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Endogenous technological change, income distribution, and unemployment with inter-class conflict

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ABSTRACT

This paper presents a Kaleckian growth model that incorporates endogenous technological change. The model endogenously determines the rate of capacity utilization, the rate of economic growth, income distribution, and the employment rate in addition to technological change. The paper shows that whether or not an increase in the relative bargaining power of workers raises the long-run equilibrium unemployment rate depends on which regime is realized in the long-run equilibrium. If, for example, the long-run equilibrium corresponds to the wage-led growth regime, a rise in the relative bargaining power of workers leads to a decline in the unemployment rate. This result is never obtained from the mainstream NAIRU model.

1. Introduction

This paper presents a Kaleckian model of growth that incorporates endogenous technological change and investigates the rate of economic growth, income distribution, and the employment rate.[1] Although a large number of attempts to endogenize technical progress have been made in mainstream growth theory, relatively less attention has been paid in the post-Keynesian tradition. In mainstream growth models, much emphasis is placed on technical progress as an engine of growth because supply-side factors determine economic growth. In contrast, because demand-side factors decide economic growth in post-Keynesian growth models, supply-side factors have not been considered so much. This is not to say that there have been no attempts to endogenize technical progress in the Kaleckian model. You (1994) introduces into a Kaleckian model a technical progress such that the growth rate of the capital–labor ratio depends on the rate of capital accumulation. In Cassetti (2003), induced technical progress known as the Kaldor–Verdoorn law (Verdoorn, 1949; Kaldor, 1966) is incorporated into a Kaleckian growth model. Stockhammer and Onaran (2004) also use the Kaldor–Verdoorn law to build a model based on Marglin and Bhaduri's (1990) work, and they empirically test the model for the US, UK, and France by means of a structural VAR analysis. Lima (2004) develops a Kaleckian model in which endogenous technological innovation plays a significant role. In Lima's model, the rate of labor-saving technological innovation depends non-linearly on the wage share, which can generate limit cycles with regard to the wage share and the capital–effective labor ratio.

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[1] See Kalecki (1954, 1971) for his economic theory. For the fundamental Kaleckian model, see Rowthorn (1981); Lavoie (1992); Taylor (2004) and Lavoie (2006).

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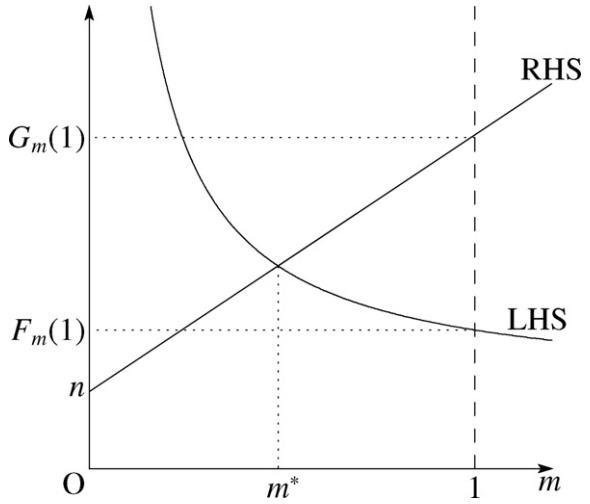

Fig. 1. Determination of m^* ($\phi < \gamma$).

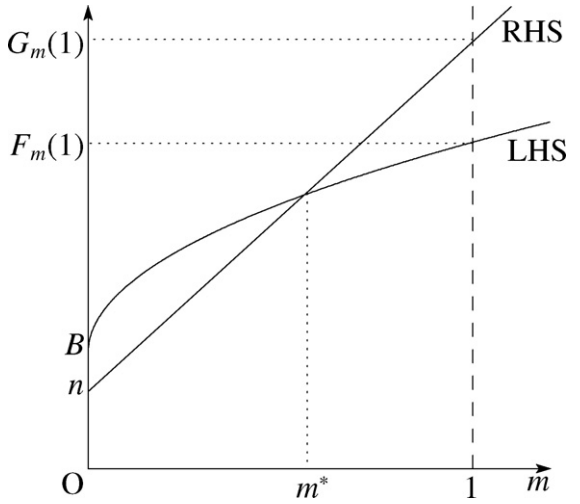

Fig. 2. Determination of m^* ($\phi > \gamma$).

To endogenize technological change, this paper adopts a technique such that the growth rate of labor productivity depends positively on the rate of employment. This formulation is proposed by Dutt (2006) and Bhaduri (2006).[2] According to Dutt (2006), this view of technological change differs from the mainstream endogenous growth theory in that it draws attention on the demand side of the economy: technological change occurs in response to labor shortage caused by the growth of employment rather than supply side which focuses on the research and development process. Bhaduri (2006) states that this captures a view that technological change is driven by inter-class conflict over income distribution between workers and capitalists. Bhaduri's (2006) model is not a Kaleckian one because income distribution is not determined by mark-up pricing. However, it bears similarity to the Kaleckian model in that effective demand plays a crucial role in determining output. In contrast, Dutt's (2006) model can be said to be Kaleckian, but it does not deal with such issues as income distribution and inflation because its purpose is to present a simple growth model that integrates the roles of aggregate demand and aggregate supply.

Our specification of endogenous technological change has the following theoretical implication. Conventional Kaleckian growth models assume that labor supply is unlimited and that firms employ as many workers as they desire at given wages. If, however, the labor supply grows at an exogenously given rate, there is no guarantee that the endogenously determined growth rate of employment is equal to the growth rate of labor supply. Thus, if the growth of labor supply exceeds that of labor demand in the steady state, then the rate of unemployment will keep on rising, but this is unrealistic.[3] In contrast, the steady state unemployment rate in our model remains constant because the two growth rates coincide in the long run. Therefore, our model overcomes the weakness of existing Kaleckian models.

It is true that our paper is not an initial attempt to consider the determination of the employment rate explicitly in the Kaleckian model. Stockhammer (2004) presents an augmented Kaleckian model that incorporates equations that determine employment and income distribution, and investigates the NAIRU (non-accelerating inflation rate of unemployment).[4] However, our model differs considerably from Stockhammer's model in the determination of employment and income distribution. Stockhammer (2004) uses an employment determination equation such that a change in the unemployment rate is given by the difference between the growth rate of exogenous labor supply and the rate of capital accumulation, and an income distribution determination equation such that the profit share depends on the unemployment rate. On the other hand, we use an employment determination equation such that the growth rate of labor productivity depends positively on the employment rate, and an income distribution equation that results from the theory of conflicting-claims inflation. Furthermore, our model is different from Stockhammer's model in that what variables are used in the investment function and whether technological progress is exogenous or endogenous. With these differences, we obtain different results from those obtained by Stockhammer. In Stockhammer's model, the rate of capital accumulation (and accordingly, the rate of capacity utilization) and the profit share are adjusted in the short run, while the unemployment rate is adjusted in the long run. However, employment (and accordingly, unemployment) necessarily changes with changes in the rate of capacity utilization. Hence, it is reasonable to assume that these three variables – the rate of capacity utilization, the profit share, and the employment rate – are adjusted at the same time. There-

[2] Bhaduri (2006) proposes two specifications. One is what we employ in this paper, and the other is that the growth rate of labor productivity is adjusted through the gap between the growth rates of real wage and labor productivity.

[3] Cassetti (2002) also sees it as a problem that the long-run rate of employment in the conventional Kaleckian model is not constant.

[4] For the NAIRU, see also Stockhammer (2008).