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Article:

Jackson, William Anthony (1990) Employment determination with variable productivity.
British Review of Economic Issues. pp. 53-65. ISSN: 0141-4739

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EMPLOYMENT DETERMINATION WITH VARIABLE PRODUCTIVITY

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Abstract

A macroeconomic model can depict employment only if it includes an account of the organisation of production. Keynes and many Keynesian writers have retained a neoclassical view of production, with fixed, technically efficient production functions; such a view is restrictive and neglects the social aspects of organising production. The present paper sets up a simple post-Keynesian model in which employment and productivity are allowed to be fully variable. To close the model an explicit representation of the organisation of production must be added, and the neoclassical view is only one possibility among others. Several alternatives are considered, as well as policies aimed at reorganising production. It is argued that post-Keynesian economics should rest on a non-neoclassical view of production, acknowledging the scope for variable productivity.

Keywords: employment, productivity, Keynesian economics, organisation of production, technical change

1. Introduction

Employment, as commonly understood in capitalist economies, means the possession of a formally recorded job; unemployment, conversely, means joblessness. The distribution of working time is skewed, so that some individuals are in full-time employment while others are inactive and receive no employment income. In these circumstances, national income and output depend on the productivity of the employed, whose number usually changes during cyclical economic fluctuations. Movements in national income can be accommodated by shifts in either employment or productivity, and a complete macroeconomic theory has to cover both.

Keynesian economics centres on the circular flow of national income, although its aim is to provide a theory of the whole economy, including employment and productivity. National income and employment are linked by the organisation of production, even if this is dealt with only implicitly. Keynes retained a neoclassical view of production, based on fixed technology and decreasing returns to labour (Keynes, 1936, Chapter 2). The production function was integrated with a neoclassical labour market, assumed not to equilibrate but unaltered in its main characteristics from pre-Keynesian economic modelling. Such a method encouraged the development of hybrid neoclassical-synthesis models and roused subsequent controversy over Keynes's true beliefs. Whatever the doubts about Keynes's beliefs, it can safely be said that he placed little emphasis on the social organisation of production; in his treatment of production, Keynes adhered to neoclassical theory.

The neglect of production is a criticism of mainstream economics often made by non-neoclassical writers (Rowthorn, 1974; Gintis, 1976; Hodgson, 1982). Neoclassical production functions posit a fixed functional relation between outputs and factor inputs, reflecting a technical efficiency that maximises output for given inputs. Production must be organised to attain efficiency, yet the 'black-box' method eschews any mention of the internal organisation of firms and industries. A non-neoclassical outlook on production

notes the wide variation in labour productivity, for the same individual over time and between individuals in the same or different working conditions: to assume technical efficiency is seen as excessively rigid, ignoring the social side of production and its potential flexibility. A stress on the human element in production is intrinsic to much non-neoclassical theorising, which aspires to avoid the mechanical analogies of neoclassical economics.

Despite the non-neoclassical arguments about production, post-Keynesian economics does not always distance itself from neoclassical theory. An example is Weintraub's aggregate supply and demand model, a frequent tool of post-Keynesian analysis (Weintraub, 1958; Davidson and Smolensky, 1964; Reynolds, 1987). Weintraub follows Keynes in setting up an aggregate supply function based on the neoclassical theory of the firm; this may be an accurate representation of Keynes, but it persists in a neoclassical view of production. The present paper adopts a different approach, considering a simple post-Keynesian model with fully variable productivity. Employment can be determined only by appending an explicit employment-productivity relation, which need not be given a neoclassical interpretation. A post-Keynesian method is better matched with a non-neoclassical view of production allowing for the institutional background to working practices and the prospect of policies to reorganise production.

2. Productivity and steady-state income

In a post-Keynesian model, a steady state is reached by shifts of income, employment and productivity, without recourse to the relative prices invoked in neoclassical economics. The initial task in introducing variable productivity is to obtain the combinations of employment and productivity at steady-state national income and expenditure.

Steady-state income and expenditure plans must be compatible, removing the tendency to further change; the model therefore has income and expenditure sides, to be equated in a steady state. The income side is:

$$Y = VE \tag{1}$$

where Y = total income;
 E = employment;
 V = average value added per employee per period.

