METHODS OF REGIONAL ANALYSIS: SHIFT-SHARE

Is the local economy growing or declining? Is this the best use of public funds? What industries should be targeted? How does our community compare with other communities? These are among the many questions that urban planners, regional analysts, and economic developers tackle day-to-day. To answer such questions, analysts rely on a standard toolkit: a set of quantitative methods that include population projection techniques, shift-share analysis, economic base analysis and location quotients, input-output analysis, optimization techniques, and benefit-cost analysis. In most cases, analysts need only a spreadsheet program—e.g. Excel, Quattro Pro, or Lotus123—to apply any of the regional methods. In this article, a popular method for identifying competitive industries is described.

What is Shift-Share?

The Texas electronics industry, for example, gained about 10,475 jobs between 1997 and 2000. What factors explain this 8.3 percent growth? The shift-share technique has been used to answer this type of question. The technique is based on the assumption that local economic growth is explained by the combined effect of three components: national share, industry mix, and regional shift. Thus, one can apply shift-share to determine how much each component contributes to local economic growth. In addition, the shift-share technique may be used to identify a local economy’s competitive industries. A competitive industry is defined as one that outperforms its counterpart at the national level.

...And the Formula Is

\[ SS = NS + IM + RS \]

- SS  \(\rightarrow\) Shift-Share
- NS  \(\rightarrow\) National Share
- IM  \(\rightarrow\) Industry Mix
- RS  \(\rightarrow\) Regional Shift
The equations for each component are

\[
\text{NS} \rightarrow \ i_{\text{local}}^{t-1} \cdot \frac{\text{US}^t}{\text{US}^{t-1}}
\]

\[
\text{IM} \rightarrow \ (i_{\text{local}}^{t-1} \cdot \frac{i_{\text{US}}^t}{i_{\text{US}}^{t-1}}) - \text{NS}
\]

\[
\text{RS} \rightarrow \ i_{\text{local}}^{t-1} \cdot (i_{\text{local}}^t/i_{\text{local}}^{t-1} - i_{\text{US}}^t/i_{\text{US}}^{t-1})
\]

**What do the subscripts and superscripts and alphabets mean?**

- \(i_{\text{local}}^{t-1}\) number of local jobs in an industry \((i)\) at the beginning of the analysis period \((t-1)\)
- \(i_{\text{local}}^t\) number of local jobs in an industry \((i)\) at the end of the analysis period \((t)\)
- \(\text{US}^{t-1}\) total number of jobs in the nation at the beginning of the analysis period \((t-1)\)
- \(\text{US}^t\) total number of jobs in the nation at the end of the analysis period \((t)\)
- \(i_{\text{US}}^{t-1}\) number of jobs, nationwide, in industry \((i)\) at the beginning of the analysis period \((t-1)\)
- \(i_{\text{US}}^t\) number of jobs, nationwide, in industry \((i)\) at the end of the analysis period \((t)\)

The **National Share (NS)** measures by how much total employment in a local area increased because of growth in the national economy during the period of analysis. For example, all else being equal, if employment in the U.S. economy grew by 10% during the period of analysis, then total employment in the local area would have grown at the same rate. **Industry Mix (IM)** identifies fast growing or slow growing industrial sectors in a local area based on the national growth rates for individual industry sectors. Thus, a local area with an above-average share of the nation’s high-growth industries would have grown faster than a local area with a high share of low-growth industries. The **Regional Shift (RS)** or competitive effect is perhaps the most important component. It highlights a local area’s leading and lagging industries. Specifically, the competitive effect compares a local area’s growth rate in an industry sector with the growth rate for that same sector at the U.S. level. A leading industry is one where that industry’s local area growth rate is greater than its U.S. growth rate. A lagging industry is one where the industry’s local area growth rate is less than its U.S. growth rate.
And this helps me, how?

As an academic exercise, shift-share analysis divides local economic growth into its component parts. Returning to the electronics example, a shift-share analysis would show how much of the 10,475 person increase in the Texas electronics industry was due to the U.S. economy, how much to the national electronics industry, and how much to the Texas economy. As a practical matter, shift-share analysis identifies leading and lagging industries. It is this information that, in turn, could help drive business recruitment decisions as well as public investment decisions. In addition, results from this analysis could help structure economic development policy.

Where can I get Data to run the Analysis?

It’s not that difficult to conduct a shift-share analysis. All you need is an Excel spreadsheet and employment data. By following the calculations as described above, you can determine what the competitive industries are in your local economy—“local” may refer to a county, metro area, region, or state.

