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Production, unemployment and wage flexibility in an ICT-assisted economy: A model

Andrea Pannone*

Fondazione Ugo Bordoni, Via Baldassarre Castiglione, 59-00142 Rome, Italy

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ABSTRACT

This paper presents a simple macroeconomic model in which a fall in money wages has contractionary effects on output and employment. As it is well known this argument in itself is not novel: the contractionary effect of a rise in the mark-up is a standard result in Kaleckian models of imperfect competition. The new contribution of this paper lies in the fact that the contractionary effect of a money wage decline is consistent with perfect competition and rationality of economic agents. This result depends on an original specification of the production side and the associated implications for pricing. This specification, which embraces many features of modern production (characterized by a massive use of ICT), represents the first attempt to use Georgescu Roegen's contribution to production analysis within a Keynesian macroeconomic framework.

1. Introduction

The dominant theory of unemployment, in its standard or in modern versions, postulates a monotonic inverse relation between employment and the real wage rate, and hence advocates wage flexibility to bring about the re-absorption of unemployment resulting from any shock.

Along the same lines, the 'neoclassical synthesis', considered in the economic standard literature as the true interpretation of Keynes's view on the subject, explains unemployment in terms of wage rigidity.[1]

In so-called 'new Keynesian' models unemployment derives from non-competitive behavior on the part of labor (trade unions) which insist on wage claims higher than the competitive, full employment, wage rate: an excessively high level of wages is no longer the result of rigidities but the outcome of optimizing procedures carried out in contexts characterized by asymmetric information (see for instance the efficiency wage models[2]). Nevertheless, this unemployment could always be reduced, if not totally reabsorbed, thanks to a cut in real wages.

In other term, in all the standard approaches the determination of unemployment depends only on behaviours

* Tel.: +39 6 54803533; fax: +39 6 54804406.
E-mail address: apannone@fub.it.

[1] For documentation on this point see Leijonhufvd (1968).

[2] The essential feature of efficiency wage models is the hypothesis that worker productivity is a positive function of wages, at least over some relevant range. Therefore, firms may be reluctant to reduce wages in the face of excess supply, since the associated decrease in productivity may result in an increase in labor costs (see Katz, 1986). There are different hypotheses to explain the link between wages and productivity that give rise to alternative efficiency models (see for instance shirking models, see Shapiro and Stiglitz, 1984; turnover models, see Salop, 1979 and Stiglitz, 1974, 1986; adverse selection models, Weiss, 1980).

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and institutions that are *specific* to the labor market, with the real wage rate as the crucial variable (see Amendola and Gaffard, 1998).

Instead, according to Keynes (1936) and others post-Keynesian authors (see, for example, Davidson, 1998), wages cuts may not help reabsorb unemployment.[3] On the contrary, wage rigidity may be necessary for avoiding that a cumulative process propels the economy far away the full employment equilibrium.[4] Along the same lines, in the Kaleckian version of the post-Keynesian model of employment, higher real wages are conducive to higher levels of employment (see Kalecki, 1971), while a rise of mark-up (and then a fall in real wages) will have contractionary effects. The Kaleckian notion of the mark-up can be viewed as the incorporation of imperfect competition considerations into the macromodel.

In this paper we present a microfounded model of the determination of output, unemployment and other macroeconomic variables in the short run. The model shows the contractionary effects of wage flexibility on output and employment. Hence the main implication of the paper is not novel. The new contribution lies:

(a) In the particular way in which the paper derives this 'non-novelty'.
(b) In the fact that the contractionary effect of a money wage decline is consistent with perfect competition and rationality of economic agents.

The pivotal element of our approach is a new theory of production and market labor that we add to a simple Keynesian macroeconomic model. This theory, that is consistent with important features of the production in modern economies (characterized by a massive diffusion of ICT in the production processes), represents the first attempt to combine the Georgescu-Roegen's contribution to the production analysis (1965, 1971, 1986)[5] with Keynesian ideas. Although the presented macroeconomic model is very simple it leads to leads us to microfound the concept of Keynesian unemployment – that is unemployment caused by a deficiency of aggregate demand – and to reject standard presentations of the Keynesian system, which explains the persistence of unemployment in terms of the downward rigidity of money wages.