Employment, E , refers to all individuals with formally recorded jobs, irrespective of working hours and full-time or part-time status. V is the average net contribution to national income of all individuals in formal employment, and for constant prices indicates the average productivity of labour. National income is V multiplied by E , both taken to be fully variable. The expenditure side of the model is:

$$X = \beta_u B(L-E) + \beta_r(1-t)VE + A \tag{2}$$

where X = total expenditure;
 L = working population;
 B = average transfer payments to the unemployed;
 A = autonomous expenditures;
 t = average tax rate on private incomes;
 β_u = average propensity to consume (APC) from transfer payments;
 β_r = APC from private net incomes.

L , B , t , β_u and β_r are assumed constant; A is an exogenous variable. There are three components of total expenditure, X . The first is consumption by the unemployed, who receive no recorded income and whose expenditures have to be financed from non-income sources, chiefly state transfer payments. The second is consumption by private income

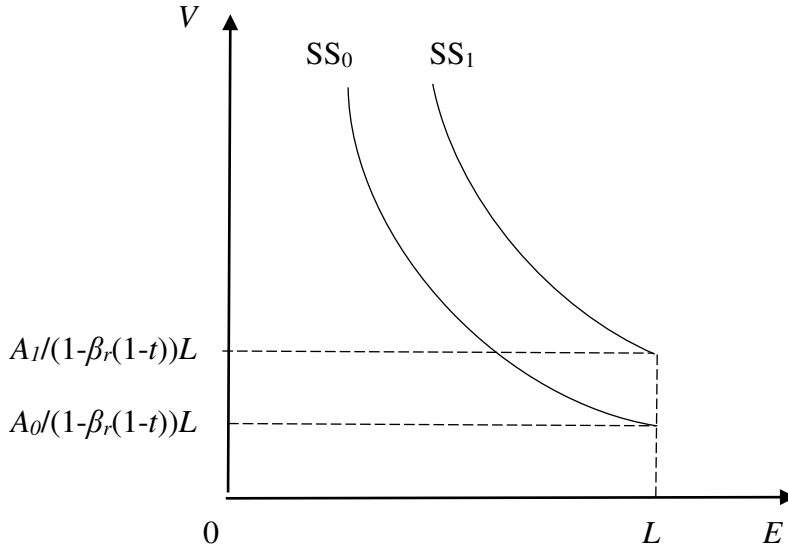
recipients, including non-wage as well as wage incomes; disaggregation of incomes by type is unnecessary provided that the distribution between wage and non-wage incomes remains approximately constant. The APC coefficient β_r is a weighted average of the coefficients for wage and non-wage incomes, its value probably lower than that for the unemployed, β_u . The final component of X is autonomous expenditures, A ; assuming a closed economy, A is composed of investment and government spending on goods and services.

If V and E vary freely, then changes in national income can occur through movements of either. In a steady state Y and X are equated, and from equations (1) and (2) it follows that:

$$E = \frac{\beta_u BL + A}{V(1-\beta_r(1-t)) + \beta_u B} \quad (3)$$

where, for A fixed, all terms except E and V are constants. Equation (3) gives the steady-state combinations of E and V , illustrated diagrammatically in Figure 1. For fixed autonomous expenditures, A_0 , the (E, V) combinations are inversely related, shown by the curve SS_0 . Because E cannot exceed L , the SS_0 curve is truncated at the L vertical, with V always lying above the associated productivity level, $A_0/(1-\beta_r(1-t))L$. A rise in autonomous expenditures to A_1 causes the SS curve to shift to SS_1 . Higher aggregate expenditure puts upward pressure on employment and productivity: one or the other must rise, but not necessarily both, and the end result cannot be discerned from the SS curve alone. All that can be told from the steady-state analysis is that the economy will lie somewhere on the SS curve for the prevailing level of autonomous expenditures.

