Biochemicals: Desirable Innovation Model

Sunday's New York Times a couple of weeks ago had an interesting article on innovation and job creation, with emphasis on the fact that companies are sitting on a great deal of money, because they see so few opportunitie to invest. And when they invest, it has largely been to achieve cost reductions and improve profitability. These investments do not create jobs versus investments that build new facilities and particularly plants that commercialize new research and development.

The author identifies three types of innovation: (a) Empowering innovations that transform complicated and costly products into simpler and cheaper products (Example: personal computers). (b) Sustaining innovations that replace old products with new models (Example: Toyota Prius hybrid). and (c) Efficiency innovations that reduce the cost of making and distributing products.

Over recent years, and particularly since the start of the great recession, companies have almost exclusively invested in efficiency innovations, reducing their costs of production while restraining from new investments, such as expanded production facilities, largely due to lack of demand caused by the recession. It is worth noting, however, that companies serving the energy industry, including chemical firms, have made what could be called *empowering* investments (e.g. solar cells and batteries), but at this point these investments have not been very successful, partly because of stiff foreign competition and partly because of the unanticipated natural gas boom.

But in another area, biochemicals, companies are making typically *sustaining* investments by developing and commercializing products that replace products hitheto made from crude oil or natural gas (i.e. from petrochemical feedstocks).

Sustaining investments do not necessarily create a lot of jobs – when people buy a Prius, they will not buy a Camry or Ford Fusion so, in a sense, that's a zero sum game. But the new plants making biochemicals do create jobs since, in most cases,

the plants that make the petrochemical-based product being partly and slowly replaced with specialties will for a long time keep making the commodity petrochemical. Thus, production of environmentally benign lactic acid-based polymer will not soon shut down polyethylene producers.

Beyond biochemicals and biofuels, the natural gas boom is causing domestic oil and chemical companies to make new investments in ethylene and downstream petrochemicals, given our country's new competitiveness. So, companies like Dow, Shell, and Chevron are again starting to use some of the capital they have been sitting on, building new crackers based on shale gas. And, of course, the shale gas boom is creating a huge number of jobs, not only where thousands of new wells are being drilled, but also in the supporting industries, such as steel mills, well service companies, etc. These investments are creating jobs here rather than in countries where lack of competitiveness increases the need to import our products.

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