Abstract for "Setting Rental Prices Right for Computers"

Hui Wei (Australian Bureau of Statistics)
Pengfei Zhao (Australian Bureau of Statistics)

It is well established that there are three key components in the capital rental price formula: rate of return, depreciation and capital gain/loss. In applying this formula to national accounts investment data, statisticians face a variety of choices.[1] These choices in calculating the price of capital services can make substantial differences to the estimates of capital input, as demonstrated in the recent debate between Diewert &Yu (2012) and Gu (2012). In his comment to the two papers, Schreyer (2012) notes that 'At this stage, there is no single method that constitute an international recommendation or standard. The current debate shows that it may be worth pursuing this objective and to go beyond the recent achievement of having capital services officially recognised as part of the UN System of National Accounts'.

In this paper we contribute to this literature by considering the case of imputing rental prices for computers. Our focus on computers is mainly due to two factors. First, computer capital is the prevalent driver of rapid growth of capital input both in official productivity statistics and hundreds of productivity studies. An enhanced understanding of the measurement issues for computer rental prices is an important step towards producing more robust and relevant productivity statistics in the information age. Second, the impact of those choices on practical estimates of rental prices appears the largest for computers.

To simplify things further, we confine our considerations to choices relating to depreciation and capital gain/loss terms. In terms of depreciation term for computers, the choice is often made between the time series depreciation and the cross section depreciation, as defined by Hill (1999). In terms of capital gain/loss term, the choice is between price indexes for new computers and general price indexes, such as CPI. This latter choice is concerned with the view of either ex-ante expectations of future price changes or ex-post price movements. In this paper, we argue that obsolescence is the common element contained in both the time series depreciation term and the computer price indexes. A combination of the time series depreciation and the computer price indexes for imputing rental prices for computers leads to double counting of obsolescence and hence results in upward biased estimates of their capital services.

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[1] Diewert (2008) points out 'there is still no agreement on the precise form for each term' and provides a summary of a few important issues in relation to 'what is the exact form of the user cost formula?' (p.23)

The common practice used by statistical agencies in compiling capital services is to adopt time series depreciation (the traditional national accounts approach) combined with asset-specific price indexes. These choices make practical rental prices for computers appear too high. For example, among the three elements in estimating rental price for computers, depreciation is set around 25%-30%, which includes both physical decay and obsolescence, and capital loss (calculated using quality-adjusted computer price index) is about 30%, which also largely reflecting obsolescence. If internal rate of return is 10%, the rental prices for computers represent about 70% of the computer stock values. We argue that these imputed rental prices are excessive because obsolescence is accounted twice here.

To solve the double counting issue, we propose a combination of the time series depreciation with CPI as a general inflation measure. This recommendation is made mainly on pragmatic grounds. First, the alternative choice of the cross section depreciation, though more consistent with the original theory of capital user cost, would represents a departure with the traditional national accounting convention, and the resulted two series of depreciation estimates would add another layer of complexity to the already complex investment and capital statistics, which often causes confusion. Second, computer price indexes are often volatile and the capital gain/loss term is the major contributor to unstable rental prices for computers, which at odds with observed behaviour of market computer rental prices. The new approach will significantly improve the stability and analytical quality of computer rental prices. This is because CPI is more stable than the computer price indexes for new computers across time.

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