Growth, distribution, and inflation: a centennial synthesis
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Growth, distribution, and inflation: a centennial synthesis

Stephen A. Marglin*

I

In a previous incarnation, I used to teach in the basic graduate sequence of courses in microeconomics at Harvard. A little more than a decade ago, having become disenchanted with neoclassical economics, I suggested to my students that the very neoclassical course I had just taught provided *one* way of characterising the workings of a capitalist economy, but hardly the *only* way. After a year of utility maximisation, partial and general equilibrium, Pareto optimality and the associated agonies of Lagrangians, Hessians, Jacobians, and fixed-point theorems, my students were able to contain their enthusiasm for this news. They had expected not one way of looking at the world, but at the very least a magical key to knowledge and wisdom. It is probably accurate to say that my message was not received at all. I shall always remember the incomprehension etched on their faces.

The next year—the last I was to teach theory in that incarnation—I decided to present at least a sketch of an alternative to the neoclassical orthodoxy. I soon discovered there were at least two foundations on which to build, one going back to Marx, who died one hundred years ago, the other deriving from Keynes, whose birth centenary we celebrate this year. These two approaches, it was clear, were as different from each other as from the neoclassical approach. The analysis of neo-Keynesian, neo-Marxian, and neoclassical theories has been a major focus of my research ever since and provides the framework for these lectures.[1]

The comparative purpose of this enterprise has compelled drastic simplifications. In the first place, it is necessary to limit the analysis to those questions on which all the theories have something to say. It is, for instance, pointless to search for a Marxian or Keynesian analysis of the effect of a frost at apple-blossom time on the price of apples or pears the following autumn. On this and similar questions, neither neo-Marxian nor neo-Keynesian theory has anything to say, at least nothing very different from neoclassical theory.

It is equally pointless to search for a neoclassical or neo-Keynesian counterpart to Marx's theory of how and why successive modes of production rise and fall. Neither is it fruitful— here I recognise that I am on more controversial ground—to search for a neoclassical or neo-Marxian theory of the short-run determination of output and employment.

[1]The basic ideas in this paper are developed more fully in my forthcoming book *Growth, Distribution, and Prices*.

By contrast, *long-run* issues of growth and distribution are issues to which all three theories speak, and these are the issues on which I shall focus. How have capitalist countries as different as Japan, Italy, Germany, and France managed to grow so much more rapidly over the post World War II period than the United States and the United Kingdom? Why is the profit rate near 30% in Japanese manufacturing, but only about 10% in British manufacturing? What in fact determines the distribution of the economic pie between property income and wage income? How are distribution and growth related? On the assumption that the English-speaking world does not suffer from a dearth of neoclassical economics, not to mention that it is the centenary of neither Walras nor Marshall, I have made the tactical decision to emphasise here the neo-Marxian and neo-Keynesian answers to these and related questions.

There are other simplifications about which I should say a word. You will note throughout the absence of joint production, natural resources, technological change, international trade, and—until the very end—government. Indeed, in view of the severe time constraints, I shall compound the felony by operating strictly within a one-good model with fixed production coefficients. I should be more defensive about these assumptions if the purpose of these explorations was to provide definitive answers. That, alas, is premature. We are, I think, rather at the point of trying to determine how to ask the right questions: does, for example, the mainspring of capitalism lie within the household, the sovereign consumer of neoclassical theory, or with the entrepreneur, the central focus of neo-Keynesian theory? What is the role of class struggle, the central idea of neo-Marxian theory, in shaping a capitalist economy? For these purposes, simple models suffice. Indeed, simple models are perhaps superior, since they allow us to focus more clearly on that which divides alternative approaches from one another.

Most of today's lecture is devoted to laying out neo-Marxian and neo-Keynesian theories of growth and distribution. As a point of reference, I shall in due course give you a one-minute summary of what I take to be the essence of the neoclassical theory. Having laid out neo-Marxian and neo-Keynesian models today, I shall attempt tomorrow to synthesise the insights of these two approaches into a single model. The synthesis introduces inflation as an important feature of long-run equilibrium; in fact inflation is the key to marrying the two systems, each of which is just determined, without overdetermining the model.

