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Long-run and short-run estimates of the elasticity of substitution

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The importance of obtaining reliable estimates of the elasticity of substitution can hardly be overstated. The rate of growth, the rate of convergence, per capita income, income distribution, the rate of return on capital, tax policies, and the response of hours of work to a technological shock critically depend on this parameter. Moreover, for most of these issues it is important to have information for both the short-run as well as the long-run values of the parameter.

Using the constant elasticity of substitutuion (CES) model with biased technological growth as the basic model, a number of attempts have been made to estimate long-run and short-run estimates of the elasticity of substitution. The point of departure for this research is the important contribution of Chirinko and Mallick who employed spectral techniques to estimate the long-run value of the elasticity of substitution. This research complements the evidence presented by Chirinko and Mallick in a number of ways. To begin with, the model is estimated over five different frequency bands: 2 – 4 quarters, 4 – 8 quarters, 8 – 16 quarters, 16 – 32 quarters and over 32 quarters. Thus, a full spectrum of elasticities is obtained, from the very short-run to long-run trends. Second, the filters used are appropriate for nonstationary data. Finally, frequencies are identified using a variety of techniques in order to establish the robustness of our results to different methodologies. Two different filtering methodologies are employed: the Christiano and Fitzgerald fully asymmetric filter and wavelet analysis. Four different wavelet families are used: Haar, Daubechies 4, Coiflet 6 and Least Asymmetric 8, so there is a total of five different sets of estimates.

The equation of the CES model relating labor productivity to the real wage rate is estimated with quarterly, aggregate US data for the period 1950:1 -2013:4. All five sets of estimates are practically identical. The estimates indicate that the elasticity of substitution is declining over time. Very short-run estimates of the elasticity are around 0.2 while long-run estimates are around 0.5. Both estimates are most probably biased upwards.

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