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INTRODUCTION TO SPECIAL SECTION ON INTANGIBLE CAPITAL

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In recent years there has been a growth of interest in the measurement of intangible capital and its impact on the economy. Lev (2001) attributes this to globalization, deregulation, and technological progress, which he argues have forced firms to innovate to remain profitable. Intangibles have risen to prominence because of their key role in the innovation process. In addition, there is a perception that the full contribution of intangibles is not being captured in gross domestic product (GDP) and measures of labor productivity and multi-factor productivity.

A clear consensus, however, does not exist regarding what exactly constitutes "intangible capital." Up to 1993 the international System of National Accounts (SNA) did not recognize the existence of intangible assets. The 1993 SNA introduced a distinction between tangible and intangible assets but recognized very few fixed assets as being intangible: namely, computer software, mineral exploration, and artistic and literary originals. The draft of the 2008 SNA appears no longer to use the terminology "tangible" or "intangible" but at the same time greatly extends the asset boundary to include more intangibles by classifying research and development expenditures as gross fixed capital formation. Instead of describing them as intangibles, however, the 2008 SNA refers to them as "intellectual property products."

The first paper in this special section by Corrado, Hulten, and Sichel (CHS) gets round these definitional problems by arguing that "any use of resources that reduces current consumption in order to increase it in the future qualifies as an investment." Essentially they then define intangible investment as all investment (as defined above) that does not come under the umbrella of tangible investment. This is a rather broad definition. Even in this case, the boundaries between what should be included and what should be excluded are not completely clear. One potentially contentious example, which I will return to later, is provided by higher education.

An important implication of the failure of the pre-1993 SNA to recognize the existence of intangible assets was that all expenditures on intangible assets were therefore classified as an intermediate or final consumption in the SNA depending on whether they were undertaken by enterprises or government. The 1993 SNA took the first step towards capitalizing expenditure on intangible assets, but as noted above, only for a small fraction of the universe of intangible assets. The 2008 SNA has continued this process by capitalizing research and development expenditure.

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The main objective of the papers in this special section is to explore the impact on the levels and growth rates of GDP and on productivity and capital deepening of reclassifying business expenditures on intangible assets as investment. Each paper focuses on a different country. The first paper by CHS covers primarily the period 1973 to 2003 for the U.S. The second paper by Marrano, Haskel, and Wallis (MHW) covers approximately the same period for the U.K. The third paper by Fukao, Miyagawa, Mukai, Shinoda, and Tonogi (FMMST) covers the period 1980 to 2005 for Japan. All three papers use the same basic methodology developed in Corrado *et al*. (2005) and further extended here in CHS. Hence the three papers provide results that are broadly comparable across countries.

The papers in this special section go beyond the 2008 SNA by also recognizing business expenditure on design, marketing, and human capital development (otherwise known as "economic competencies") as investment. CHS and MHW both find that expenditure on economic competencies accounts for about half of all intangible business investment in the U.S. and U.K., respectively. FMMST, by contrast, find that expenditure on economic competencies is rather less important in Japan.

The immediate impact of capitalizing intangible expenditures is to push up GDP. According to CHS, this increases U.S. GDP in 1999 by 1 trillion dollars (compared with a benchmark where all intangible investment is treated as intermediate expenditure). Perhaps of greater interest is the impact of capitalizing intangibles on the growth rate of GDP. CHS find that investment in intangible capital rose much faster than investment in tangible capital from the 1950s to 2003. Capitalizing expenditure on intangibles therefore acts to increase the growth rate of GDP. Similar results are obtained by MHW for the U.K. and by FMMST for Japan, although in Japan this result is reversed in certain sub-periods (e.g. 1990–95). Also in Japan, the share of intangible capital in the total capital stock appears to be much smaller than in the U.S. or U.K.

The three papers also consider the implications of their methodology for measured labor and multifactor productivity. By increasing the growth rate of GDP (at least in the U.S. and U.K.), capitalizing intangibles acts to increase measured labor productivity (since the growth rate of the labor input is unaffected). CHS find that the growth rate of U.S. labor productivity rises by about 0.3 percentage points per year. In the U.K., MHW find that capitalizing intangibles increases the growth rate of labor productivity by about 0.5 percentage points in the 1995–2000 period, but by only about 0.1 percentage points in the preceding and following periods. For Japan the results are more nuanced. FMMST find that, in some periods, capitalizing intangibles actually reduces slightly measured labor productivity, although on average this is not the case. CHS find that capitalizing intangibles acts to reduce measured multifactor productivity in the U.S. The same is true for the U.K. (see MHW) and Japan (see FMMST), except during the 1995–2000 period.

FMMST attribute the poor productivity growth performance of the service sector in Japan at least partly to its reliance on intangible capital and the unwillingness of banks to recognize intangible capital as collateral for loans. This, combined with the lack of alternative forms of corporate finance, has starved the service sector of access to funds for investment. One interesting implication of this

is that capitalization of intangible capital in the national accounts might actually encourage Japanese banks to increase their lending to the service sector.

Given the focus on business activity, one form of intangible investment that the papers in this special section do not attempt to capitalize is the human capital created by higher education (although as noted above they do capitalize business expenditure on human capital development). At present, the SNA treats expenditure on higher education as final consumption (either household or government, depending on who pays for it). However, it could alternatively be treated as an intermediate input into the production of knowledge by students which would require both the production and the asset boundaries of the SNA to be significantly extended (see, for example, Jorgenson and Fraumeni, 1989, 1992). The imputed value of the human capital created would then need to be calculated and included in GDP. Quantifying the effect of such imputations on GDP and its growth rate is difficult but may be an interesting area for future research.

The authors of the three papers in this special section are to be commended for wading through the myriad of conceptually complex details required to generate the results. Along the way, a number of assumptions had to be made. For example, to obtain estimates of net domestic product (NDP) or multifactor productivity it is necessary to specify depreciation rates for intangible capital. The assumed depreciation rates range from 20 percent for research and development to 60 percent for brand equity per year. The plausibility of these various assumptions and their impact on the results warrant further investigation. Nevertheless, these papers provide a very useful benchmark, illustrating what can be achieved in terms of quantifying the impact of business intangibles on the economy.

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