Structural Change and Economic Dynamics 40 (2017) 1–9

Contents lists available at ScienceDirect

Structural Change and Economic Dynamics

journal homepage: www.elsevier.com/locate/sced

Distribution and growth. A dynamic approach☆

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ARTICLE INFO

Article history:
Received 13 February 2013
Received in revised form
28 September 2016
Accepted 12 November 2016
Available online 15 November 2016

JEL classification:
E22
E24
E25
E31

Keywords:
Investment
Growth
Employment
Income distribution

ABSTRACT

This paper studies the effects of an (exogenous) distributional shock on accumulation and growth. We develop a model that studies the dynamics of demand, profits and investment following a change of the nominal wage-rate, which is not accompanied by a simultaneous proportional change of prices to maintain the initial distribution of income. The initial income distribution, however, is eventually restored through a gradual adjustment of prices to the new level of the nominal wage-rate.

We concentrate on the process of transition from the initial to a new equilibrium and consider both cases in which the process of transition is 'wage-led' and case in which it is 'profit-led'. In all cases, the dynamics of the economy is crucially affected by the firms' initial response to the shock and it is path-dependent.

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1. Introduction

This paper is concerned with the problem of the relationship between growth and income distribution. It analyses the effects of a distributional shock on the capitalist process of growth in a non-perfectly competitive economy, which initially is in a state of equilibrium characterised by the existence of unemployed labour.

The distributional shock is caused by an initial (exogenous) variation of the nominal wage-rate not accompanied by a simultaneous proportional variation of prices. In other words, it is assumed that an increase (decrease) of the wage-rate is accompanied by an increase (decrease) of prices such as to determine a decrease (increase) of the mark-ups. The variation of mark-ups that we contemplate, however, is only temporary. In time, prices adjust to restore the initial distribution of income.

The model focuses on the analysis of the effects of the initial distributional change on the capitalists' investment decisions by considering two effects: a 'demand-effect' and a 'profit-effect'. The model, in particular, determines the conditions under which the wage change yields positive outcomes for the economy; that is to say the conditions under which the economy responds to the initial shock by starting a process of accumulation leading to a new 'superior' equilibrium, characterised by larger output, employment and productive capacity but by the same income distribution as the initial. Thus, the model is mostly concerned with the analysis of the way in which the economy moves from one equilibrium to another.

More in particular, we consider two distributional shocks.

(1) An increase of the nominal wage-rate and a temporary distributional shock in favour of workers. We study the conditions under which such shock produces a positive demand-effect on investment that is stronger than the negative profit-effect, so that investment increases. The economy undergoes a process of accumulation leading to a superior equilibrium. Such a process can be depicted as *wage-led*. If the negative profit-effect dominates, the economy moves to an 'inferior' equilibrium, characterised by lower levels of output, employment and productive capacity.
(2) A decrease of the nominal wage rate and a temporary distributional change in favour of profits. We determine the conditions

☆ Previous versions of this paper have been read and helpfully commented by A. Bhaduri, C. Chiarella, G. Harcourt and E. Hein. We wish to thank them all. We would like also to thank the anonymous referees of the journal for their helpful and insightful comments and suggestions. The responsibility for any possible remaining mistake is of course solely ours.

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http://dx.doi.org/10.1016/j.strueco.2016.11.001
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under which the negative demand-effect on investment of this shock is more than offset by a positive profit-effect, so that investment increases. The economy undergoes a process of accumulation leading to a superior equilibrium. This process can be depicted as *profit-led*. The economy moves to an 'inferior' equilibrium if the negative demand-effect dominates.

The processes outlined above are all path-dependent, as their direction is determined by the sign of the initial response of investment to the distributional shock. If the response of investment in the first period following the wage change is positive (negative), then investment keeps on increasing (decreasing) in all the following periods until the new equilibrium is reached.

The model to analyse the processes outlined above, which is expounded in Sections 2 and 3, is kept at the simplest possible level to emphasise its basic features and outcomes; in Section 4, however, we sketch some possible developments and extensions of the analysis. Section 5 relates the model presented in the paper to other approaches. Section 6 concludes.

2. A simple two-sector dynamic model

In this section we expound the general features of the model and its equations; Section 3 analyses the dynamic effects of a distributional shock.

