

STRUCTURAL CHANGE AND TECHNOLOGY. A LONG VIEW

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Abstract

It is commonly recognized that technological change is one of the main drivers of economic growth. Structural change is an important aspect of the relation between technology and growth. The Schumpeterian perspective (emerging from Schumpeter's seminal work *Business Cycles*) argues that the diffusion of radical technological breakthroughs leads to waves of creative destruction, i.e., the demise of sectors and productive capacity associated with the 'old' technology, and the rise of new sectors, consumer products and capital goods.

Neo-Schumpeterians of the 1970s and 1980s (such as Freeman, Soete, Kleinknecht and Mensch) argued for the concept of pervasive technological systems as one way of interpreting creative destruction. Pervasive technologies are basic innovations that find application in a wide variety of sectors in the economy. The observed diffusion pattern of pervasive technologies is one in which the main sectors associated with the new technology increase their share in the aggregate economy, both by an increase in the deliveries of intermediate and capital goods to other sectors, and by an increase of deliveries to final consumers.

It has recently been suggested that the period of rapid economic growth in the 1990s in the United States can be explained by the rise of a set of technologies known as Information and Communication Technologies (ICT). Such an interpretation is certainly in broad accordance with the notions of Schumpeterian radical technological breakthroughs, creative destruction and pervasive technological systems. This raises the question how the recent ICT 'revolution' compares to previous instances of pervasive technological systems and their impact on the economy.

This paper provides an attempt to make this comparison. In order to do this, it will make use of historical as well as recent (1997) input-output data for the United States. The paper starts with a description of the broad theoretical framework of neo-Schumpeterian economics as a tool for the analysis of economic growth, structural change and technology. A definition of pervasive sectors will be derived from this work, and applied to the input-output data. Also, decomposition techniques will be used to give an impression of the relative importance of changes in final demand, productivity and other sources for changes in output of the key sectors associated with ICT. In this way, it will be possible to provide an impression of how important recent developments in ICT related sectors are for the US economy, and to investigate whether the data are in accordance with the neo-Schumpeterian idea of ICT as a pervasive sector that drives economic growth.

Using the same methods on historical data (going back to 1919), it will be possible to draw parallels with developments over the entire span of the 20th century. The main question guiding this part of the research is whether it is possible to identify pervasive sectors associated with major technological breakthroughs that occurred in the past (and which have been identified in the neo-Schumpeterian literature). Differences and parallels between the historical cases and the recent developments in ICT will be identified. The paper concludes by drawing lessons on the historical comparison.