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Diffusion of the Internet and low inflation in the information economy

Huub Meijers *

*Maastricht Economic Research Institute on Innovation and Technology MERIT, University
Maastricht, P.O. Box 616, 6200 MD Maastricht, The Netherlands*

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Abstract

The adherents of the so-called ‘New Economy’ claim that we are entering a new era with high output growth, low unemployment and low inflation. ICT investments in general and the increased use of the Internet play an important role in this claim. In the literature we find three different explanations for the low inflation experience. Increased productivity growth combined with sluggish adjustment of wages, improved credibility of monetary policy and improved functioning of the labour market. This paper provides another explanation where adoption of Internet as a cost reducing and efficiency improving technology changes market structures and affects the mark-up margins of firms and thereby the relation between costs and output prices. The diffusion of the Internet as a cost saving technology is introduced in a model with network effects and dynamic market structures. The latter two result in an endogenous diffusion process of the use of the Internet for business-to-business commerce. However, there is also some feedback from the increased adoption of the Internet. Diffusion also affects the market structure and therefore the gains of the efficiency improvements obtained by doing business via the Internet. The combination of the diffusion of the Internet, the characteristics of network effects and the dynamics of the markets can explain variation in the mark-up on production costs explains at least a part of the low inflation experience. However, the model also predicts that the inflation suppressing effect of the increased use of the Internet eventually will cease and that inflation will increase in the longer run. The paper adds two new elements to the existing literature. First, it describes a model that combines network

* Fax: +31 43 388 4905.

E-mail address: huub.meijers@merit.unimaas.nl.

effects with changes in market structures to explain the diffusion of a cost reducing technology, i.e. the Internet. Second, it uses this model to explain the current low-inflation experience.

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1. The Information economy, productivity and low inflation

It is a well-established view that investments in information and communication technologies (ICTs) have a positive impact on productivity. Whereas this relation has been absent for many years, leading to a vast literature on the so-called Solow paradox, the developments in the last decade, especially in the US, led many authors to conclude that ICT investment indeed pay off.¹ There is even some evidence that investments in ICTs lead to positive network externalities such that productivity gains are larger than anticipated by investors and are larger for larger networks in which firms operate.² Apart from boosting productivity, the ‘Information Economy’, or ‘new economy’, shows a remarkable relation between inflation and unemployment. There is ample evidence that the non-accelerating-inflation rate of unemployment (NAIRU) has been fallen in the last decade. Several reasons are addressed in the literature. [Ball and Moffitt \(2001a,b\)](#), [Ball and Mankiw \(2002\)](#), among others, show evidence that wage rates adopt slowly to changes in productivity such that a boost in productivity is not immediately followed by an increase in wage rates such that total wage costs fall.³ This effect explains both the rise in the NAIRU in the 1970s, a period characterized by the productivity slowdown where growth in wage rates did not adopt to the fall in productivity growth as a result of which the NAIRU rose, as well as the more recent opposite developments.

Another explanation for the falling NAIRU is the increased transparency of the labour market and reduced search and matching costs due to online matching agencies. If indeed the labour market has become more efficient, the Beveridge curve – which shows the relation between unemployment and vacancies – shifts inwards such that upward pressures on the wage rate starts at a lower level of unemployment. (See e.g. [Zieseimer \(2003\)](#) and [Ihrig and Marquez \(2004\)](#)). Although this could explain the

¹ For a discussion on the Solow paradox and possible explanations, see e.g. [Berndt and Malone \(1995\)](#), [Diewert and Fox \(1999\)](#), [Triplett \(1999\)](#), [Gordon \(2000\)](#), [Moulton \(2000\)](#). For more recent evidence on ICT investment and productivity growth, see e.g. [Jalava and Pohjola \(2002\)](#), [Jorgenson \(2001\)](#), [Pilat et al. \(2002\)](#), [van Ark \(2002\)](#), [Daveri \(2002\)](#), [van Ark et al. \(2003\)](#).

² See e.g. [Becchetti et al. \(2003\)](#) and [Meijers \(2004\)](#). [Stiroh \(2002\)](#) does not find any network effects on a sectoral level for the US. However, he does not include lagged effects of ICT investments which are typically found by other authors.

³ [Kiley \(2003\)](#) argues that productivity should enter the Phillips curve as a proxy for inflation expectations such that the NAIRU should fall when productivity growth increases.

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