

Accounting for Growth in the Age of the Internet: The Importance of Output-Saving Technical Change

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We extend the conventional Solow growth accounting model to allow innovation to affect consumer welfare directly. Our model is based on Lancaster's "New Approach to Consumer Theory," in which there is a separate consumption technology that transforms goods, measured at production cost, into utility. This technology can shift over time, allowing consumers to make more efficient use of each dollar of income. This is an *output-saving* technical change, in contrast to the Solow TFP *resource-saving* technical change. The output-saving formulation is a natural way to think about the free information goods available over the Internet, which bypass GDP and go directly to the consumer. It also leads to the concept of *expanded GDP* (EGDP), the sum of conventional supply-side GDP and a willingness-to-pay metric of the value of output-saving innovation to consumers. This alternative concept of GDP is linked to output-saving technical change and incorporates the value of those technology goods that have eluded the traditional concept. It thus provides a potentially more accurate representation of the economic progress occurring during the digital revolution. One implication of our model is that living standards, as measured by EGDP, can rise at a faster rate than real GDP growth, which may shed light on the question of how the latter can decline in an era of rapid innovation.