ALTERNATIVE BASELINES FOR RELATIVE EXPENDITURES IN THE UNFOLDING ANALYSIS OF STATE POLICY SPENDING

A report to accompany "A New Measure of Policy Spending Priorities in the American States"

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October 2007

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All three versions of the unfolded state policy spending scores (i.e., obtained using total spending, state population, and gross state product as the baselines to create relative expenditure figures) are available on the authors' web sites:

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In order to employ the metric unfolding approach used in "A New Measure of Policy Spending Priorities in the American States," it is necessary to make the input data values comparable across states and time points. We accomplish this in "A New Measure ..." by using the proportion of total yearly state policy spending allocated to each of the nine policy areas in that year. Alternative strategies for making the data values comparable include using per capita spending figures, or spending figures expressed as a proportion of gross state product (GSP). Each of these approaches differs in the baseline, or the value that is divided into the raw expenditures in order to obtain relative spending figures which are (hopefully) comparable across states and time.

We strongly prefer *not* to use spending per capita, or spending figures that are adjusted by GSP in the unfolding analysis. In this report, we will describe the various limitations involved in using these alternative approaches. But, we will also demonstrate that nearly identical unfolding results are obtained, regardless which baseline is employed to prepare the spending data.

It is an easy matter to create alternative versions of the 1982-2005 state spending data. Information on state populations and GSP's is available in the *Statistical Abstract of the United States* (U.S. Census Bureau 2007). The three possible baselines are highly correlated with each other. The correlation between total spending and gross state product is 0.980. The correlation between total spending and state population is 0.888. The large values of these coefficients verify that the relative expenditure figures should be almost identical, regardless which baseline is employed in their calculation.

Nevertheless, it is problematic to use the per capita or GSP-adjusted spending values as measures of relative allocations across program areas. The problem is that the states vary in their levels of generosity (i.e., overall amounts of spending devoted to public policies) and their costs of living (i.e., the purchasing power of a fixed amount of money), even after differences in state size and overall economic activity are taken into account. The existence of these systematic interstate differences implies that each state has its own "metric" or unit

of measurement for its relative policy expenditures, even though the "objective" units are constant across the states (i.e., dollars per capita or dollars as a proportion of GSP). In order to eliminate this problem, and render the relative spending figures comparable across states, it is necessary to standardize the relative spending spending figures within each of the states. In other words, each state's relative spending values are transformed to have zero mean and unit variance across the nine policy areas and the 24 years included in the dataset. Note that this standardization is not necessary when total spending is used as the baseline because each state's relative spending figures are proportions which sum to 1.0 in each year, by definition.

We replicated the unfolding analysis using the standardized per capita spending data and the standardized GSP-adjusted spending data. The goodness of fit measure for the spatial proximity model is the squared correlation between the unfolded interpoint distances (i.e., between state and policy points) and the input data values (i.e., the relative spending figures). As explained in "A New Measure ...," this R^2 is 0.954 for the proportionate spending figures, when total spending is used as the baseline. The R^2 is somewhat lower, at 0.921, when the input data are based upon standardized gross state products. And, the R^2 is 0.880— lower still— when expenditures are expressed in standardized per capita figures. Thus, the spatial proximity model fits the empirical data better when the relative expenditures are based upon total spending, rather than state population or GSP.

In fact, the unfolded scales of state spending priorities are highly correlated with each other. The correlation between the scale scores based upon total spending and those based upon gross state product is 0.955. The correlation between the scale scores based upon total spending and those based upon per capita spending is 0.840. Figures 1 and 2 show the scatterplots of the unfolded scale scores obtained with the proportionate spending figures versus the unfolded scores obtained using GSP and per capita spending as the baseline. Each figure provides strong visual evidence to back up the information already provided by the correlations: The state spending priority scores obtained using different baselines are

strongly, linearly, related to each other. Given this result, one could argue that the three versions of the unfolded state priority scores are interchangeable. The reasoning is that, since they are close linear functions of each other, all three versions of the variable will exhibit nearly identical structural relationships to other variables in substantive models that include state policy priorities as an explanatory or dependent variable.

