physical capital. The policy inferences addressed in what follows are based on research that I and others have done on the micro-workings of specific occupations at the regional level (e.g. Markusen and King, 2003). Here, we explore approaches and tools that can be used to sharpen the occupational

focus and build to a region's strengths in its economic base. A discussion of how to choose occupations to target and how data can be used to operationalize this exercise is found in Markusen, 2004.

Build on occupational networks, organizations and institutions

Regional development officials can tap into existing occupationally-oriented institutions – including professional associations, trade unions, education and training institutions, and informal networks – to identify policies that could improve the viability of those occupations within the region. This utilization of existing associational infrastructure is a fairly common organizing tool among economic developers targeting specific industries, especially those using an 'industry cluster' approach (Waits, 2000).

Many occupations, especially in professional and scientific fields, have counterpart professional associations and/or that are linked to national or international bodies – for instance, the American Society of Mechanical Engineers, or the National Writer's Union. On the national level these organizations establish standards for education and certification, provide forums for networking and technical debate, do research on pay and benefits, offer support on issues of contracts and property rights, and monitor relevant public policy issues. On the regional level, they are more commonly a vehicle for networking and professional development, but rarely an active participant in efforts to promote economic development related to their field.

For example, efforts to promote biosciences should include not only trade associations comprised of bioscience firms, but also educational institutions that directly impact the future supply of workers in these fields (in this specific example the 'supply' side is generally the province of universities and their personnel responsible for research efforts, e.g. the Minnesota Bioscience Initiative). These efforts should not overlook the interests and motivations of bioscience workers, whose individual decisions to move into or out of a particular region or to pursue an entrepreneurial venture have enormous impact on a region's economic trajectory. Traditional, firm-oriented economic development approaches largely miss this important piece of the puzzle. Working with occupationally-oriented institutions would facilitate the kinds of interventions discussed below and enhance industry-oriented development efforts as well.

In practice, the involvement of occupationally-based organizations in economic development initiatives works better under certain circumstances. One is when a real or perceived shortage of workers in a given field is either current or projected. This was clearly the case in the 1990s with information technology occupations, when rising demand for workers in these fields mobilized a number of educational institutions and training organizations to develop programs (Benner 2002; Chapple et al 2000). This was also the case with the need for telecommunications installers as new technologies came on line in the 1990s. Unions such as the Communications Workers of America and the IBEW became important partners to smaller firms in their effort to train workers for this job (Wolf-Powers, 2003).

Second, working with occupational groups is particularly important when an occupation is not closely co-terminant with a single industry and where there are high levels of self-employment and entrepreneurship. The arts are a good example here. Artists (including visual and performing artists, musicians and writers) exhibit high rates of self-employment, between 30 percent and 65 percent depending on the genre (Markusen *et al.*, 2004). Many of them work across industry sectors, doing contractual work for non-arts firms and selling their work and services through the internet, publishers, at art fairs and by traveling to perform, none of which is captured in regional employment figures based on employers' records. Some regions are beginning to understand the economic development significance of artistic spaces, facilitating artists' live/work buildings and studio space, supporting artists' centers (hothouses where artists congregate to compare notes on craft and livelihoods, share equipment, find mentoring, exhibit and present), and commissioning public art as part of redevelopment projects (Markusen and Johnson, 2006). Agglomerations of artists also have salutary benefits in stabilizing and upgrading neighborhoods, although spirals of unsettling gentrification have sometimes ensued (Markusen, 2006).

Of course, a well-disciplined system will ensure that organizations involved in these activities are monitored to prevent opportunistic behavior (e.g. to ensure that unions don't use training funds to run their general operations or to discriminate against certain groups of workers). The use of intermediaries, described below, is one form of structural monitoring – in this model, employers who seek workers and community groups who represent aspiring workers work collaboratively via third-party groups to build intermediaries that identify desirable skill sets, teach these in workplace like sites and with employer instructors, and rely on community organizations to provide non-firm specific recruiting, counseling and training. Providers offering training should be held to performance standards and should be expected to compete periodically for contracts.

Promote entrepreneurship in key occupations

A human-capital strategy pays particular attention to entrepreneurship, a phenomenon that we believe is easier to identify by thinking occupationally rather than industrially. It relies on the cross-fertilization of occupational knowledge across sectors to generate new entrepreneurial opportunities for economic development and to deepen the process of regional specialization. Occupation-led economic development can facilitate this by working through organizations and institutions to help individuals identify entrepreneurial and self-employment opportunities and to learn the business skills to pursue them.