As it well known, at the heart of the standard approaches to macroeconomics there is, more or less explicitly, a typical representation of production and of the labor market equilibrium. Production is sketched by means of a neoclassical production function. Market labor equilibrium is determined by the intersection of the schedule of labor supply with the schedule representing the demand for labor. While the labor supply is often assumed to be given and to be unresponsive to changes in the real wage rate (but the same is to assume the supply as a non-negative function of the real wage rate), the demand for labor is derived from the principle of profit maximization applied to the production function. The postulate of decreasing marginal productivity, applied to labor as to any other factor of production, implies that the demand for labor be a negative function of the real wage rate. As a result, if the supply of labor exceeds the demand and there is a problem of unemployment, then the solution lies in a decrease in the real wage as this will increase the quantity of labor demanded and will close the unemployment gap. This tenet that is derived from the marginalist tradition is shared from all the standard analyses of unemployment (see Corsi and Roncaglia, 2002).

In this analytical context the presence and persistence of unemployment could be explained only by adopting the hypothesis of sticky prices (wage and/or price) that implies necessarily the existence of imperfect market shapes. It poses the problem of their microeconomic foundations.[6] For instance, sticky price models like the *disequilibrium models*[7] are unsatisfactory, as they do not explain why rational individuals do not propose changes to the terms of trade at which they exchange. Clearly, if prices are fixed at no market clearing levels, some agents in the economy can mutually benefit by exchanging at different prices, and therefore have an incentive to propose changes in prices. A literature on small menu cost appeared arguing that introducing a very small cost for economic agents to change prices may result in large fluctuations in aggregate output (see Mankiw, 1985).

However we know that the neoclassical production function, from which the labor demand schedule and the standard wage/employment relationship are derived, is characterized from absence of indivisibility[8] and high possibility of substituting the production elements *at each moment* and *for each given scale of production*. It is well known that if some kind of indivisibility is present, increasing returns exist[9] and the assumption of convexity on

[3] According to Keynes (1936) changes in money wage lead to equiproportionate changes in prices, leaving the real wage unchanged.

[4] For instance Hahn and Solow (1986) show, in the context of a dynamic model, that the paths followed by an economy with flexible nominal wages is likely to be far less attractive than those followed by one with rigid wages.

[5] Clearly we are referring to the 'fund-flow' model. For a presentation of the model see also Tani (1986). Interesting theoretical developments can be found in Scazzieri (1993) and in Piacentini (1995).

[6] For instance Layard et al. (1991), in a modern version of the mainstream unemployment theory (see also Layard et al., 1994; Bean, 1994; Blanchard and Katz, 1997) assume the existence of a finite number of firms living in an imperfectly competitive environment, each endowed with a Cobb–Douglas technology. The basic feature of their framework is the emphasis on labor market imperfections as fundamental sources of equilibrium unemployment. They support their work with a huge empirical evidence and a big variety of analytical techniques.

[7] Clower (1965), Leijonhufvd (1968), Barro and Grossman (1971), Malinvaud (1977) among others, assume that agents express their demands on the basis of market prices and perceived quantity constraints. When nominal prices cannot adjust to clear markets, some agents are rationed and output is determined by the minimum of the quantity demanded and the quantity supplied.

[8] Indivisibility refers to indivisible goods that appear in a production process as inputs or as output.

[9] Stigler gave a railway track as an example of an input indivisibility and its influence on output. The optimum output for the track is 200 trains a day. Any deviation from optimum will lead to a fall in output. Less than 200 means that the divisible factors, mainly staff, will have to be reduced while the indivisible factor, the track, remains unchanged and underutilized. If more than 200 trains a day are run, the quantity of divisible factors will have to be increased and the track will be over-utilized because output