Figure 1. Steady-state combinations of employment and productivity



National income itself is indeterminate, since income does not stay constant as V and E change along a given SS curve. Steady-state income satisfies the relation:

$$Y = VE = \frac{\beta_u BL + A}{1 - \beta_r(1-t) + \beta_u(B/V)}$$

so that $dY/dV > 0$; moving northwest along an SS curve, national income in the steady state increases. The reason is that higher productivity concentrates working hours in a smaller proportion of the constant working population and thus raises the unemployment rate. As the state is committed to providing transfer payments to the jobless, a higher unemployment rate elicits higher expenditures from non-income sources and higher national income. An SS curve denotes a specific national income only if $B = 0$, which is not in general feasible if the unemployed are to subsist. The model assumes an absence of balanced-budget effects, crowding out and ultra-rationality.

To close the model and derive national income and employment, there must be some additional detail of productivity variation and hence of the organisation of production.

3. Productivity and the organisation of production

In the short run technology is constant, and productivity varies through the operation of given technologies. The main causes of variation in V can be categorised as follows:

(i) **Decreasing returns:** Under standard neoclassical assumptions a rise in employment in an industry with constant technology and capital will bring decreasing returns and a fall in the marginal and average productivity of labour. While neoclassical theory is silent on the organisation of production, decreasing returns presume that factors are less productive when other factors are relatively scarce.

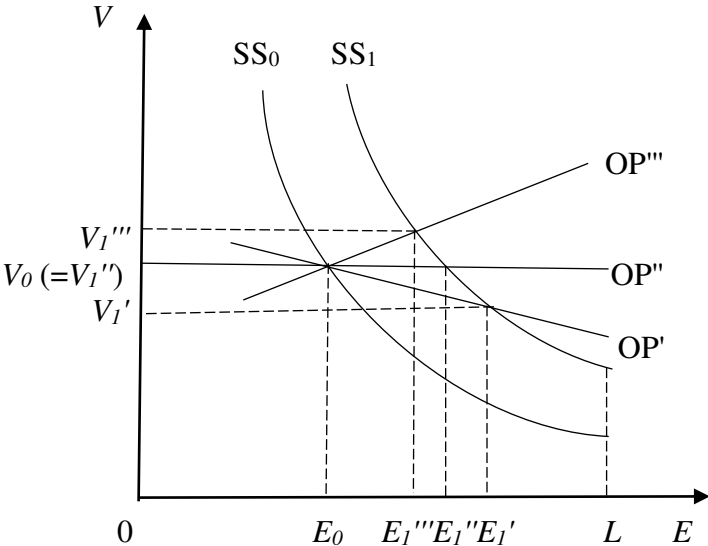
(ii) **The distribution of output between industries:** As V is an aggregated productivity measure, it may be influenced by distributional changes. If industries differ in their labour productivity, then a change in the composition of output can change V without any changes in the productivity of individual industries. The relevance of distribution depends on the productivity differences between industries and whether the industries most vulnerable to short-run fluctuations are typical in their productivity of industry as a whole.

(iii) **Working hours:** For a given total number of working hours, longer hours per worker reduce employment and raise the average productivity of the employed. If total working time is changed partly by varying average working hours, then there is less need for layoffs and recruitment; V may be positively related to income, weakening the relation between income and employment.

(iv) **Work intensity:** Productivity can also vary through the intensity of work within a technology. Variable intensity is hard to reconcile with neoclassical assumptions of technical efficiency, but fits more comfortably into a non-neoclassical perspective, as, for instance, in the Marxian labour process or behavioural notions of organisational slack. V will be variable wherever changes in output are met wholly or partly by changes in the intensity of work for existing employees. The key question is whether these disparate influences combine into a stable employment-productivity relation.

Returning to the model, if a well-defined employment-productivity relation exists, then it can be plotted as an additional curve in (E, V) space. Let this be termed the organisation of production (OP) curve, so that there is now a unique steady state at the intersection of the SS and OP curves, as in Figure 2.

Figure 2. Steady states allowing for the organisation of production



The initial steady state is (E_0, V_0) , where SS_0 intersects the OP curve. A rise in autonomous expenditures will shift the SS curve from SS_0 to SS_1 , yielding a new steady state further right along the OP curve. Nothing is known a priori about the slope of the OP curve, and three possibilities are illustrated. A negative slope (OP') accentuates employment changes, with productivity moving in the opposite direction to output; a zero slope (OP'') implies constant productivity and a smaller employment change; a positive slope (OP''') shares the adjustment of output between employment and productivity, with a rise in productivity and the smallest rise in employment.

