

## **Which Economic Freedoms Contribute to Growth? Reply**

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A number of studies have recently tested the connection between the degree of a nation's economic freedom and its economic performance based upon a single, aggregated index of economic freedom derived from a weighted summation of several measures of underlying components of economic freedom. In a recent article in this journal, we argued that existing aggregation procedures are inappropriate since they assume all underlying freedom components are positively correlated with growth (Heckelman and Stroup 2000). We have shown this is not a correct statistical assumption through bivariate and multivariate analysis of the underlying components of the most typically used freedom indexes from Gwartney, Lawson and Block (1996, hereafter referred to as GLB). Subsequently, Sturm, Leetouwer and de Haan (hereafter referred to as SLH) have criticized our methodology on several grounds.

SLH agree with our main point that the standard weighting procedures are ad-hoc and potentially misspecified. Specifically, we were concerned that any weighting procedure which forced all the components to positively contribute to the aggregate freedom index (and therefore positively contribute to a country's predicted economic growth) would yield a biased estimate of the aggregate freedom index-economic growth relationship. As such, the lack of significance when we regressed economic growth on the GLB aggregated freedom index was not surprising.

Our stated goal was to develop a more statistically sound methodology for constructing an aggregate economic freedom index that would be meaningful for predicting economic growth. The procedure we developed was based on hedonic regression analysis, where economic growth was regressed directly on each of the GLB freedom components to determine the weighting of each com-

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ponent for aggregating them into a single index. Our weights were generated from the relative contribution of the t-statistic for each component, which encompasses both the estimated marginal impact of that component, as well as the error distribution of the point estimate for that component.

Subsequently, those components that were found to be directly correlated with growth were given positive weights and those components that were found to be inversely correlated to growth received negative weights. We then ranked the countries according to our growth enhancing version of an economic freedom index. SLH found our ranking of Italy above UK and USA to be 'counter-intuitive' because they misinterpreted our ranking as strictly representing the level of general economic freedom within a country. Rather, prominence in our country ranking represents those nations that were found to have relatively higher levels of the growth-enhancing freedom components *and* relatively lower levels of the growth-reducing freedom components.

SLH also claim that since we derive our index by regressing the various freedom components against economic growth and then show that a positive and significant correlation exists between our index and economic growth, we have succumbed to 'circular reasoning'. To the contrary, the new aggregated index produced by our procedure is simply a more parsimonious representation of the initial multivariate component regression. Regressing growth against our aggregated index is not meant to directly validate our derived index, but simply allows for a direct comparison to the performance of the GLB aggregate index in a bivariate growth regression. Our conclusion that

'differences in economic freedoms between the nations can explain almost half of the variation in growth' (p. 542)

is based on the *identical* R-square measure of 0.456 for both the multivariate freedom component regression and the bivariate aggregated index regression. We wish to make clear these 'differences' need not be unidimensional; growth is enhanced by greater economic freedom in certain categories but less economic freedom in other categories also enhances growth.

In response to our concerns over the standard aggregation methods and their own criticism of our methodology, SLH advocate aggregation by the principal components method, a procedure also utilized previously by Caudill, Zanella and Mixon (2000)<sup>1</sup>. Since some of the freedom component weights from the principal components procedure are negative<sup>2</sup>, the ranking of these aggregated

1. The article by CZM appeared before our study was published, but after it was initially accepted.
2. The weights are not presented in either SLH's comment or CZM's earlier study, but were sent to us upon request. We greatly appreciate the promptness with which they complied.

indexes do not represent an aggregate level of overall economic freedom as conceived by GLB (nor does our ranking, as explained above). In order for the aggregated index to retain an interpretation of overall economic freedom, more freedom in any component value must contribute positively to the aggregated index score, which means all weights must be positive. Although some of the weights from our hedonic procedure are also negative, our procedure generates an aggregate index that retains an intuitive description, since the component weights we derive originate specifically from each individual freedom component's empirically derived relationship to economic growth. As stated above, our ranking reflects the nations whose policy mix of freedom and control is most conducive to growth. The same cannot be said of a principal components index. Consequently, it is not clear to us what the resulting country ranking under the principal components method is supposed to represent<sup>3</sup>.

Another SLH criticism of our study was that we failed to perform robustness tests on our regression analysis, or to include additional explanatory variables in our procedure. Note, however, that SLH find our aggregated index to still be statistically significant when including the initial GDP level, investment share, and population growth as additional explanatory variables, whereas neither their index nor the GLB index is significant in the economic growth regressions they perform. Again, it is not surprising the SLH aggregate index is found to be not significant, since as noted above, it is not clear what this type of index actually represents. In their robustness tests our index still performs strongly, much better than either their principal component index or the GLB index. As such, the robustness analysis conducted by SLH actually serves to reinforce our results. Thus we reject their conclusion that economic freedom does not have a robust relationship to growth.

SLH also perform a different type of robustness analysis, based on sample selection, to determine the sensitivity of our estimated weights. They conclude the weights are sensitive to the selection of countries. However, according to their description, this robustness analysis was based only on bivariate regressions between economic growth and each of the individual freedom components, rather than the multivariate regression from which our weights were derived. Further, it is curious that their own weighting procedure was not subject to the same robustness criteria.

We again stress, as we did in our previous article, that hedonic regression analysis is not necessarily the only reasonable way to proceed. We conclude here by advocating the continued pursuit of research linking economic freedom

3. In his econometrics textbook, Greene (1997, p.273) is highly critical of the principal components method as being devoid of interpretation, among other problems.

and economic growth, and the development of alternative methods of aggregating freedom components into a single index.

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