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Unemployment and endogenous growth with new technologies–skill complementarity

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Abstract

Models developed by recent economic literature do not manage to account simultaneously for the three main stylized facts observed in many EU countries since the mid-seventies: (i) the increase in the overall unemployment rates, particularly in that of low-skilled workers; (ii) the stability of relative wages; (iii) the deceleration in per capita output growth rates. This paper focuses on these issues. We construct an endogenous growth intertemporal general equilibrium model with two types of jobs and two types of workers. We allow for job competition between high- and low-skilled workers on the low-skilled segment of the labor market and for on-the-job search for high-skilled workers. Matching processes are represented by matching functions *à la* Pissarides. Workers search intensities are endogenous. We distinguish between embodied and disembodied technological progress and endogenize them through a *learning-by-doing* process based on capital accumulation. Biased technological change is introduced via embodied technical progress and new technologies–skill complementarity relationship. When simulated the model provides satisfactory results in reproducing the observed stylized facts.

JEL classification: E24; J21; J23; O40

Keywords: Skill mismatch; Equilibrium unemployment; Ladder effect; Macro dynamics; Endogenous growth; Productivity slowdown; Learning-by-doing

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1. Introduction

Over the last 25 years the economic evolution of most European economies has been characterized by three facts. First, there has been a rise in unemployment rates, particularly in that of low-skilled workers. Second, this increase in unemployment has been accompanied by a rigidity in relative wages (see Table 1). And third, after the first oil shock, there has been a deceleration in the growth rate of per capita output and in the growth rate of total factor productivity (*productivity slowdown puzzle*) (see Table 2).

Even if unemployment and growth problems often arise together, the literature has traditionally treated them separately. Models of economic growth typically assume full employment and models dealing with employment assume no growth. Since the beginning of the nineties there is, however, an emerging literature introducing growth into matching and search models of unemployment or matching and search frictions into growth models. Pissarides (2000), analyzes the relationship between growth and unemployment in the presence of embodied and disembodied exogenous technical change. Bean and Pissarides (1993) build a simple OLG endogenous growth model with matching frictions. Merz (1995) captures many of the stylized facts observed in the U.S. labor market using a Real Business Cycle (RBC) model with search frictions and exogenous labor augmenting technological progress. Postel-Vinay (2002) develops a Schumpeterian model to analyze the short- and long-run responses of unemployment to exogenous changes in the rate of technological progress. Postel-Vinay (1998) goes a step further and studies the transitional dynamics of the well known Pissarides (2000) search model in an endogenous growth framework *à la* Romer (1986). Finally, the growth–unemployment relationship is considered in an efficiency–wage model framework by Brecher et al. (2002) and in a generalized augmented Solow type model by Bräuninger and Pannenberg (2002).

This paper constitutes an attempt to deal simultaneously with the observed stylized facts about unemployment, wages and growth in European economies. Our main contribution consists thus in taking into account both European labor market and growth issues in a dynamic setup which is inspired from the RBC tradition. However, contrarily to Merz (1995), where growth arises from an exogenous labor augmenting technological progress, in our framework growth is

Table 1
Low-skilled unemployment rates (difference with respect to average unemployment rates) and relative wages in five OECD countries (in percent)

	Low-skilled unemployment rates (difference with respect to average unemployment rate)			Relative wages			
	1970–1979	1980–1989	1990–1999		1980–1984	1985–1989	1990–1995
Belgium	0.7	2.7	6.2	D1/D5	..	71.6	71.8
France	1.6	8.5	11.3	D1/D5	61.1	61.9	62.0
Germany	2.7	7.2	7.8	D1/D5	68.0	70.7	72.9
United Kingdom	1.4	7.4	6.5	D1/D5	63.1	59.6	57.4
United States	2.5	3.4	5.1	D1/D5	51.5	48.7	48.5

D1/D5: ratio of the upper earnings limit of the first decile of workers to the upper limit of the fifth decile.
Source concerning unemployment rates: Sneessens and Shadman (2000) for Belgium; Fonseca et al. (1998) for France; Buttler and Tessaring (1993) for Germany; Nickell and Quintini (2001) for the United Kingdom (only male workers); Bureau of Labor Statistics database for the United States.
Source concerning relative wages: OECD Employment Outlook 1996 chapter 3. For Belgium we have information only between 1985–1993 and for Germany between 1983 and 1993.