The neoclassical view of production, as espoused by Keynes in the *General Theory*, suggests a negative slope for the OP curve. Of the four influences on V listed above, the last three are discounted as secondary: the distribution of output between industries is either constant or systematically related to income; average working hours per period are approximately constant in the short run; the intensity of work is subsumed in technical efficiency. The remaining influence is decreasing returns, which reduces productivity in individual industries as employment rises and, other things being equal, leads to a negative relation between average productivity and employment. Productivity is countercyclical and plays no part in the adjustment of output.

A non-neoclassical approach appeals to a broader range of influences on productivity. Greater prominence is given to social and institutional factors, which affect productivity largely through working time and work intensity. All four of the potential influences on V are relevant, increasing the complexity of the employment-productivity relation and sowing uncertainty about its shape and stability. Non-neoclassical views can support a negative, zero or positive slope of the OP curve.

A downward sloping OP curve may arise from Marxian bargaining arguments. Employers and workers have conflicting interests over productivity, with employers wishing to raise labour productivity at the expense of longer working hours and poorer working conditions (Bowles, 1985; Weisskopf, 1987). Bargaining strengths of employers

and workers are governed by economic activity: in a depressed economy, employers can readily find replacement labour, lessening the resistance to higher productivity; as output expands, the bargaining position of labour improves, permitting better working conditions and lower productivity. Employers always stand to benefit from high productivity and a concentration of working hours, and their best chance to gain productivity rises is during a recession. A contradiction emerges, such that expansion assists employers by easing the realisation of profit, while diminishing their bargaining strength and reducing productivity.

A horizontal OP curve signifies the lack of a short-run relation between employment and productivity, so that productivity is at a constant level decided by technology and longer-term social factors. Employment and output are then proportional and virtually proxies for each other. Productivity will stay constant if each industry has fixed proportions and excess capacity, and the distribution of output between industries is stable. A fixed-proportions technology is assumed in much non-neoclassical theory, drawing the contrast with the smooth factor substitutions of neoclassical modelling (Eichner, 1976, 1983). A stable output distribution may be an appropriate assumption in the short run; otherwise, if distribution changes with economic activity, the OP curve will be horizontal only if industries have similar productivity.

An upward sloping OP curve may result from flexible working practices and the hoarding of labour, with employers meeting changes in demand by varying the productivity of existing labour. The preservation of a static, regular labour force gives rise to procyclical productivity and the adjustment of output through working hours or the intensity of work. Non-neoclassical theory dwells on the institutional features of labour markets, explaining procyclical productivity as a consequence of sheltered labour, which is not made redundant during a recession but works less intensively (Freedman, 1976). Sheltering is normally a facet of labour market segmentation, observed especially in internal or primary labour markets distinguished by their hierarchical organisation and use of rules and customs (Doeringer and Piore, 1971; Edwards, 1979). A primary labour market binds the firm and employee more closely than a secondary labour market, the

employee enjoying better pay, working conditions and job security in return for loyalty and commitment. A high proportion of sheltered labour in an economy will increase the slope of the OP curve, to the extent that a positive slope may ensue.

The ambiguity about the slope of the OP curve is due to the flexibility of production. When the social and institutional aspects of production are acknowledged, work within a given technology can be organised in different ways; an OP curve is a 'soft', social relationship, capable of taking many forms. Flexible production has repercussions for economic policy, broaching the topic of whether production should be reorganised.