While career development is a common focus in unions and professional associations, such efforts are generally directed toward improving, upgrading, and codifying skills. This occurs through certification processes, training seminars and short courses that allow individuals to remain current on new technology, issues, etc., related to the occupation. Benner (2002) discusses the importance of continuing education through professional associations (as labor market

intermediaries) in assisting information technology workers in Silicon Valley to keep pace with rapidly-changing technologies for applications such as Web design.

However, most traditional occupational organizations stop short of active assistance in helping their members to identify new business opportunities, develop business plans, navigate capital access and intellectual property concerns, and learn management skills. At the same time, the resources that do exist for individuals to pursue entrepreneurial ventures – such as the U.S. federally-funded Small Business Development Centers – tend to be occupationally- and industrially-generic and thus less directly attuned to the particular circumstances or knowledge base of a given occupation. Many engineers, for instance, aspire to start their own businesses but lack the managerial acumen. Economic developers could help to supply entrepreneurship training to occupational groups that show interest and promise.

In occupations such as the arts, where the rate of self-employment is quite high, this blurring of boundaries between professional development and entrepreneurship is more common. Across the U.S., help for artists in designing their careers and dealing with the business side of it has been forthcoming from enterprising arts organizations, not from economic development agencies. In Minnesota, Springboard for the Arts offers inexpensive counseling for artists on these issues, and in Los Angeles, the Center for Cultural Initiatives does the same. Both have helped thousands of regional artists to create viable strategies for pursuing their art as their major livelihood, figuring out how to connect to new markets and beginning to build businesses that employ others.

Secure and enhance the pool of regional talent

A regional human capital strategy develops the region's ability to supply and retain top-notch talent – both 'home grown' and imported – around its occupational specializations. The goal is to build a regional identity around key occupations that allows it to be known as a 'place to be' for that occupation. Examples are IT professionals in the Bay Area, media artists in the Los Angeles region, automobile engineers in Detroit, outdoor gear designers in Boulder, software engineers in Seattle, writers in Boston and so on.

How should policymakers approach this? To begin with, having well-funded education and training institutions is essential. But just as importantly, those institutions need to be connected systematically to the demand side of the labor market, allowing them to ably recruit regional graduates before they leave for greener pastures elsewhere and to ensure that graduates remain current. This is common practice at universities and community colleges through industry advisory groups and customized training programs. In addition, planners and policymakers need intelligence on what kinds of environmental amenities and networks members of target occupations prefer and rely upon, and attempt to enhance the presence of these in their regional economies.

Efforts to recruit and retain individuals within targeted occupations can also work through occupational intermediaries. States and localities should market themselves directly to individuals within key occupations by advertising in occupationally-specific trade publications, marketing within education and training institutions, etc. For example, Michigan recently established the Michigan Recruitment Alliance to connect job seekers, businesses and educational institutions around its targeted areas of life sciences, information technology, and advanced manufacturing occupations. Recruiters can also work with lists of alumni of regional universities and colleges, encouraging them to come home to work and/or run their business. Such efforts appear to be oriented primarily toward retention of regional college graduates. It is less clear whether they are successful in tapping into existing occupational labor pools in other places.

Link initiatives with community-based organizations

A region pursuing a human capital strategy will seek to ground its occupational specializations in unique ‘place’ characteristics that endow them with local character, and generate benefits for the broader community. This can be done by linking occupationally-oriented economic development efforts to community-oriented goals of community-based organizations. Community-based organizations (CBOs) often take a direct stake in the vitality of industry sectors and occupations with a substantial presence in those communities. In the 1980s the City of Chicago institutionalized the use of CBOs for this purpose through its Local Industrial Retention Initiative (LIRI) that funded CBOs to provide technical assistance and outreach to local manufacturing businesses (Fitzgerald and Leigh 2002). Over time, many of these organizations have worked actively to link the prosperity of regional businesses to that of regional residents through training and placement services targeted at good-paying, skilled and semi-skilled occupations critical to those businesses. A widely cited example of this is the Jane Addams Resource Corporation, whose metalworking training program feeds skilled workers to manufacturing businesses throughout the city and surrounding region (Fitzgerald and Leigh, 2002; Glasmeier *et al.*, 2000).

Efforts to create districts that harbor particular occupations and related work and shop or performance spaces are another route that is becoming increasingly more important. For instance, in the arts, economic developers are beginning to understand that funding large destination arts facilities surrounded by parking lots is an expensive way of remaking an area and often fails to create synergies in the immediate neighborhood. Shaping revitalization around artist live/work buildings, instead, has required modest funds with large payoffs for areas such as St. Paul’s Lowertown neighborhood. Artists residing in concentrated numbers has prompted commercial and retail growth, the revival of the farmer’s market, and spring and fall arts crawls where thousands come to visit artists showing their work in their studios. Smaller towns are investing in artists’ centers and artists’ live/work buildings as the keystone to revitalization of aging downtowns (Markusen and Johnson, 2006).