Tomorrow will be devoted to putting the hybrid model through its paces, so to speak. In the process I shall argue that—despite the simplifications and limitations of the model— it sheds some light on the 'now you see it, now you don't' nature of the Phillips curve over the post-war period, as well as on the limitations of fiscal and monetary policies in macroeconomic management. At the end I will use, perhaps abuse, the liberty of this platform to suggest some political implications to which the economic analysis leads.

Let me begin the analytics by characterising the common core of all three models, neoclassical as well as neo-Marxian and neo-Keynesian. Production of a single good, 'corn', takes place with a fixed-coefficient technology in which the only inputs are seed corn and labour. Corn can be allocated between two uses, consumption and investment, according to the 'production equation'

$$\frac{X}{L} = C + a_1 \frac{X_{+1}}{L},\qquad(1)$$

in which X represents current corn output, L this year's employment, C consumption per worker, a_1 the seed-corn requirement per bushel of corn output, and X_{+1} next year's corn output. Denoting the rate of growth by g we have

$$X_{+1} = (1+g)X \tag{2}$$

and multiplying through by the labour coefficient

$$a_0 = L/X \tag{3}$$

we have

$$1 = a_0 C + a_1(1+g). \tag{4}$$

Observe that the economic content of this equation is minimal. It simply says that what is not invested is consumed.

Corresponding to equation (1) is a 'price equation',

$$P = Wa_0 + (1+r)Pa_1 \tag{5}$$

relating the price of corn to the labour cost Wa_0, the cost of seed corn Pa_1, and profit rPa_1. Observe that the profit rate is *defined* in terms of the current price; so defined, profit excludes capital gains or losses. (Piero Sraffa's influence (1960) will be seen in the implicit assumption that wages are paid at harvest time and hence do not form part of capital.) Once again, the economic content of this equation is minimal: it says only that what is not wages must be profit, these being the only two categories of income.

In real terms, the price equation becomes, upon division by P,

$$1 = \frac{W}{P}a_0 + (1+r)a_1 \tag{6}$$

the form of which is symmetrical with equation (4). The important point for our purposes, however, is not the symmetry of equations (4) and (6) but the fact that we have two equations with four unknowns—C, g, W/P, and r. This is where alternative theories come in; each theory adds two independent relationships, two independent equations, to complete the system and allow us to solve for the four unknowns.

Let me begin the exposition of the models with a brief summary of my understanding of neoclassical theory. Neoclassical theory is not, in my judgment, fundamentally marginalist. Rather, the essence of neoclassical theory lies in its appeal to household utility maximisation and price clearing to close the model. The real wage is assumed to clear the labour market in the same way the price mechanism is supposed to clear an isolated market in partial equilibrium analysis (for example, Marshall's fish market). The consequence is that the growth rate g must adjust to the rate of growth of the labour force, the 'natural' rate n. This assumption allows us to solve equation (4) for C. Profit and wage rates must be such as to make households—assumed to maximise utility over future as well as present consumption—content to save just the amount of corn required for growth at the rate n. Observe that in the neoclassical closure, growth and consumption are 'prior' to distribution—not in a temporal sense, but in the sense that distribution adjusts to an exogenously given growth rate. If utility functions change, *only* the distribution of income is affected. If the natural rate of growth changes, *all* the equilibrium values are affected.

Neo-Marxian and neo-Keynesian theories take a different view of both labour markets and capital accumulation. Let me begin with the saving function since this aspect of the two theories is the same. Saving propensities are assumed to be a matter fundamentally of class—an assumption that goes back to Adam Smith and David Ricardo. I shall deal with a relatively simple version of the classical saving hypothesis: capitalists will be assumed to save a fixed fraction s_c of their income, whereas workers will be assumed to save nothing.
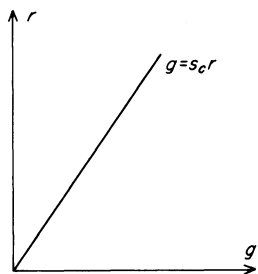
Fig. 1. *A classical saving function*

I hasten to point out that nothing essential hinges on the assumption that workers do not save. At the price of complicating the dynamics of the models, we could incorporate the arguments of Nicholas Kaldor (1956, 1966) and Luigi Pasinetti (1962) in this respect. But for present purposes, the simpler assumptions will do.

