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Accounting for variability in the growth rate of income

by

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Abstract

The average of periodic growth rates is a downwardly biased estimator of the rate of growth of a country. The higher the variance of the periodical growth rates, the higher the downward bias. The longer the business cycle, the higher the downward bias. In this short paper, we demonstrate these facts on a number of different levels, from intuitive to quite technical. We suggest that the variability of growth rates be taken into account whenever a long term forecast is prepared.

Keywords: growth rate, individual incomes, gross national product.
JEL classification codes: O47, B41, E37

1. Introduction

Consider first a symmetric distribution of periodic growth rates. Then the distribution of the principal for more than one period is positively skewed. To see this, assume two periods. There is a positive probability of two consecutive good or bad periods. (Joseph's Biblical dream was about seven years). The base for the second period after a first 'good' period is greater than the base for the second period after a first 'bad' period. As illustration, assume rates of return of -10%, +10% on an investment of $100 made for two consecutive periods. The principal after the first period is $110 ('good' case) or $90 ('bad' case). The value of the investment after both periods is either $121 if both periods are good, $101 if one is good and the other bad, or $81 if they are both bad. With the certainty of a zero rate of return, the value of the investment after 2 periods would remain at $100. Only if both periods are bad, is the uncertain return unambiguously inferior to the certain return. Sufficient variability in the rate of return increases the return on the principal.

This result is probably unsurprising. In the context of individual decision-making under risk, it is noted by Yitzhaki and Lambert (2014) that if random