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Introduction

New and old economy: the role of ICT in structural change and economic dynamics

Since the theme of a *New Economy* first appeared in *Business Week* in 1994, both the term and the subject matter have undergone a drastic evolution. At the outset, the effects were conjectured by some in the popular press to imply that the days of business cycles were over. But the .com collapse and the slow-down of US economic growth put a halt to such speculations, and the perception among some observers has now turned 180° and the suggestion is that nothing actually happened. While the early conjectures about the New Economy were obviously wrong, such an opposite extreme may be equally wrong. In 2001, Chris Freeman already provided a critical analysis of the new economy that took a more realistic view on the 'real' and 'spurious' effects (Freeman, 2001). This special issue contains four new perspectives on the "New Economy"—all written after most of the New Economy hype settled in the 2000s, and all trying to elicit processes associated with the introduction of radical and pervasive new technologies. The papers are all based on contributions presented at the DRUID 2002 Summer Conference on "Industrial Dynamics of the New and Old Economy". DRUID (Danish Research Unit for Industrial Dynamics, http://www.druid.dk/) is anchored at the Copenhagen Business School and at Aalborg University.

The special issue starts off with a historical analysis blended with a conceptual discussion of the New Economy (Carlsson), followed by two theoretical papers using simulation models featuring the introduction of new sectors in the economy (Saviotti and Pyka; Eliasson, Johansson and Taymaz). The special issue is concluded by a paper involving an econometric analysis of information and communication technologies (ICTs) adoption by Swiss firms (Hollenstein).

Bo Carlsson adopts the notion of a general purpose technology (GPT) in his paper "The digital economy: what is new and what is not?" in order to address questions concerning the causes of the different behaviour of the US macro economy in the late 1990s, compared to earlier periods and questions concerning the drivers the observed changes. The paper provides a review of the documented effects of previous GPTs (including transportation and communication technologies in the 19th century, the Corliss Steam Engine, and the Dynamo). Based on the historical evidence, it is concluded that the GPTs have all led to

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higher productivity as it is conventionally measured, but that the effects may have been much greater in terms of launching entirely new products and services, given that the level of "connectivity" between actors and ideas increased dramatically in all cases. Using a series of examples, the paper goes on to argue that digitalization in combination with the Internet has increased connectivity between actors in both the "new" and the "old" economy. Carlsson furthermore argues that the observed changes are consistent with the view that digitalization of information, combined with the Internet, represents a GPT that is giving rise to not only higher productivity, but also to a vast new array of possible combinations that may be referred to as the New Economy.

Pier Paolo Saviotti and Andreas Pyka find—like Carlsson—that new products or services are a chief cause of economic growth. In their paper "Economic development, qualitative change and employment creation", Saviotti and Pyka explore the employment implications of the creation of new sectors in a model of economic development. Economic growth is created by the emergence of new sectors, as old ones decline. Each sector is created by entrepreneurs based on a pervasive innovation that establishes an adjustment gap, which is an empty market whose potential demand is only gradually satisfied as the required productive capacity is created and as consumer demand is created. The dynamics of the number of firms in each sector is chiefly influenced by the balance between entry (as determined by the size of the adjustment gap and by financial availability) and exit (as determined by increasing competition and by mergers and acquisitions). During this process, the average size of firms increases within each sector. Employment creation is due to the combination of the creation of new firms and rising labour productivity of firms. While a growing number of firms create increasing employment, firms employ fewer workers per unit of output as they increase in size. The model concludes that aggregate employment can grow even when there is, within each 'old' sector, a trend towards falling employment. Again—and consistent with the view of Carlsson—the idea is that radical innovation (an example could be ICT) allows for the creation of new sectors, producing new goods and services. The creation of new sectors is spurred by the joint action of intensity of competition, which rises as new imitators join the bandwagon, and by the saturation of demand, leading to a gradual closure of the adjustment gap. Using the model, the authors show that a relatively stable macroeconomic growth pattern is compatible with—and may require—a much more turbulent micro economic dynamics.

Gunnar Eliasson, Dan Johansson and Erol Taymaz also study interactions between micro and macro levels in the (New) Economy. In their paper "Simulating the New Economy", Eliasson et al. take two paradoxes as the point of departure. The first one is the Solow paradox ("we see computers everywhere, except in the productivity statistics"), while the second one is the fact that, while academics were discussing the Solow paradox, the shift to fast productivity growth happened in the mid 1990s without any immediately apparent explanation. By applying an updated version of the MOSES model of the Swedish economy, the authors are able to analyse the introduction of ICT in a New Economy setting—the New Economy being understood as the shift to fast productivity growth. In the model an ICT industry is introduced, but the focus is on the diffusion of the technologies developed in the ICT industry in other "older" industries. The authors demonstrate that the development period of a radically new organization of an economy needed to realize the potential productivity gains proposed for the new economy may be very long, and as a result the

"productivity paradox" emerges. Moreover, the paper demonstrates that when the productivity gain is finally being realized at the macro level, the background relationships are far too winding and complex to be explained by near term factors. Accordingly, the macroeconomic growth surge appears "unexpectedly" out of the blue. Finally, the authors show that when the circumstances defining the receiver competence of new technology at all levels are not in place, the New Economy may not emerge at all.

Echoing these results, Heinz Hollenstein empirically examines the assertion that despite a large potential, the full effects of the adoption of ICT may only be reaped after the completion of a long route paved by technical and organisational impediments. In the paper "Determinants of the adoption of information and communication technologies: An Empirical Analysis Based on Firm-level Data for the Swiss Business Sector", Hollenstein puts under scrutiny the empirical timing and intensity of a firm's adoption of ICT—in particular Internet related technologies—while using a rank model of technology adoption. The explanatory variables of the model reflect different dimensions of anticipated benefits from and costs of technology adoption, while the model captures the impact of uncertainty and adjustment costs as well. The results imply that both benefits as well as costs of adoption are indeed key in explaining the diffusion of Internet related technologies. On the cost side, know-how deficiencies, managerial problems as well as costs of financing ICT investments seem to be the most important obstacles to the introduction of Internet related technologies, whereas there is little evidence for a negative impact of technological uncertainty and switching costs. The findings by Hollenstein show that the adoption of ICT is strongly linked to the adoption of "new workplace organization", and is consistent with the result of Eliasson et al. that receiver competence is of utmost importance when it comes to diffusion if ICT. Hollenstein's analysis also shows that ICTs are not only cost-reducing, efficiency-enhancing technologies, but also exhibit a great potential to generate competitive advantages based on new output characteristics in terms of product innovations, improved customer-orientation, etc. In other words, the paper is in line with the contributions of both Carlsson, Saviotti and Pyka in finding that increased variety is a major feature of "the New Economy".

References

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Keld Laursen
DRUID, Department of Industrial Economics and Strategy
Copenhagen Business School
Solbjergvej 3, 3rd Floor, 2000 Frederiksberg, Denmark
Tel.: +45 3815 2565; fax: +45 3815 2540
*E-mail address:*kl.ivs@cbs.dk

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