While that may well be the case, we still believe the version of the scale based upon proportionate spending figures is preferable because its values are more readily interpretable. As explained in the text of "A New Measure ...," differences in the scores assigned to the states correspond to differences in their proportionate spending on the subset of policy areas that we call collective goods. Thus, if state A has a value of, say, 0.10 and state B has a value of 0.15, this means that B allocates five percent more of its total spending toward collective goods than does A. With the unfolded scales created from the data using standardized GSP-based or per capita figures, there is no such straightforward interpretation of the state scores. Instead, the differences in the unfolded state point locations reflect differences in Z-scores which are, themselves, calculated separately within the respective states. For that reason, there is no simple interpretation of the specific scale values, even though the *relative* distances between the state points still correspond to *relative* differences in the amounts of money that the states devote to collective goods.

Figure 1: Scatterplot of unfolded state ideal points from analysis using proportion of total state spending versus unfolded state ideal points from analysis using spending as a proportion of gross state product.

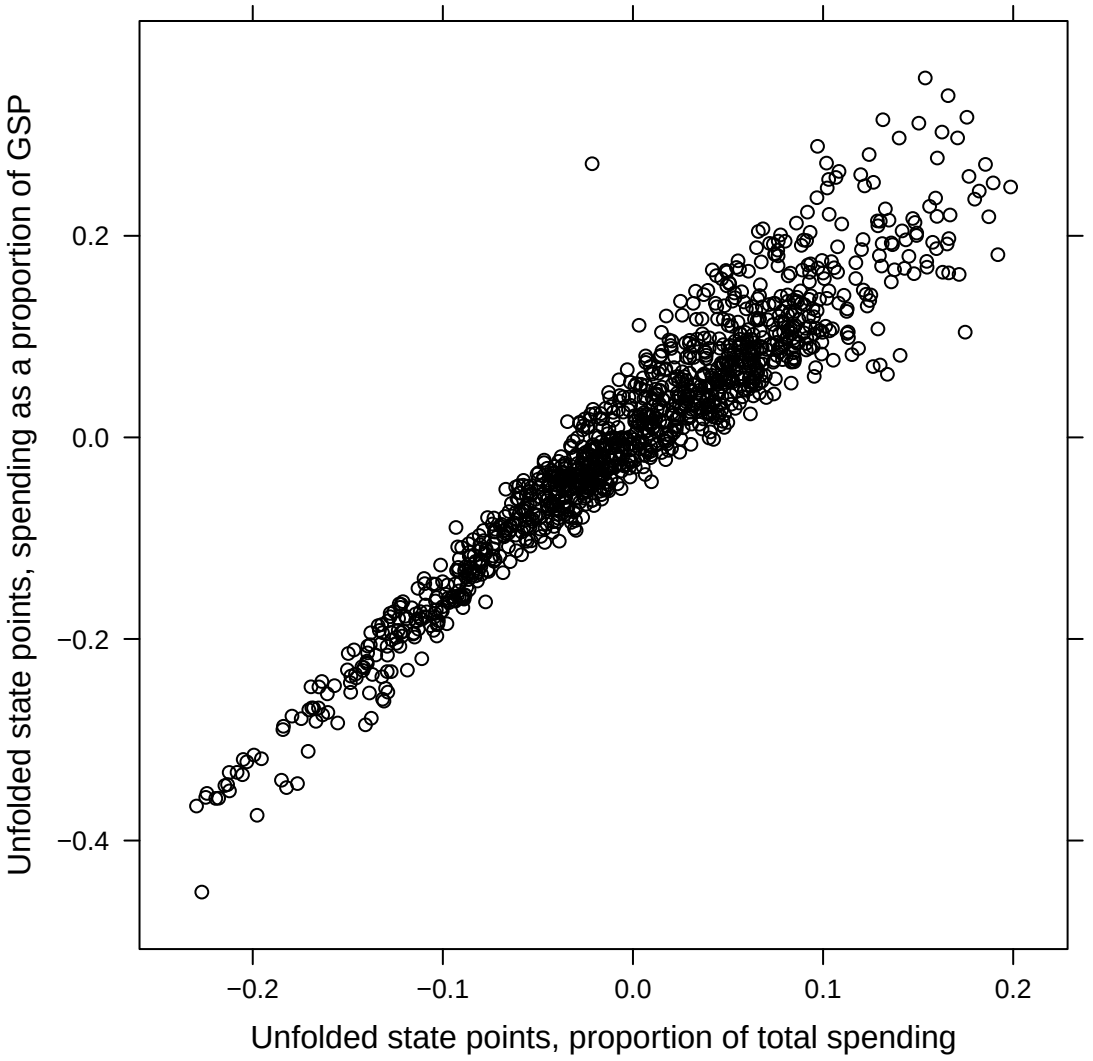
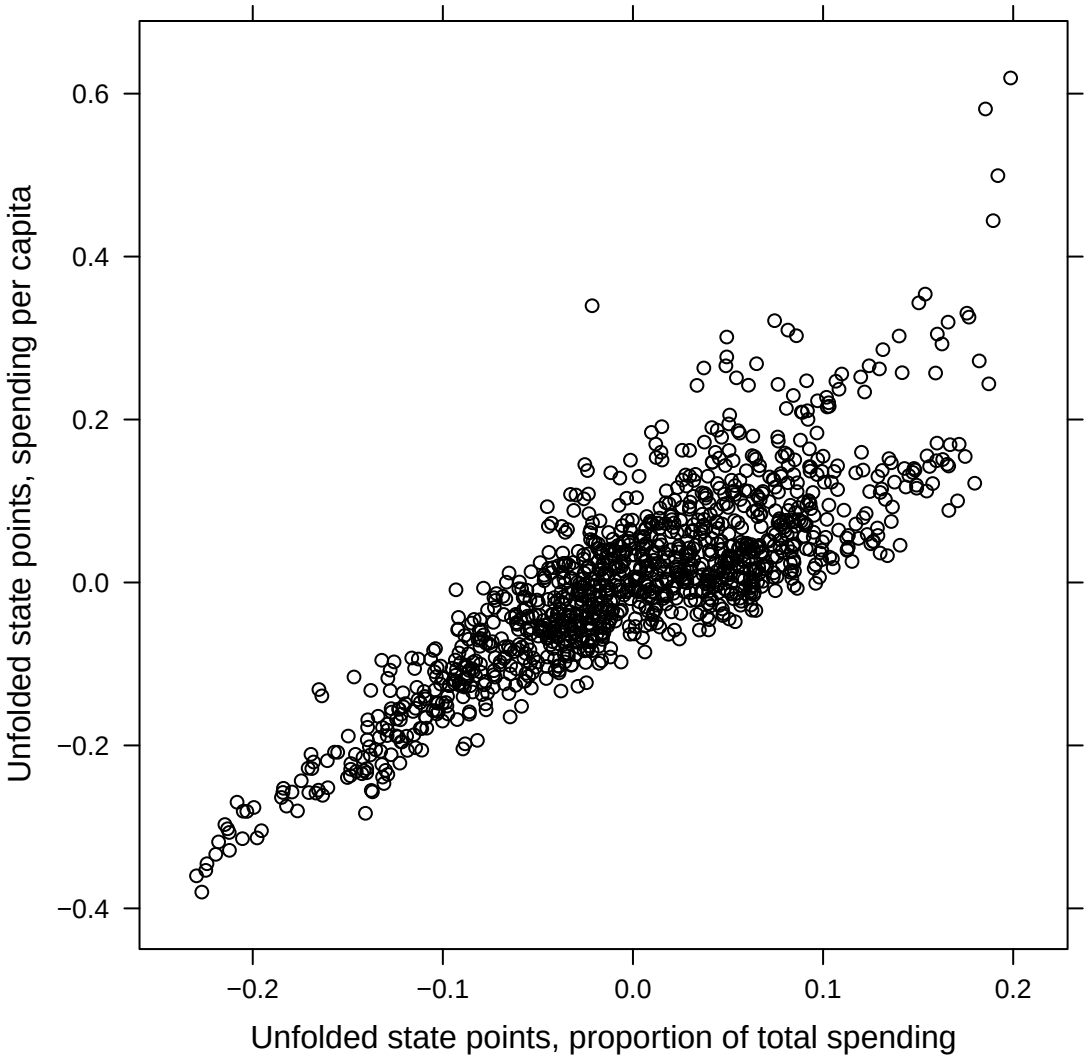
Figure 2: Scatterplot of unfolded state ideal points from analysis using proportion of total state spending versus unfolded state ideal points from analysis using spending per capita.