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Macroeconomic analysis has been beset by a "failure to match theoretical constructs with appropriate empirical counterparts" (11), leading to inordinate confusion in public discourse and policy making. Particular problems arise from relying on current and past values of critical variables as proxies for the future expectations upon which outcomes actually depend, employing measures of income and production that are too narrowly defined, and weaknesses in the conventional measures of saving, investment and capital. We should heed Tjalling Koopmans' warning about the dangers of "measurement without theory", and seek to better reconcile the two.

CURRENT VERSUS EXPECTED VALUES

Critical problems arise in the estimation of major macroeconomic values because key arguments in the estimation functions are expected values. For example, response to an increase in the money supply will depend on unobservable expectations about both the likelihood of increasing inflation and the duration of the change, so we are often reduced to estimation based on current and past variables for which data are available. However, if future values will be based on expectations about certain variables, then we must first ask whether the effects of existing data on expectations were considered when generating the estimation functions, and then whether we can assume that the same expectational relations will apply in the future. The most critical problem arises with regard to investment, because it is entirely forward looking. In theory, investment behavior depends primarily on the expected future values of variables such as output, profit, and interest rates, and very little on their current or past values, yet the latter are used as arguments in investment functions.

MEASURES OF INCOME AND PRODUCT

Income is theoretically defined as what we can consume while maintaining our level of real wealth, but there are many discrepancies between this definition and measurement of income in practice. For example, capital depreciation allowances have been steadily increasing and may be overstated, resulting in underestimation of national and individual income, and net savings as well. The calculation of capital gains and interest earnings also falls short. Real capital gains -- i.e., the nominal gain less the increase necessary to compensate for inflation -- should be included in income, but capital gains are left out of income accounting entirely. On the other

hand, nominal interest earnings are fully included in income, but again, it is only real interest earnings that should be counted.

The failure of national income statistics to include imputations for some important non-market outputs is also a concern. We do impute values for some items, especially net rent of owner-occupied housing. But the same is not done for other durable goods such as automobiles; car rental is included in national income, but the use of our own cars is not. Housework is another well known example of this problem. Ignoring it results in overestimation of growth rates of total output as women increasingly move from uncounted work in the home to paid, counted jobs in the market, and in miscalculations of total productivity changes as well.

Problems also arise from counting the same expenditures differently if they are made by a firm, by its employees, or by the government. In particular, the practice of including all of government output in GNP, even though much of it is really intermediate output, overestimates GNP. For example, a firm's employment of security guards is counted as intermediate input, but when the government hires more police officers -- or invests large amounts in national defense -- national income, as presently calculated, increases.

DEFICITS AND NATIONAL SAVING AND INVESTMENT

While the differences between theoretical and measured values of income are substantial, they are actually quite small compared to the discrepancies in saving and investment measures. First, because investment can be defined as the acquisition or production of capital that will contribute to current and future output, production of durable goods like automobiles, research and development expenditures, and education costs should all be included. Yet all of these are treated as consumption expenditures. Government expenditure on education is thus pejoratively labeled as government spending, rather than as investment, which is viewed more favorably.

Gross saving consists of personal and corporate saving plus government saving (i.e., budget surplus). We are frequently bombarded with dire warnings that national saving is too low and the government budget deficit too high, but two adjustments can nearly wipe out this deficit. First, the government, like private firms, should only count real depreciation charges on capital in current outlays, rather than current capital expenditures. Second, only real interest payments on the national debt should be charged to current outlays, rather than nominal payments.

Serious discrepancies between theoretical constructs of net foreign investment and official measures occur because much of overseas investments of U.S. firms and foreign investment in the U.S. are counted at their original costs. They should instead be adjusted for changes in their value either in the local currency, and also due to changing exchange rates in dollars. Measuring these values in real, current market terms would virtually wipe out the calamitous "debtor nation" image of the U.S. (in 1988), because U.S. foreign investments have appreciated much more (in the currencies of the countries of investment) than have foreign investments in the U.S. (in dollars), and the falling value of the dollar has further increased the relative value of U.S. overseas investments.

The differences between conventional measures and indices that better reflect theoretical constructs may be substantial. The author's "total incomes system of accounts" (TISA) produces estimates of net national product that are 30 percent greater than standard measures, and estimates of real gross private domestic investment four times those measured by conventional indices. Research and development, education and training, and health investments -- all left out of current capital stock measures -- account for fully 48 percent of the TISA measure.

NEW BEHAVIORAL RELATIONS, THEORY AND POLICY

Changing the value of a few variables cannot remedy these problems; adjustment must include rethinking fundamental economic relations. For example, standard production functions such as Cobb-Douglas only include arguments for "labor" and "capital," but a strong case can be made for adding variables for government infrastructure capital, research and development, and human capital. Preliminary testing of the latter two suggests that they could both have significantly positive coefficients. We should thus be taking a much broader view of capital than advocates of tax credits and other incentives for standard business investment would propose.

Investment functions should also be respecified to include more in capital than just business plant and equipment. This might help to overcome some of the empirical weaknesses of investment theory that relates a firm's capital expenditures to the ratio between its market value and its capital replacement costs. Because firms' investments in the experience, skills and dedication of their employees affect market values, but are not yet included in the assessment of capital replacement costs, investment theory has proven largely irrelevant as it is currently used.

Similar problems arise when economists derive monetary and fiscal policy prescriptions based on inadequate and often irrelevant indices, at times resulting in serious misdirection of macroeconomic policy. For example, when real government budget surpluses were miscalculated as deficits in the late 1970s (due to a failure to distinguish between real and monetary values of government debt at a time of high inflation), a great deal of confusion arose because, contrary to prevailing theories, unemployment was also increasing. This misunderstanding led to policies that probably made matters worse.

PROVISION FOR THE FUTURE: THE CASE OF SOCIAL SECURITY

Social security accounts are an area of particular concern, in part because of the dire warnings about our budget deficits. One proposal for dealing with this is to incorporate all "contingent liabilities" -- the present value of expected future payouts less expected contributions -- into the general federal accounting framework. In principle this is not a bad idea, but given the current problems with mis-measurement it would actually only compound the problem. The alternative proposal that we place social security trust funds in entirely separate budgets is even worse. We may face problems with social security accounts in the future as aging baby boomers will have to be supported by relatively fewer workers. The best solution to this problem is to raise the productivity of the work force, and the best way to do this is by increasing investment in public, social infrastructure, in research and development, and in human capital (including education, training and health care). This is how the government should use the current surpluses in the

Social Security system, but because of the present misinterpretations of macroeconomic variables, this is politically difficult. If, on the other hand

. . . we had federal budget and national accounting measures that properly classified all of this vital capital accumulation, the choice of wise public policy, and the economic analysis on which it would build, might be much easier. (10)