GDP growth rate and population

Ivan O. Kitov

Abstract

Real GDP growth rate in developed countries is found to be a sum of two terms. The first term is the reciprocal value of the duration of the period of mean income growth with work experience, T_{cr}. The current value of T_{cr} in the USA is 40 years. The second term is inherently related to population and defined by the relative change in the number of people with a specific age (9 years in the USA),

$$(1/2)*dN9(t) /N9(t)$$

where N9(t) is the number of 9-year-olds at time t. The T_{cr} grows as the square root of real GDP per capita.

Hence, evolution of real GDP is defined by only one parameter - the number of people of the specific age. Predictions for the USA, the UK, and France are presented and discussed.

A similar relationship is derived for real GDP per capita. Annual increment of GDP per capita is also a combination of economic trend term and the same specific age population term. The economic trend term during last 55 years is equal to $400 (2002 US dollars) divided by the attained level of real GDP per capita. Thus, the economic trend term has an asymptotic value of zero.

Inversion of the measured GDP values is used to recover the corresponding change of the specific age population between 1955 and 2003. The population recovery method based on GDP potentially is of a higher accuracy than routine censuses.

Key words: economic development, GDP, population, modeling, the USA
JEL classification: J1, O11, O51, E37