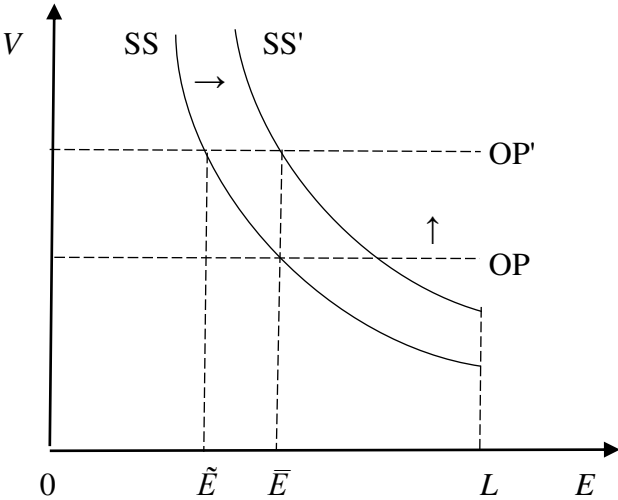
4. Reorganising production

Variable productivity creates policy options additional to the traditional concern of macroeconomics with the position and shape of the SS curve. If the organisation of production is flexible, then the OP curve can also be moved and reshaped to meet macroeconomic objectives. Two policy objectives can be identified: to influence the general level of productivity, that is, the height of the OP curve; and the methods of adjusting output and employment, that is, the slope of the OP curve.

Discussion of the general level of productivity is motivated largely by technical change and its effects on employment. Technology has so far been assumed constant, but technical advances will tend to produce an upward drift of the OP curve, as in Figure 3. Assuming (arbitrarily) a horizontal OP curve, changing technology will cause a movement of the OP curve to OP'. Other things being equal, employment will fall to \tilde{E} , national income will rise and the distribution of income will become increasingly skewed. Technical change may concentrate employment in a privileged, high-income sector, juxtaposed with a growing group of jobless unemployed. The standard Keynesian remedy is to expand aggregate demand, shifting the SS curve outwards to SS' and restoring

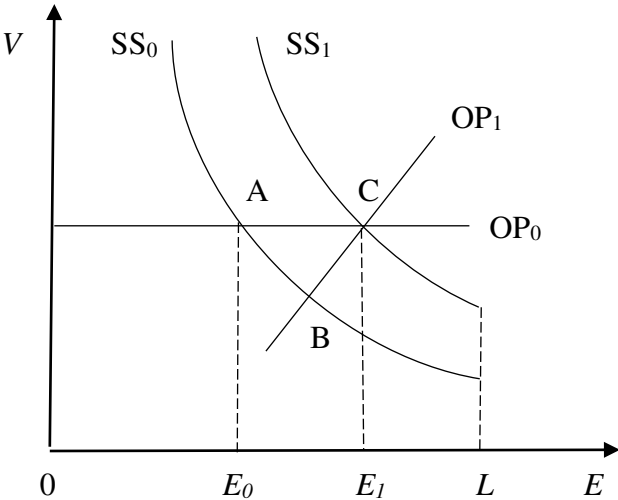
employment to \bar{E} . National income will rise further, growing proportionately with productivity if unemployment is stabilised at a constant long-run level. 'Technological' unemployment is ruled out by the unlimited opportunities for expansion of demand, opening up of new markets, and so forth. In principle it is indeed possible for an acceleration of growth to offset declining employment, although in the very long term rapid growth may not be sustainable. To speak of demand alone, however, is one-sided and spurns the other potential benefit of high productivity, namely a reduction in working time for a constant output level. On the OP-SS diagram a reduction in average working hours per period moves the OP curve downwards, offsetting the upward trend from technical change. If demand is held constant and working hours are reduced in proportion to rising productivity, then the OP curve is static, employment stays at \bar{E} and the same national income is maintained with a reduction in working time. A composite approach would manipulate both the SS and OP curves in response to technical change, combining a rise in national income with stable employment and shorter working hours.

Figure 3. The effects of technical change



The second policy objective focuses on the variability of productivity rather than its level, in other words, on the slope of the OP curve rather than its height. Job security can be enhanced by increasing the slope of the OP curve, preferably by a rotation about a point near the full-employment vertical, as in Figure 4. Initially the economy has constant productivity along OP_0 with employment at E_0 . The aim is to stabilise employment by increasing the slope of the OP curve. Little is gained by rotating the OP curve about point A; rotation should be about a point such as C, with the productivity of A and higher employment. Other things being equal, to get from A on to the new OP curve, OP_1 , there has to be a movement to point B, with lower productivity and higher employment. Expanding aggregate demand shifts the SS curve outwards from SS_0 to SS_1 , so that the economy moves up OP_1 to point C. Autonomous fluctuations in demand are then satisfied along OP_1 , giving greater stability of employment than OP_0 . A higher slope of the OP curve entails a greater willingness to adjust output by changes in working hours or work intensity instead of by layoffs, widening the incidence of sheltered labour. Universal sheltering is impossible in a dynamic, growing economy, but the intention is to confine layoffs to cases of major structural change, and to restrict their use in regulating the volume of production.

