

Bubble Chart Analysis of Industry Clusters

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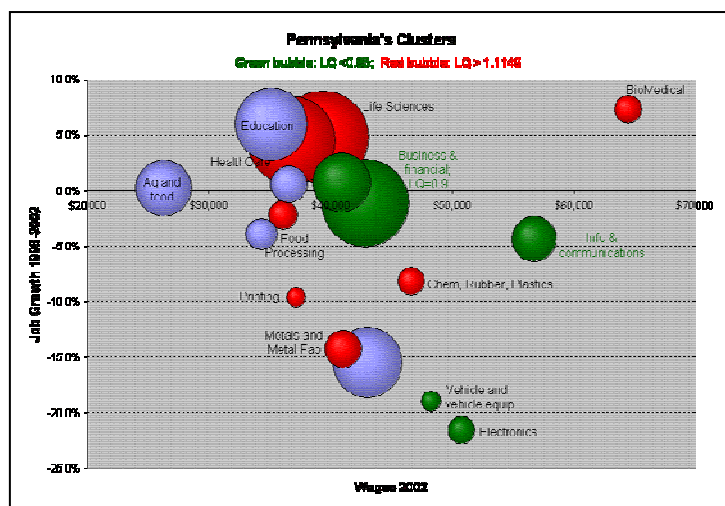
Bubble charts are popular tools for identifying and illustrating industry clusters. Essentially, these charts allow four different variables to be plotted within the same graph, making it easy to assess relative economic performance. Because they allow visual comparisons of well-understood measures, bubble charts are often used for pinpointing priority industries that should receive attention from a state economic development agency.

Bubble charts: what they are

Figure 1 illustrates industry cluster relationships for the 17 Pennsylvania targeted industry clusters (CWIA 2004). The following four variables are plotted in this single graphic:

1. Average cluster wages in 2002: on the x-axis (horizontal)
2. Growth in jobs, 1998 to 2002; on the y-axis (vertical)
3. Employment size of the industry, 2002; indicated by the size of the bubble
4. The industry's location quotient, 2002?; indicated by the color of the bubble

With user-defined demarcations, location quotients (see Shields (2003) for more details) show whether a state or region is more specialized (>1.1149), less specialized (<0.95) or as specialized in a particular industry as is the nation or the reference region. In this graphic, clusters in which the state is more specialized than the nation are shown in red, clusters with less specialization are shown in green, while clusters with average specialization are shown in blue.



Bubble charts: how they are used

Bubble charts show the most important clusters in a state or region as measured by total employment size (the bigger the bubble the better), recent job growth (the further up in the graph the better), and high-paying jobs (the further to the right in the graph, the better). Depending on the state's economic development objective – that is, whether the goal is to create more jobs or better-paying jobs, or both – the state agency responsible for economic development might choose to concentrate on industries with large bubbles or industries located in the right-hand side of the graphic. To many, the ideal is to focus

on rapidly-growing, high-paying industries depicted in the upper right-hand corner of the graph.

For example, the biomedical industry is promising because it pays relatively high wages, has shown substantial growth in the last 5 years, and it has a red location quotient (indicating that the state has some locational advantage in the industry). However, it is also a relatively small industry in terms of employment size, in contrast to, for example, Life Sciences and Health Care.

Looking at other clusters, our analysis shows that Information and Communications is a high-wage industry with declining employment and a location quotient that indicates below-average specialization in the state compared to the nation. By comparison, the Agriculture and Food sector is moderately important in terms of employment size, but the jobs tend to be low-paying; furthermore, the sector has not expanded over the period of interest.

While bubble charts can help identify “promising” clusters, an important shortcoming of this analysis is that they can not identify “why” a particular region has an advantage. For example, is a cluster strong in a region because of access to resources or markets? Or, does the region possess a particularly skilled labor force? Or, are there agglomeration economies gained through spillovers among similar businesses. Because bubble chart analysis can not answer the “why” and “how” questions, it should be seen as an important part of economic development analyses, but it is only one part of the process.

Nonetheless, bubble charts are a good starting place for any discussion about cluster-based economic development policies. For example, in our cluster work with communities, the first question after identifying an important cluster is usually some variant of “why here?” This opens the door for rich conversations about the potential causes of local competitive advantage. With respect to the growth in the health care cluster in Pennsylvania, for instance, practitioners soon begin to talk about the changing demographics of the commonwealth and the emergence of regional medical centers. Here, the educational process is getting participants to realize the importance of both local demand conditions and changes in industrial organization.

And lessons can also be learned from declining clusters: the second question we usually get is “what’s going on?” as audiences look at historically important clusters that seem to be in decline. For example, the decline in printing employment (high LQ) tends to raise questions about off-shoring and the supposed transition to a paperless, digital economy. Thus, bubble charts provide not only a method for identifying clusters, but also an entrée for discussing more advanced topics, both theoretical (why?) and practical (how?).

Bubble charts: How to create them

The easiest way to create bubble charts is to set them up in Excel, using the chart/bubble option. Analysts can then copy them directly into PowerPoint or a Word document. In practice, creating a bubble chart is only slightly more complicated than creating a bar or

line chart. In the above example, put the 1998 wages (x -axis) into the first column, the percent job growth (y -axis) into the second column, and the industry employment size into the third column, and the location quotient into the fourth column. Users then simply need to highlight the three first columns and subsequently plot the chart.

For users familiar with writing macros in Excel, various colors can be assigned to bubbles via a macro. In this example, we chose the color red for a bubble if the cluster location quotient exceeds 1.15 (recall, the demarcation value for high-LQ clusters is user-defined). For analysts unfamiliar with macros, individual bubbles can be manually colored after the plot has been generated. For additional details analysts can also add text labels to highlight particular industries, if so desired.