

## **Regional Asset Indicators: Innovation**

### **July 2006**

#### **Why is Innovation Important?**

The level of *innovation* of a region is an asset that contributes to diverse economic opportunities and strategies—leading to regional prosperity. Research and development, high-tech firms, and patenting are all indicators of innovation, but of these three, patenting is measurable for counties and rural regions. Research finds patenting activity supports entrepreneurship, in turn fueling regional economic growth.<sup>1</sup>

The good news for rural America is that research finds a large population center is not a prerequisite for innovation.<sup>2</sup> Less populous, often rural, regions can compete in relatively mature technological fields, especially related to agriculture and natural resource extraction.

#### **How Do We Measure Innovation?**

Innovation at a regional level is difficult to define and measure. However, patents are a consistent quantitative measure of innovation at the local level—and relatively few data are available at the local level, especially for rural regions. Additionally, while research and development and high-tech firms suggest investment in innovation, the number of patents granted implies innovation has successfully occurred. Patenting has some shortcomings

---

<sup>1</sup> Camp, Michael. 2005. “The Innovation-Entrepreneurship NEXUS, A National Assessment of Entrepreneurship and Regional Economic Growth and Development.” Small Business Administration, Office of Advocacy. April.

<sup>2</sup> Orlando, Michael and Michael Verba. 2005. “Do Only Big Cities Innovate? Technological Maturity and the Location of Innovation.” *Economic Review*. Federal Reserve Bank of Kansas City. Second Quarter.

though—many innovations are not patented and the local economic impact of patents varies enormously.<sup>3</sup>

We use average patents divided by county population as our measure of innovation. Patents are assigned to counties according to the residential address of the first inventor named on the patent.<sup>4</sup> We calculate the average number of patents granted in a county between 1995 and 1999 and divide this by 1999 county population.<sup>5</sup> Denominators other than population, such as total employment and establishments, yielded very similar results and spatial patterns.

Patenting activity is highest in the northeast, spreading through metropolitan areas of the Great Lakes region, but otherwise does not have distinct spatial or regional patterns (Figure 1). Rather, patents per capita tend to be high due to a certain industry or firm located in a region. For example Washington County, Oklahoma, population 49,000, has a high level of patents per capita because the headquarters of a large oil company is located there and consultants, engineers, and scientists are a relatively high percentage of the population—marking this region as high in our measure of innovation.

---

<sup>3</sup> Carlino, Gerald, Satyajit Chatterjee and Robert Hunt. 2005. “Matching and Learning in Cities: Urban Density and the Rate of Invention.” Federal Reserve Bank of Philadelphia. April.

<sup>4</sup> We use patent data from the United States Patent and Trademark Office (USPTO), 1995-1999.

<sup>5</sup> 1999 Population, Regional Economic Information System, Bureau of Economic Analysis.

Our innovation measure is two times higher in metropolitan counties than in rural counties. Average patents per capita is 0.000188 in metropolitan counties, half this (0.000091) in micropolitan counties, and smaller yet in town counties (0.000062).<sup>6</sup>

### **What Implications are there for our Region?**

The overall rate of innovation is highest in populous places. Orlando and Verba find high-tech workers and high-tech capital are employed disproportionately in large cities; however, they also find patenting in tractor-type machinery and mineral oils to be over ten times larger in some rural counties than the nationwide share of these patents.

The location of innovation depends on technological maturity—mature industries thrive in rural regions where costs are low and agricultural and mineral extraction clusters exist.<sup>7</sup> Rural regions can become more attractive to inventors in mature technological fields by implementing policies that increase access to areas with high economic activity. Examples of such policies include partnering with urban business networks, increased communication through broadband internet access, and increased transportation infrastructure.

---

<sup>6</sup> Metropolitan counties contain at least one city of 50,000 or have substantial out-commuting to a metro county. Micropolitan counties contain at least one city of 10,000 to 50,000 residents and town counties contain no towns of more than 10,000 residents.

<sup>7</sup> Orlando and Verba. 2005.

**Figure 1. Average Number of Patents Per Capita, 95-99**

