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Estimating Tax Buoyancy, Elasticity and Stability

Calculating tax buoyancy and tax elasticity is helpful in assessing whether tax revenues rise at the same pace as GDP. Measure of tax stability is important in determining when an increase in a given tax leads to greater, or lesser, overall revenue stability.

Does tax revenue rise with national income? To answer this question, it is useful to measure the buoyancy and elasticity of a tax. One of the outputs of the EAGER Project sponsored by USAID, is a methodological study* explaining how to calculate tax buoyancy, tax elasticity, and tax stability.

Tax Buoyancy

Tax buoyancy is the percentage change in tax revenue divided by the percentage change in the tax base. When discussing total tax revenue, the base used is typically Gross Domestic Product (GDP). Other possible tax bases are consumption as the base for sales tax revenue or imports as the base for tariffs. Increases must be measured in real terms, since not adjusting for inflation will lead to biased estimates. Measures of tax buoyancy tend to vary greatly from year to year; thus, it is useful to measure buoyancy over a longer period, such as five or ten years. There are several techniques for determining tax buoyancy, including: calculating buoyancy for each year and taking the average; calculating the growth of tax revenue and base between the end years of a period; calculating the growth of tax revenue and base between the average end years (e.g. comparing the average of the first three years of the period to the last three years). Tax buoyancy can also be determined through regression analysis. One method is to regress the log of tax revenue on the year and the log of the base on the year. The coefficients of the independent variables in each equation yield the growth rates used to calculate buoyancy. The most satisfactory approach usually is to regress the log of tax revenue on the log of the base.

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Tax Elasticity

Tax elasticity is also defined as the percentage change in tax revenue divided by the percentage change in the tax base. What distinguishes elasticity from buoyancy is that for elasticity, revenue is calculated as if there had not been any change in the tax laws. In other words, calculating tax elasticity allows one to determine what tax revenue would have been if last year's laws continued to apply this year. If a tax is naturally elastic, it will yield more revenue as GDP rises, even if the rates do not change from year to year. Governments find elastic taxes desirable because they reduce the need to adjust the tax system each year. In order to calculate elasticity, one must first generate a revenue series, assuming no change in the tax rates from year to year, and then apply the same methods used to calculate buoyancy.

Tax Stability

Although revenue from different taxes varies from year to year, revenue stability is desirable because it makes it easier for a government to build a plausible spending and borrowing plan for the year ahead. Taxes whose revenue is relatively stable, or whose revenue is negatively correlated with the revenue from other taxes, contribute to overall revenue stability.

The measure of the stability of tax revenue is the coefficient of variation, which is the standard deviation of tax revenue divided by the mean of tax revenue. An important aspect of stability is whether revenue from a given tax leads to more or less stability in overall tax revenue. To determine the impact of a particular tax on revenue stability, one would calculate the revenue stabilizing coefficient by subtracting the coefficient of variation of revenue with the tax in question from the coefficient of variation of revenue without the tax.

*** This policy brief is based on EAGER Discussion Paper Number 11, Estimating Tax Buoyancy, Elasticity and Stability, 1998, by Jonathan Haughton [jhaughto@sclas.suffolk.edu], Suffolk University, Boston, Massachusetts.**

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