Figure 4. Stabilising employment



In practice, most policies to reorganise production involve changes in working time, for example, changes to the working week, job-sharing schemes, flexible working practices, and changes in annual vacation arrangements. Any of these measures can move the OP curve in the direction desired, although whether its shape and position can be chosen with precision is less certain. One difficulty is that besides formal working time, the OP curve depends on the intensity of work, which is not immediately observable and may leave a residual component of productivity at the discretion of employers or workers. Other difficulties may be faced if the policy requires a spreading of skilled, high productivity employment among larger sections of the working population. Unless the necessary skills are available, labour will be insufficiently mobile for a redistribution of working time to be accomplished. An extension of training and education is likely to be essential to a reorganisation of production: without it, new jobs may be confined mostly to low-skilled service sectors, as is evident in recent UK experience (Barker and Dunne, 1988). Further difficulties derive from the effect of shorter or variable working hours on the factor distribution of income. Holding wages per working hour constant preserves the same factor distribution of income, other things being equal, but reduces a worker's total earnings if working hours fall. Holding earnings constant for reduced working hours changes the factor distribution of income in favour of wages, leading to a shift of the SS curve as well as the OP curve. Wages are one of the more contentious issues in organising production (White, 1980), although distributional conflicts can be alleviated if shorter working time is coupled with a more efficient utilisation of capital. To reorganise production would therefore raise substantial, but not insurmountable, practical difficulties. Cases where shorter working hours have accompanied increased plant operating time have proved that reorganisation is feasible and can promote higher employment (European Commission, 1988). Even with no conscious policy, the long-run trend is for a slow reduction in working hours (Blyton, 1985). A general strategy to redistribute working time seeks to formalise this trend, providing more equal access to high-productivity employment with shorter working hours (Purdy, 1988; Gorz, 1989). Ideally, policies to reorganise production enable the fuller expression of existing social and cultural attitudes to work, and

do not impose an organisation of production from above. If so, then the policy measures are not merely discretionary and exogenous, but consonant with social and cultural change.

5. Conclusion

The principle of effective demand, while crucial to Keynesian economics, cannot alone determine national income and employment: a portrayal of the organisation of production must be added. Keynes took his view of production second-hand from neoclassical theory, and thereby limited the social and institutional content of mainstream Keynesian modelling. Neoclassical economics is reductionist in tone, hoping to reduce economic behaviour to the supposedly fundamental entities of technology and human nature. Social structure is regarded as a less fundamental *ad hoc* element, often construed as an imperfection impeding the functioning of markets (Eatwell and Milgate, 1982). Production receives less attention than exchange, and the social organisation of production is concealed by technically efficient production functions. The constricted view carries over to Keynesian models based on the neoclassical theory of production.

An alternative is to move away from the neoclassical goal of ahistorical generality, towards a method which is openly social and institutional (Hodgson, 1988). Modelling then has to incorporate specific social detail, contingent on time and place: in the present model, both the SS and OP curves depend on particular social and economic circumstances. Sociological studies of unemployment show that social structures have their own distinct importance, and that there is no unique connection between technology and the organisation of production (Ashton, 1986). The same technology can be operated with different working practices, as is apparent from productivity comparisons between countries (Granick, 1972; Dore, 1973; Caves, 1980; Nichols, 1986). Productivity is also variable within a given economy over time, demonstrating the scope for policies to reorganise production. To represent these issues fully, theory has to give a proper place to

social structures, without subordinating them to technology and human nature. An explicitly structural approach is fairly rare in economics, given the dominance of neoclassical theory, although commonplace in sociology and in the social sciences as a whole. In some respects, the introduction of social structure makes economic theorising harder, by inserting an additional irreducible element. The advantage is the recognition that there is such a thing as society, that it matters for economic theorising, and that it warrants a role beyond that of an imperfection in models of market-clearing equilibrium. A method which accords due weight to social and institutional factors is necessary for a more realistic depiction of the economy.

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