

## Taking Account...

### Economists' new analysis of R&D within firms

To present a more realistic view of research and development (R&D) within a firm, a recent paper by Christian Awuku-Budu of the Bureau of Economic Analysis (BEA) and Leo Sveikauskas of the Bureau of Labor Statistics uses a regression-based approach to assign firms' pre-2008 R&D expenditures to more than one industry.

The study's results demonstrate that their regression-based method of assigning R&D to multiple industries on the basis of payroll generally works well. However, it becomes less effective over time as more firms outsource their manufacturing function.

Most of the data used to measure R&D in official national economic statistics come from the National Science Foundation Surveys of Industrial Research and Development (SIRD), which the Census Bureau has long administered.

The Census Bureau measures industry R&D by assigning each firm to a particular industry, usually based on observed industry payroll, and then allocating the firm's entire R&D to that industry. In recent years, such methods would have assigned considerable proportions of the R&D found in multidivision firms to trade and services.

For large multidivision firms, assigning a firm's R&D expenditures to one industry assumes that these firms conduct little or

no R&D outside their primary field.

For example, if a large firm produces pharmaceuticals and medical devices, for the period prior to 2008, the Census Bureau procedures would allocate all of the firm's R&D expenditures to the industry with the greatest payroll. For 2008 forward, if the same firm reports \$1 million dollars of R&D in pharmaceuticals and \$2 million in medical devices, Census procedures would assign the firm's entire R&D to medical devices.

Because the 2008 Business Research and Development and Innovation Survey (BRDIS) shows that some firms conduct R&D in more than one industry, the authors note that forcing a firm's entire R&D expenditures into a single industry distorts the industry distribution of R&D expenditures.

For 2008 forward, because the BRDIS provides information on R&D spending by line of business, each firm's R&D expenditures can be readily assigned to different industries. However, there is no obvious way to allocate R&D expenditures to more than one industry prior to 2008 to generate a consistent time series of R&D expenditures by industry.

The authors provide a regression-based method for assigning firm R&D expenditures for these years. Their method allows for differences in R&D intensities across industries and utilizes all available data on each firm's to-

tal R&D expenditures and its distribution of payroll across industries. Data on domestic payroll from the Longitudinal Business Database allow the authors to distribute R&D across industries in proportion to payroll.

Since payroll is available annually, the authors were able to estimate R&D intensity in each industry for every year between 1976 and 2007. One major advantage of this regression-based approach is that the estimates do not require ad hoc adjustments to account for a firm's switch from one industry to another. Instead, the gradual change in the distribution of payroll across industries automatically generates a corresponding natural distribution across industries.

For the firms that perform R&D in more than one line of business, assigning their R&D to different industries improves the industry distribution of R&D, provides a more consistent industry time series, and helps reduce the need for arbitrary adjustments.

The authors' analysis also connects with important recent work on factory-less production, which describes how firms outsource production domestically or abroad and therefore retain only a small proportion of payroll in their home industry.

*(This summary was prepared by the SURVEY OF CURRENT BUSINESS staff in conjunction with the paper's author. The paper is available on the BEA Web site.)*