Depending on the level of geography and industry detail, analysts have used gross state product, personal income, value-added, and employment numbers. Employment data is preferred simply because it is readily available at all geographies and all industry detail. Employment data by industry may be secured through the U.S. Census Bureau’s annual County Business Patterns publication or accessed through the County Business Patterns website:

www.census.gov/epcd/cbp/view/cbpview.html

The U.S. Bureau of Labor Statistics also provides employment data by industry for every state and county through its Covered Employment (ES-202) data series. The ES-202 data may be accessed at www.bls.gov/data/

The Texas Workforce Commission also provides Covered Employment and Wages data http://www.twc.state.tx.us/lmi/lfs/type/coveredemployment/coveredemploymenthome.html

In addition, the Workforce Commission has a shift-share analysis program on-line that will calculate results for any of the state’s 28 local workforce development areas. http://socrates.cdr.state.tx.us/iSocrates/ShShare/shshare.asp

Here’s an Example.

Suppose that the state’s economic development task force has concluded that manufacturing is the key to continued economic growth and development in the state. Further suppose that the task force wants to identify which manufacturing industries would most likely benefit from aggressive state recruitment efforts and investment initiatives. The task force has directed this request to the state’s ED agency and has asked for this information by the close of business the following day—if not sooner.
Pare the request down to a narrow and manageable question: what are the state’s leading and lagging manufacturing industries? Next determine the method of analysis, time frame, and data availability. In this example, we use the shift-share technique, the 1997-2000 period, and employment data provided by the Bureau of Labor Statistics.

Texas Manufacturing Industry Employment Data

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<tr>
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<tbody>
<tr>
<td>20</td>
<td>Food and Kindred Products</td>
<td>99,593 99,346</td>
<td>-0.2%</td>
<td>1,687,808</td>
<td>1,688,864</td>
<td>0.1%</td>
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<td>21</td>
<td>Tobacco Manufacturers</td>
<td>-----</td>
<td>-----</td>
<td>41,233</td>
<td>34,900 -15.4%</td>
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<tr>
<td>22</td>
<td>Textile Mill Products</td>
<td>-----</td>
<td>-----</td>
<td>617,332</td>
<td>530,823 -14.0%</td>
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<td></td>
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<tr>
<td>23</td>
<td>Apparel</td>
<td>58,095 42,314</td>
<td>-27.2%</td>
<td>821,364</td>
<td>632,476 -23.0%</td>
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<td></td>
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<tr>
<td>24</td>
<td>Lumber &amp; Wood</td>
<td>44,911 48,288</td>
<td>7.5%</td>
<td>796,724</td>
<td>823,066 3.3%</td>
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<tr>
<td>25</td>
<td>Furniture and Fixtures</td>
<td>19,230 21,069</td>
<td>9.6%</td>
<td>510,710</td>
<td>555,348 8.7%</td>
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<td></td>
</tr>
<tr>
<td>26</td>
<td>Paper &amp; Allied Products</td>
<td>29,784 28,889</td>
<td>-3.0%</td>
<td>684,567</td>
<td>655,253 -4.3%</td>
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<tr>
<td>27</td>
<td>Printing &amp; Publishing</td>
<td>75,343 75,605</td>
<td>0.3%</td>
<td>1,543,404</td>
<td>1,538,304 -0.3%</td>
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<tr>
<td>28</td>
<td>Chemicals &amp; Allied Products</td>
<td>84,965 83,530</td>
<td>-1.7%</td>
<td>1,034,851</td>
<td>1,031,634 -0.3%</td>
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<tr>
<td>29</td>
<td>Petroleum &amp; Coal Products</td>
<td>26,452 24,653</td>
<td>-6.8%</td>
<td>138,965</td>
<td>127,375 -8.3%</td>
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<tr>
<td>30</td>
<td>Rubber &amp; Misc. Plastics</td>
<td>53,415 57,960</td>
<td>8.5%</td>
<td>996,250</td>
<td>1,011,707 1.6%</td>
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<tr>
<td>31</td>
<td>Leather &amp; Leather Products</td>
<td>7,524 6,287</td>
<td>-16.4%</td>
<td>90,424</td>
<td>70,074 -22.5%</td>
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<tr>
<td>32</td>
<td>Stone, Clay, &amp; Glass Products</td>
<td>41,268 46,441</td>
<td>12.5%</td>
<td>551,366</td>
<td>578,319 4.9%</td>
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<tr>
<td>33</td>
<td>Primary Metals</td>
<td>30,645 31,644</td>
<td>3.3%</td>
<td>710,800</td>
<td>699,744 -1.6%</td>
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<tr>
<td>34</td>
<td>Fabricated Metals</td>
<td>99,379 106,823</td>
<td>7.5%</td>
<td>1,479,111</td>
<td>1,535,628 3.8%</td>
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<td></td>
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<tr>
<td>35</td>
<td>Machinery except Electrical</td>
<td>143,090 138,865</td>
<td>-3.0%</td>
<td>2,166,852</td>
<td>2,110,991 -2.6%</td>
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<tr>
<td>36</td>
<td>Electric &amp; Electronic Equipment</td>
<td>126,013 136,488</td>
<td>8.3%</td>
<td>1,690,079</td>
<td>1,712,335 1.3%</td>
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<tr>
<td>37</td>
<td>Transportation Equipment</td>
<td>78,077 79,921</td>
<td>1.1%</td>
<td>1,838,711</td>
<td>1,850,681 0.7%</td>
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<tr>
<td>38</td>
<td>Instruments &amp; Related Products</td>
<td>41,059 35,638</td>
<td>-13.2%</td>
<td>863,017</td>
<td>841,359 -2.5%</td>
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<tr>
<td>39</td>
<td>Misc. Manufacturing</td>
<td>19,565 20,467</td>
<td>4.6%</td>
<td>390,781</td>
<td>391,264 0.1%</td>
<td></td>
<td></td>
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</tbody>
</table>

