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Innovation, the knowledge economy and intangibles

Innovation and the "knowledge economy" are all around us. Goods like iPods, SatNavs and Digital Cameras are now commonplace. Downloaded mobile phone ringtones are part of the Retail Prices Index. New software has revolutionised firms' supply chains, customer analysis and staff rostering.

Whatever one's favourite name for these developments, be it innovation, the new economy, the knowledge economy or the intangible economy, there are two broad questions that confront us. First, activity: how much innovation are firms undertaking? Second, consequences: what are the effects of this activity for the economy (e.g. on investment, GDP, growth etc)?

Both questions are surprisingly hard to answer. Take the first question, on activity, or more precisely, how much are firms innovating? A standard, widely discussed and targeted measure of innovation spending is R&D. On this measure, vast areas of the economy are apparently not spending at all, such as financial services. Indeed in many studies over 80% of R&D spend is accounted for by about a dozen big companies (mostly in pharmaceuticals and defence). This does not seem to line up with the seemingly fast pace of innovation. Nor does it seem realistic that the vast bulk of companies are not spending at all: what about all the companies who are spending on new knowledge like software, training and design?

The second question, on consequences, turns out to be similarly rather hard. One of the main problems is that innovation in a knowledge economy creates "intangible" assets. Now, spending on *tangible* assets, like buildings and plant, has a long tradition of measurement and analysis. Such spending is measured by statistical agencies and accountants, is counted as investment and feeds directly into GDP. However, spending on most knowledge or intangible assets, like software, R&D, design, training and branding is typically not measured by accountants. With the exception of software it is treated as an intermediate expenditure by national accountants and so does not affect investment or GDP.

There are of course some good reasons for this approach to R&D and to GDP. By international convention, R&D is confined solely to scientific R&D (R&D surveys typically ask only for expenditure that "resolves scientific and technological uncertainty"). So it is

little wonder that financial services apparently do so little measured R&D or that design is excluded. Similarly, the prime measure of economic output used in all countries, GDP, has to exclude double counting. The GDP of an economy producing electricity and steel is not the sum of the values of the electricity and steel. Since the electricity that goes into making the steel, GDP counts as value added, that is, subtracts the value of intermediate inputs (electricity in this case) from the value of output of the steel. So treating expenditures as intermediates is a prudent way of measuring GDP.

When the economy was mostly composed of investment in tangible assets, like machines, or R&D was mostly in science, these conventions did not seem so distorting. But if innovation in the economy is increasingly a result of investment in intangibles, this approach might miss some very substantial parts of economic activity. Indeed, we may already be starting to see the consequences of this omission. The ratio of measured investment to measured GDP has stayed more or less where it was since the 1950s. UK productivity growth has deteriorated since 1995, despite a major investment in IT. It is hard to reconcile these measures with the perception that firms are investing in knowledge assets in the teeth of an unprecedented information revolution.

Our recent workstream on intangibles is an attempt to confront some of these problems. On activity, we take the view that to innovate or produce new knowledge, companies have to devote resources, be it on R&D or training or design. Thus we do not seek to survey whether companies think they have innovated, or plan to innovate or their attitude to innovation. Rather, we measure how much they are spending. To account for spending over and above than that measured by currently-defined R&D we look at spending on a range of broad range of knowledge assets; software, design, training, reputation, firm-specific organisational capital. Thus for example we count both R&D in science and R&D in people (training). Whilst this means we look closely at industries often called the “creative sectors”, we have to go further than this to cover what companies spend on creative activities in-house (e.g. a bank or retailer writing their own software).

On the consequences of that activity, we regard such knowledge spending as building a knowledge or intangible asset (just as spending on tangible capital goods builds a tangible asset) and hence a flow of services to contribute to output. This gives a consistent and robust method of measuring the investment and growth impact of knowledge asset spending on GDP.

We believe that such an approach will help us better understand vital trends in current economic activity. In work so far for example, we think we have already spread some light on some of the puzzles that arise when intangible investment is mostly ignored, as it is currently. For example, broadening the spending definition beyond R&D suggests considerable spending on knowledge assets. To get a sense of the scale of it, business investment in *tangible* assets in 2004 was about £120bn, around 15% of (private sector) gross value added. We found that business investment in *intangible* assets in 2004 was also about £120bn. (Of that intangible investment, for example, around 12% is on scientific R&D, 15% is on software and the rest on design, reputation, human and organisational capital).

Further, since 1970, investment in intangibles has grown from about 6% of GDP, so that including intangible investment means that the overall investment rate (investment/GDP) has been rising, not flat. Finally, the boom in intangible investment in the 1990s, if it is included as investment, raises GDP and productivity growth, in contrast to the current measured productivity fall.

Of course, there is much more to do; better measures, more microdata work, international comparisons. But this seems to be a very promising start on an area of increasing importance.

Reference:
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Contact: Jonathan Haskel, Department of Economics, Queen Mary, University of London E1 4NS. T: +44-20-7882-5365, F: +44-20-8983-3580, E: j.e.haskel@qmul.ac.uk, W: www.ceriba.org.uk.