The classical saving hypothesis provides us with one of the two equations needed to close the model. If workers consume all their wages and capitalists consume a fraction $(1-s_c)$ of net profits, then consumption per worker is given by the equation

$$C = \frac{W}{P} + (1-s_c)r\,\frac{a_1}{a_0}. \tag{7}$$

Substituting into equation (4) and subtracting equation (4) from equation (6), we have

$$g = s_c r \tag{8}$$

presumably a familiar formula in these precincts.

Equation (8) is an important part of my story, so it is worth taking a moment to understand its limitations. Equation (8) is neither a theory of growth nor a theory of profit: every point on the line in Fig. 1 satisfies equation (8), so that equation (8) alone determines neither profit nor growth rate.

We need a second relationship to remove the indeterminacy, and here Marx and Keynes part company.[1] In neo-Marxian theory, labour is a 'produced' commodity whose cost of production determines the real wage. I prefer the term 'conventional' wage to the more usual term 'subsistence' wage for two reasons. First, despite the importance accorded not only by Marx but by Smith and Ricardo to history and culture in determining the level of subsistence, this term still suggests—misleadingly—a biologically determined level of existence bordering on malnutrition or even on starvation. Second, the term conventional wage has two different connotations, both relevant to the determination of the real wage: one is the idea of custom, the other the idea of an agreement, accord, or contract.

Central to both senses of the word 'convention' are community standards, on which the classical economists, starting with Smith, placed great weight. Of course, community standards are partially dependent on class power. In the eighteenth and nineteenth centuries, English workers and capitalists fought over whether the working-class standard of living should include the white bread that had for centuries been a distinguishing feature of a non-working-class diet, or whether English workers' living standards would be based on the oatmeal of the Scots or the potato of the Irish.

In the twentieth century, the issue has shifted from diet to whether workers would own

[1]Basic references for the neo-Marxian model begin with Marx (1865, 1867) and Luxemburg (1913). Morishima (1973) provides a formal model.
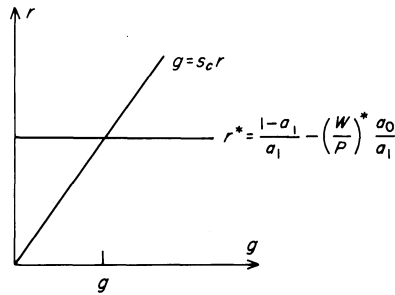
Fig. 2. *Neo-Marxian Equilibrium*

houses, cars, television sets, video cassette recorders, and the like. In the twenty-first cen-
tury, the issue may become one of second homes or winter holidays that now are largely
upper-class prerogatives.

I have said that standards depend in part on class power. What then determines class
power? It is perhaps inevitable that the power of the working class is bound up with trade
union militancy—inevitable but unfortunate. First, a militant union is not necessarily a
powerful one. Power may reside in being able to speak softly by virtue of a big stick.
Militancy can be a substitute for power as well as its expression.

More important, too much can be made of unions altogether. Informal shop-floor net-
works exist whether or not a plant is unionised. Working class communities have more
or less political power according to aspects of their structure and cohesion that go well
beyond trade unions. And if class power affects prevailing standards of social justice and
equity, the relationship is surely reciprocal: these standards have an important impact on
class power.

I should mention that the definition of the conventional wage in terms of a *rate* rather
than a *share* makes sense only in the absence of technological change that enlarges the pie
to be bargained over. But, once again, for present purposes, the simpler assumption will
do.

The conventional wage closes the neo-Marxian model, as Fig. 2 shows. With the conven-
tional wage equal to $(W/P)^\star$, we can solve equation (6) for the profit rate:

$$r^\star = \frac{1-a_1}{a_1} - (\frac{W}{P})^\star \frac{a_0}{a_1}. \tag{9}$$

The rate of growth follows directly from equation (8).

Several observations are in order here. First, in contrast with causality in the neoclassical
model, distribution is here prior to resource allocation: change the conventional wage and
both the distribution of income and the growth rate change; change the propensity to save
and *only* the rate of growth changes.