Use occupational screens in allocating employer incentives

Occupational analysis has often been used as a subsidiary exercise when targeting industries in economic development. Once industries are chosen, their occupational structure is examined for ways to harness the workforce development system to the effort (Balfe and McDonald, 1994; Theodore and Carlson, 1998). Our research suggests that occupational analysis could play a lead role in economic development efforts. Turning the tables, economic development planners and policymakers could choose a set of target occupations and then use these as a screen for deciding how employer-based incentives might be allocated across industries.

If occupations are targeted on the basis of their current presence (even if modest), capturability, good pay and benefits levels, longer term promise, cross-industry fertilization and fit with the regional populations' skills and aptitudes, the resulting occupational set can be matched to the occupational composition of a prospective employers' workforce or that of a current employer asking for retention incentives. Those employers where there is a good fit would be more readily funded, while those with a poor fit could be asked whether they are willing to upgrade their technologies and skill profiles as a counterpart for public support. They could also be asked to work with key occupational groups and CBOs as recruitment and training partners. Similarly, if the region has strength in post-secondary colleges and universities in particular fields where local demand is under-represented, it could target its recruiting on employers who need these skills to stem the outflow of graduates from your region.

Conclusion

These planning and policy prescriptions are the product of a mixed-method research agenda that has endeavored to understand the broader trends regarding regional occupational specialization as well as the micro processes that give rise to those trends. This is very much a work in progress, as the recognition of the role of human capital and skill in economic development is only now taking hold. The effort to make labor pool formation and retention co-equal with physical capital investments and firm retention is a promising economic development challenge for the coming decade.

One very positive sign that labor is being taken more seriously in development planning is the structural re-organization of state and local agencies in some U.S. cities and states to force greater integration between workforce and economic development. In Minnesota, the state Departments of Economic Development and Employment Security have been merged into a single Department of Employment and Economic Development. So far, after more than one year, the merger is far from complete – even the research departments are currently co-equal, with neither Director responsible to the other. At the city level, Minneapolis' new Mayor has abolished the powerful Metropolitan Community Development Agency and merged its operations with the workforce development agency, directing that

all economic development efforts should take the needs and skills of the city's workforce into account.

Complicating the creation of an occupationally-focused and/or 'stereo vision' (both occupational and industrial lenses) strategy for metropolitan economic development is the fact that responsibility for job creation and retention is currently split between states and local governments, each with different tools at their disposal and political constituencies to answer to. Although metropolitan planning around land use, transportation and environmental issues has made great gains over the past twenty years, metropolitan economic development planning remains vestigial. It will take at least a decade for regional planners to realize that rational land use, transportation and environmental planning must take into account the powerful economic development competition among jurisdictions if it is to succeed. Experiments at the regional level are more apt to drive this fusion, we believe, than is reform of state level economic development.

Two final caveats should be made. First, the human capital strategy described here does not contain a neat formula for optimizing the deployment of educational and skill investments among individuals or places. Just as infrastructure can be over-invested in, human capital may be as well. The chronic problem of over-production of college graduates in Africa compared with under-investment in elementary and secondary education is well known. Systems should be monitored for over-production in certain fields or skills training that poorly matches the market. Not every community should have a community college, and states, regions and national governments must make tough decisions about how many research universities to support and where. Towns hosting colleges will undoubtedly do better than those that do not, so it is difficult to avoid competition and conflict over such policy. Nor is concentrating on 'people prosperity' rather than place prosperity clearly preferable. Also, deciding whether or not to concentrate resources on lower levels of literacy as opposed to higher education is an important political choice, one that good research on the societal returns can help inform. For each of these dimensions, the proper locus of responsibility – at local, regional and national levels – is a major enveloping policy issue.

Finally, a human-capital focused and occupationally-targeted regional development strategy is not costless. The kinds of organizational interactions, the hands-on work with individuals, the cultivating of educational and training institutions and the monitoring systems to ensure that they work well all come with a price tag. Apart from the formal educational system, which has many non-economic benefits for the society, it is hard to imagine that human capital strategies would come close to the price tag for physical-capital investments that have formed the bulk of regional policy for a half-century. In addition, human capital investments are quite labor-intensive and likely to increase the in-region multiplier associated with them as well as honing skill sets of providers that are of ongoing productivity for the region. Nevertheless, human capital strategies require ongoing monitoring and research to determine their effectiveness and to compare them with other development strategies and with alternative spending priorities.

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