Consider a non-perfectly competitive economy, in which firms set prices by applying a mark-up on their unit costs. Firms have a target mark-up, μ^*, which must be realised in equilibrium.[1] Equilibrium conditions are detailed below, after having specified the economy's technology, production, consumption and investment decisions.

2.1. Production

There are only two goods: a consumer-good (C) for capitalists and workers and an investment-good (I). The consumer-good is produced by means of capital (K) and labour (L^C) with a linear technology with factor complementarity:

$$C_t = \min(AK_t, \lambda^C L_t^C)$$

where A and λ^C denote the productivity of capital and labour producing C respectively which, for simplicity, are taken as constant. Capital depreciates at a rate δ.

Without loss of generality, we can set the productivity of capital equal to 1 ($A = 1$) and obtain

$$C_t = \min(K_t, \lambda^C L_t^C) \tag{1}$$

The investment-good is produced by labour only (L^I):

$$I_t = \lambda^I L_t^I \tag{2}$$

where λ^I is the productivity of labour producing I.

Gross profits in the two sectors are:

$$P_t^I = p_t^I I_t - wL_t^I$$
$$P_t^C = p_t^C C_t - wL_t^C$$

In the investment-good sector, net and gross profits ($\tilde{P}^I$ and P^I respectively) coincide because the good is produced by labour only. In the consumer-good sector, instead, gross profits include the cost of capital replacement, so that net profits are

$$\tilde{P}_t^C = P_t^C - p_t^I \delta K_t$$

Aggregate net profits then are

$$\tilde{P}_t = p_t^C C_t + p_t^I I_t^N - w(L_t^C + L_t^I)$$

where $I_t^N = I_t - \delta K_t$ is net investment.

2.2. Demand

As for the workers' consumption, we make the hypothesis that their marginal propensity to consume is 1, so that wages are entirely consumed. As for capitalists' consumption (B), we adopt the following function

$$B_t = q\tilde{P}_t + G_t \tag{3}$$

where $0 < q < 1$ is the capitalists' propensity to consume out of net profits and G_t is an autonomous component that evolves over time together with the economy's level of activity.[2]

We make also the hypothesis that in the consumer-good sector the short-side of the market prevails, i.e. when the demand for it in real terms is higher than its output C_t, the market is rationed.[3] Conversely, if demand falls short of supply, producers of the consumer-good experience a pile-up of their stocks. This amounts to assuming away the existence of excess capacity and the possibility of variations of the degree of capacity utilisation in response to changes in demand.[4] As for the investment-good we assume that it is produced to order, so that whatever level of demand for it by the consumer-good sector is always met. Investment is an increasing function of demand and profits with a time lag,

$$I_{t+1} = I(D_t, P_t) \tag{4}$$

The investment function will be expressed in an explicit form below, after having defined equilibrium.

2.3. The stationary steady-state equilibrium

Consider an economy that, at $t = t_0$, is in a stationary steady-state equilibrium.[5] There must be the equality between the demand for and the supply of both goods and the equilibrium mark-up μ^* must be realised in both sectors. μ^* is associated with prices whose levels depend only on the money wage-rate w since the factors' productivity is constant. Let us denote such prices as $p^{*,I}(w)$ (investment-good) and $p^{*,C}(w)$ (consumer-good).

Moreover, in a stationary steady state the economy's growth rate and net investment are nil, so that investment is equal to capital depreciation

$$I^* = \delta p^{*,I}(w) K^* \tag{5}$$

where K^* is the equilibrium stock of capital.

[1] However, for simplicity, in the text the analysis is carried out without considering mark-ups explicitly. See Appendix A for a more detailed exposition of the firms' pricing policy.

[2] Given the economy's technological characteristics, the level of activity and the capital stock necessarily evolve together; therefore, the autonomous component G_t can be also interpreted as evolving with the capitalists' wealth, denoted by their capital stock. Since also the wage bill and the level of activity evolve together, for simplicity we take the component G_t as proportional to the wage bill. See Section 3 and Appendix A for further details.

[3] See, for example, Benassy (2002) for an analysis of quantity rationing in non-perfectly competitive economies.

[4] See Section 5 below for further considerations on the issue of capacity utilisation and a more detailed explanation of the reasons why we do not contemplate the possibility for firms to have a certain amount of unused capacity.

[5] It would be easy to generalise the model and consider a positive steady-state growth rate without any significant change of our general results.

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