Second, despite the absence of production coefficients in the saving equation, the rate
of growth as well as the distribution of income are very much dependent on these coef-
ficients since they play an important role in equations (4) and (9). These coefficients are
not however purely technological, as in the neoclassical model: Marxians attach a great
deal of importance to the role of the institutional structure of the production process in
determining a_0 and a_1. Differences between Japanese and British labour : output and
capital : output ratios are as much a matter of differences in the social relations of
production as of differences in the development of the forces of production.

Finally, because we shall need these results later, let us look briefly at the non steady-state properties of the model. If the balance of class power is assumed to be constant, then temporary departures of the real wage from $(W/P)^*$ may be assumed to be self-correcting. Formally, wage adjustment is described by a difference equation reflecting 'real-wage resistance':

$$\Delta(\frac{W}{P}) = -\theta[(\frac{W}{P})_{-1} - (\frac{W}{P})^*].\tag{10}$$

If equation (8) holds whether or not the system is in equilibrium, stability requires only that the inequality $0 < \theta < 2$ holds in equation (10).

It may be thought at the very least peculiar to argue for a stable equilibrium in a neo-Marxian model, given that Marx's purpose was to discover the internal contradictions that would finally undo capitalism altogether. The reason for this result is that the business cycle—the mechanism through which instability reveals itself in Marxian theory—plays no role in the present model. This absence tells us something about the Marxian approach itself—I would reiterate that there is not in my judgment any very satisfying Marxian theory of the short run—but it tells us even more about the limitations of the enterprise I have engaged you in.

Nevertheless, the model captures several Marxian insights about capitalist economic development. The most important of them is the absence of a role for the natural rate of growth n in the neo-Marxian model. The equilibrium growth rate g^* in Fig. 2 can be higher or lower than n. Only by chance will $g^* = n$.

What assumptions permit long-run economic growth to escape the constraint of population growth? Technical change would be one way out, but I have already ruled that out, and in any case exogenous technical change (at least if it is 'labour augmenting') simply changes the natural rate of growth.

The independence of g^* from n is the result of two assumptions. First, the neo-Marxian model focuses on the growth of a specific sector—the capitalist sector—rather than on the economy as a whole. If the population as a whole is growing at the rate n, then the capitalist sector will expand or contract, relatively, according to whether g^* is greater or less than n. But eventually, it may be argued, if $g^* > n$, the population constraint will become binding. That is perhaps so, but here is where the second difference from neoclassical theory comes in: the eventuality that natural reproduction limits the growth of capitalism is a longer 'long run' than is meaningful for present purposes, however appropriate it might be for neoclassical purposes. I should perhaps have stressed at the outset that a steady-growth equilibrium is for me simply an analytic device whose purpose is to permit one to abstract from economic fluctuations, and for this purpose a long run of 15 to 20 years, perhaps a generation, will do. Over such a period, there is no reason why the capitalist sector cannot grow at the expense of other modes of production, especially when it is realised that the capitalist sector can draw on foreign as well as domestic labour resources.

Marxians will recognise that I am introducing the 'reserve army' as the mechanism for divorcing g^* from n. When $g^* > n$, the reserve army makes up the difference. When $g^* < n$, the capitalist sector itself becomes a source of recruits for the reserve army.

Although not the case in the recent past, the historical tendency of capitalism has been to expand at a faster rate than natural reproduction would permit. The result is that the capitalist sector has had to draw on a succession of reserve armies. In the United States, for example, immigration was the main source of reserve labour until World War I temporarily, and post-war legislation permanently, reduced the flow of immigrants to a trickle.
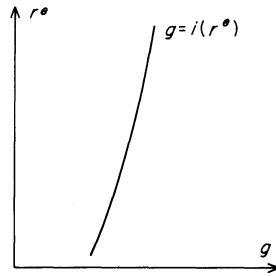
Fig. 3. *Neo-Keynesian investment demand*

At that point, domestic agriculture became the main reserve army. Whereas in 1920 the farm population was 30% of the total, in 1950 it had fallen to 15% of a much larger total. By 1970, the farm population had fallen to 5%. Since World War II, the reserve army has been recruited from the kitchen: women have been increasingly drawn into the labour force. In 1950, only one-third of women above 16 years of age were in the labour force, but now the figure is close to a half.

In Europe the pattern has been somewhat different. For the most part, immigration has followed rather than preceded the shrinking of the farm sector. Indeed the post World War II boom relied heavily on migration from the periphery—the 'guest workers' who figured so prominently in European expansion until the post-war boom petered out.

The reserve army is thus not a static concept, not a number of bodies to be counted, but a dynamic concept, a force which expands (or contracts) to fit the needs of capitalist growth. The point is that in the long run, labour supply is not given, not a constraint. It is endogenous. Students of economic development will recognise the reserve army as an application of W. Arthur Lewis's unlimited supplies of labour (1954) to the capitalist economies of Western Europe, North America and Japan. In the neo-Marxian model, unlimited supplies of labour are not a special feature of poor, densely populated countries, but the general characteristic of capitalist growth.

Let us turn now to the neo-Keynesian model.[1] It goes without saying that the notion that wages are fixed in real terms is totally out of place in a neo-Keynesian approach. In place of the conventional wage, the neo-Keynesian model is closed by investment demand. A neo-Keynesian investment-demand function

$$g = i(r^e) \tag{11}$$

is pictured in Fig. 3: investment demand per unit of capital is an increasing function of the expected rate of profit r^e. This schedule is, *mutatis mutandis*, the long-run counterpart of the short-run marginal efficiency of capital schedule (more accurately, marginal efficiency of *investment* schedule) of *The General Theory*. The most important difference between the two schedules is that long-run investment demand is a function of the *prospective* rate of profit, whereas short-run Keynesian investment demand is conventionally represented as a function of the rate of *interest*, ρ, as in Fig. 4.

There is no inconsistency between the two diagrams; they simply emphasise different aspects of the investment decision. In Fig. 4, the prospective rate of profit is held constant and the diagram shows how much investment would be forthcoming at different levels of the interest rate, conceived of as a cost of capital. In Fig. 3, the cost of capital is held

[1] The neo-Keynesian model derives from Keynes (1930, 1936) and Kalecki (1971). Of all their followers, Robinson (1962) is closest to the neo-Keynesian model elaborated in these lectures.
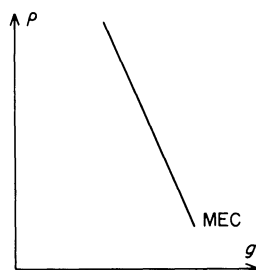
Fig. 4. *Keynesian investment demand: the marginal efficiency of capital schedule*

constant, and the diagram shows how much investment would be forthcoming as the prospective rate of profit varies. An increase in the prospective profit rate shifts the entire schedule in Fig. 4 outward; an increase in the interest rate shifts the schedule in Fig. 3 inward.

To fix the difference between the two diagrams, recall the net present value formula for a project that yields a constant return in perpetuity. In this case, the net present value (NPV) is equal to the ratio of the annual return to the interest rate:

$$\mathrm{NPV} = \frac{r^e}{\rho}. \tag{12}$$

Evidently, any given project becomes more attractive—NPV increases—as r^e increases and as ρ decreases.

Both schedules are continuous functions because there is a distribution of investors, each of whom sees the world somewhat differently. The prospective profit rate is, as it were, the first moment of a distribution of outcomes: investors may differ with respect both to their assessment of potential risks and in their attitudes towards risk. A progressively larger number of investors are willing to undertake a progressively larger amount of investment as the spread between the prospective return and the cost of capital widens.

'Animal spirits' were invoked by Keynes (1936) to determine the position of the short-run schedule in Fig. 4. But this terminology is misleading in talking about Fig. 3, for a shift in animal spirits can mean both a move *along* the long-run investment-demand schedule and a shift *of* the entire schedule. If, for instance, the prospective wage rate falls, but nothing else changes, then the prospective profit rate will rise, and investment demand will climb up the existing schedule. If investors become less risk averse, or if businessmen unearth a new set of projects, then the entire investment–demand function will shift to the right.

While using the formal language of net present value calculations, Keynes himself went to great lengths in *The General Theory* (see also Keynes 1937A) to argue that prospective profit was rooted in nothing more substantial than the psychology of the business community: the prospective profit rate, because it concerns the future, exists in the last instance in the entrepreneur's mind. However, in long-run equilibrium, the future must resemble the past, so prospective and current rates of profit coincide. With $r^e = r$, we can write equation (11) as

$$g = i(r). \tag{13}$$

Neo-Keynesians are thus in a limited sense believers in rational expectations.

