

The National Accounts from the Neoclassical Perspective.

See notes on National Income and Product Accounts.

The aggregate technology is described by the aggregate production function

$$Y = C + X = F(K,N).$$

Here K is the capital stock, N is labor services, C is capital services and X is investment or gross capital formation. Capital depreciates at rate $\delta > 0$, so

$$K' = (1 - \delta) K + X.$$

Let w be the rental price of labor and r the rental price of capital. Aggregate labor income is $W = w N$, and aggregate (gross) capital income is $R = r K$. If factors markets are competitive,

$$Y = R + W.$$

Problem: What are the empirical counterparts of the variables in the above expressions?

Determining W and R :

Each claim of product must be split between R and W . This assignment is not obvious in the cases of proprietors' income. Part of proprietors' income is return on the owners' equity in the proprietorship and part is return on proprietors' labor services allocated to the proprietorship. It turns out that a reasonable assumption for most purposes is to simply assume that the share that is labor income is the same as the economy-wide share.

The assignment of indirect business taxes to capital and labor also is not obvious. Most indirect business taxes are sales, value added and excise taxes. For these items, the economy-wide assumption that I recommended for proprietors' income is a reasonable one. A refined procedure would be to assign all of the property taxes sub component to capital income. Still

another procedure is to follow Kuznets, the father of national income and product accounts, and assume that property taxes are used for intermediate goods provided by the government. These taxes pay for fire and police protection and other public services. With this approach, both public consumption and indirect business taxes are reduced by the amount of the property taxes. Note that this preserves the equality of income and product. For purposes of the growth facts, just make the economy-wide assumption for indirect business taxes, as the growth facts are robust to the alternative assumptions. Make the same assumption for Business Transfer Payments and for Statistical Discrepancy.

Services of consumer durables must be imputed and included as part of C . There must be imputations to income of the same size. Otherwise, income and product would not be equal. The issue of how to impute this income is discussed later in this lecture.

You should be able to figure out capital income of all capital other than consumer durables. This stock is denoted \hat{K} . From theory, its rental price is

$$\hat{r} = i + \hat{\delta}.$$

Here, i is the interest rate and $\hat{\delta}$ is the depreciation. Thus,

$$\hat{R} = \hat{r} \hat{K}.$$

Given \hat{K} , \hat{R} and $\hat{\delta}$, interest rate i can be determined.

Now you are ready to determine a rental price for consumer durables. This rental price is

$$r_{cd} = i + \delta_{cd}.$$

Once services to consumer durables and the corresponding rental income have been imputed, variables R , W , C and X can be determined. Note every component of product in the national income and product accounts must be assigned to either C or X . Be sure to check that

Income = Product

Comment 1: There are important conceptual issues in national income and product accounting. There are industries where currently there are no well-defined products and, as a consequence, there is no measure of output, just measures of the value of output. These industries are becoming increasingly important, which raises concerns of how well output is being measured. I would not be surprised if when better measures of output are available, productivity growth in the eighties and nineties will be significantly higher than with existing measures of output.

Comment 2: In making international income comparisons, differences in income using a common set of prices across countries, (the purchasing power parity approach), are very different than when exchange rates are used. With exchange rates, Argentines are nearly twice as rich as Chileans. With purchasing power parity, the Chileans are about 10 percent richer than the Argentines. At PPP, the U.S. is 25 percent richer than the other rich industrial nations. At exchange rates, a number of countries are richer than the U.S.

Comment 3: There are problems with the concept of capital stock. The concept used here is the value of capital at replacement costs. If some capital good has a useful life of 10 years and has been used for 3 years, only 70 percent of the cost of producing a new capital good is included in the value of the capital stock.

Comment 4: In the theory, the relative price of C and X is constant. In fact, the relative price of durables relative to other goods and services has probably fallen dramatically. I don't use estimates of the real stock of capital. In my opinion, they are made up numbers and their use is bad science. Using the value of the capital stock is another matter. Here there are prices to measure.

Growth Accounting

The accounting assumes the production function structure

$$(1) \quad Y = A F(K, N).$$

Variable A is **total factor productivity**. It is the efficiency with which the inputs are used in producing output. Competitive factor markets and profit maximization are also assumed.

Differentiating (1) with respect to time, t ,

$$(2) \quad \dot{Y} = \dot{A} F(K, N) + A F_K(K, N) \dot{K} + A F_N(K, N) \dot{N}.$$

Dividing by Y and letting s denote a factor income share,

$$(3) \quad \dot{Y}/Y = \dot{A}/A + s_K \dot{K}/K + s_N \dot{N}/N.$$

Note $s_K = K F_K(K, N)$ and $s_N = N F_N(K, N)$. Letting lower case symbols denote logarithms,

(3) becomes

$$(4) \quad \dot{y} = \dot{a} + s_K \dot{k} + s_N \dot{n}.$$

If factor income shares are constant, (4) can be integrated to obtain changes over any time interval or between any two countries. The resulting numbers are consistent in the sense that the difference between country i and country k is the sum of the difference between country i and country j and between country j and k . In fact, factor income shares are relatively constant and best practice is probably to just use a 70 percent share for labor and 30 percent for capital.

A bigger problem with this approach is defining the aggregate inputs. Here the appropriate measure is not value. Rather the appropriate measure is some measure of units of physical and human capital services. There is a huge growth accounting literature using make-up numbers. I see such studies as bad empirical research. Stick with the facts as in the growth fact exercise. The fact that numbers are in data sets does not mean that they should be taken seriously.