MANUFACTURING 1,078,408 1,083,228 0.4% 18,654,349 18,420,145 -1.3%

Total National Employment (E) 121,044,320 129,877,063 7.3%


The data indicates that—over a three-year period—10,475 new electronic equipment manufacturing jobs were created in the state; 7,444 new jobs were created in the state’s fabricated metals manufacturing industry; overall, 4,820 new manufacturing jobs were created in the state. How much of this growth may be attributed to the unique Texas business climate? In other words, since an industry’s local performance is affected by fluctuations in the national business cycle and by its national performance, external forces need to be subtracted. Thus, to identify the local economy’s leading and lagging industries, we apply the shift and share calculations previously described.
Interpreting the Data Analysis

In 1997, nearly 1.078 million workers were employed in the state’s manufacturing industries. Three years later, 1.083 million workers were employed in the industry. How much of that increase may be attributed to the national economy?

\[ 1.083 = 1.157 - 0.092 + 0.018 \]

Actual NS IM RS

National Share (NS): Had the state’s manufacturing industry grown at the same rate as the national average, there would have been 78,693 more workers in 2000. So, what explains the loss of 73,873 jobs in the state’s share of national employment? Was there something unique about the industry itself?

Industry Mix (IM): There is usually a difference between a particular industry’s growth rate and the national average. The employment data show that, nationally, manufacturing employment declined even though overall employment increased. Had Texas manufacturing grown at the same rate as the national manufacturing industry, the state would have lost 92,232 jobs. Since it did not, it is fair to say that Texas provided a better environment for manufacturing between 1997 and 2000.

Regional Shift (RS): The difference between the national share and industry mix is the regional shift. The regional shift indicates that local conditions were responsible for the state’s competitive position in manufacturing. The RS column in the data analysis table shows...
Top 5 Leading Manufacturing Industries (1997-2000)

Electronics and Electronic Equipment
Rubber & Miscellaneous Products
Fabricated Metals
Stone, Clay, & Glass Products
Lumber & Wood Products

Top 5 Lagging Manufacturing Industries (1997 - 2000)

Instruments and Related Products
Apparel
Chemicals & Allied Products
Machinery except Electrical
Furniture & Fixtures

The results clearly indicate that the Texas manufacturing industry outperformed its national counterpart during the expansionary period, 1997-2000. Based on the identification of leading and lagging industries, this analysis suggests that manufacturing recruitment efforts—at least in good economic times—should be directed at bringing more electronics manufacturers and fabricated metals companies to the state.

Limitations of the Shift-Share Technique

The shift-share technique is only a descriptive tool. It should be used in combination with other analyses to determine a region's economic potential. Shift-share does not account for many factors including the impact of business cycles, identification of actual comparative advantages, and differences caused by levels of industrial detail. A shift-share analysis is a "snap-shot" of a local economy at two points in time. Thus, the analysis may not offer a clear picture of the local and national economies since the results are sensitive to the time period chosen. On the other hand, the shift-share technique provides a simple, straightforward approach to separating out the national and industrial contributions from local growth. It is also useful for targeting industries that might offer significant future growth opportunities.
Additional Information on Regional Methods

Web Sites:

Regional Research Institute’s Web Book of Regional Science
www.rri.wvu.edu/regcweb.htm

Hubert H. Humphrey Institute’s Economic Development Page
www.hhh.umn.edu/slp/edweb

DRI-WEFA
http://www.dri-wefa.com/the_list/

Articles on Shift-Share Analysis:


Texas Workforce Commission. “Shift-share analysis Narrative”

Text Books:
