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# Unemployment and productivity growth: an empirical analysis within an augmented Solow model

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## Abstract

Does a country's level of unemployment have an impact on the long-run growth rate? Incorporating unemployment into a generalised Solow-type growth model yields some answers. In the traditional Solow model, unemployment has no long-run influence on the growth rate and the level of productivity. The long-run level of productivity is reduced if higher unemployment leads to less formal education or to less learning-by-doing. If we allow for endogenous growth, unemployment reduces long-run productivity growth. Using panel data from 13 OECD countries from 1960 to 1990, we find evidence that an increase in unemployment scales down the long-run level of productivity. © 2002 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

Does a country's level of unemployment have an impact on the long-run growth rate? Persistently high unemployment rates in Europe over the last two decades

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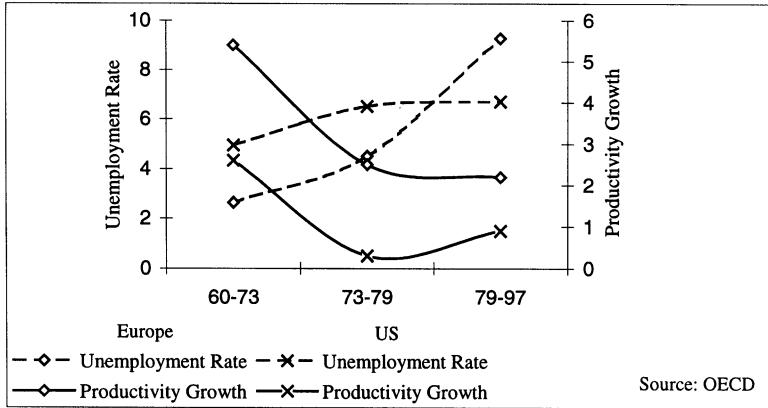


Fig. 1. Unemployment and productivity growth.

indicate that unemployment is, at least to a large extent, not a pure business cycle phenomenon. This implies a continuing squandering of labour and of human capital in most European countries. Hence, it seems reasonable to ask, if given levels of unemployment influence long-run productivity growth or the long-run level of productivity itself.

Unemployment is a severe problem in Europe, but not in the US. The decline in productivity growth has, however, been stronger in the US over the last decades of the 20th century. Between 1979 and 1997 the average rate of unemployment in the US was 6.7% and the average growth rate of labour productivity was 0.9%. In Europe the average rate of unemployment was 9.3% and the average growth rate of labour productivity was 2.2%. These figures might indicate a potential trade-off between unemployment and productivity growth. However, if we look at simple time series plots, the evidence lends at best mild support to this suspicion. Fig. 1 shows the development of unemployment and productivity growth in Europe and in the US between 1960 and 1997. It is striking that there has been an increase in the rate of unemployment that goes along with a decline of productivity growth in Europe as well as in the USA.

Bean (1997) and Gordon (1997) argue that this time series evidence shows a causal link running from unemployment to growth.<sup>1</sup> Section 2 formalises this link by introducing unemployment into an augmented Solow growth model. The model nests the standard Solow model as well as endogenous growth models as special cases. Our main argument is that unemployment reduces production and income and thereby the accumulation of physical and human capital via a reduction of

<sup>1</sup>The traditional link between unemployment and productivity is represented in Okuns law. However, the focus of Okuns law is on short-run demand dynamics (see Gordon, 1979). Neither the slow-down of productivity growth nor the increase in unemployment over the last decades can be explained by such short-run business cycle effects.

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