There are of course two important differences between the neo-Keynesian and neo-classical versions of rational expectations. In the first place, neo-Keynesians emphasise that
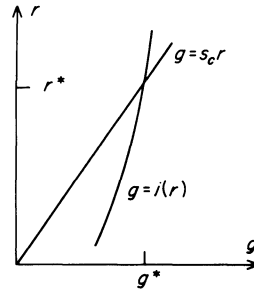
Fig. 5. *Neo-Keynesian equilibrium*

rational expectations are a characteristic of long-run equilibrium, not of every transitory short-period situation, as the neoclassical doctrine holds. Second, neoclassical rational expectations are—at least as far as the growth rate is concerned—presumptively rooted in an objective future, a future describable in terms of an objective probability distribution that exists independently of people's expectations; in the neo-Keynesian model, expectations themselves shape future growth. For Keynes this was the central point. 'There is', he wrote on one occasion, 'a subtle reason drawn from economic analysis why . . . faith may work. For if we consistently act on the optimistic hypothesis, this hypothesis will tend to be realised; whilst by acting on the pessimistic hypothesis, we can keep ourselves for ever in the pit of want.' This by the way, is taken not from *The General Theory* but from the preface to the *Essays in Persuasion*, dated 8 November 1931.

   Fig. 5 shows how the investment function, equation (13), and the saving function, equation (8), jointly determine the long-run neo-Keynesian equilibrium. Once g^* and r^* are determined, consumption per worker C^* and the real wage $(W/P)^*$ can be determined from equations (4) and (6). As in the neo-Marxian model, g^* is not necessarily equal to n; Joan Robinson (1962) in particular emphasised the fortuitous conjunction of events necessary for a 'golden age', in which $g^* = n$. In general, however, the neo-Keynesian rationale for divorcing g^* from n seems to me less persuasive than the neo-Marxian, and less general: instead of $g^* \neq n$, the neo-Keynesian assumption is $g^* \leq n$.

   Growth in the neoclassical model, was observed to be 'prior' to distribution; this causal ordering is reversed in the neo-Marxian model. In the neo-Keynesian model, by contrast, growth and distribution are simultaneously determined: what affects one must affect the other.

   It will surprise no one that neo-Keynesian theory, like neo-Marxian theory, rejects the neoclassical idea that biology (in the form of the natural growth rate) and utility play important roles in determining the rate of profit. More surprisingly, neo-Keynesian theory rejects the common element in neoclassical and neo-Marxian theories of profit—namely, technology. By contrast, technology does enter into the determination of wages, as a glance at equation (6) indicates. For given r^*, $(W/P)^*$ depends on the labour and capital coefficients, a_0 and a_1. In this respect the neo-Marxian and neo-Keynesian models are mirror images of one another: in the first, profit is the corn left over after workers' conventional wage requirements are met; in the second the wage rate is determined by the amount of corn left over after capitalists' investment appetites have been satisfied.

   The residual determination of real wages is a well-known feature of the neo-Keynesian model: the wage rate is fixed in money terms independently of the price level, and the price level adjusts to clear the corn market. But such a description of the institutional

arrangements is incomplete: a fixed money wage does not in itself explain how capitalists are able to stake the first claim on output.

To answer this question—central in my judgment to an appreciation of neo-Keynesian theory—it is necessary to examine the operation of the neo-Keynesian system out of equilibrium. Assume that in the short run capitalists are myopic: they expect the last period's rate of profit and price level to persist into the future. This assumption, I should make clear, is not made to facilitate the approach to equilibrium; on the contrary, neo-classical rational expectations would do better for that purpose. It is to show rather that the story works *even when* capitalists are myopic.

Suppose that the entire harvest is heaped up in front of the 'Corn Exchange Bank', and that a depreciation allowance—seed adequate to maintain production at its previous level—is set aside. Meanwhile workers are paid a money wage $\overline{W}$ and capitalists borrow money to finance investment plans laid in terms of the previous period's price level and profit rate. At this point the Corn Exchange Bank closes and the market for corn opens: the price of corn is determined by demand and supply.

There are three components of demand: capitalists' investment expenditure, workers' consumption expenditure, and capitalists' consumption expenditure. Investment expenditure per bushel of corn output is $P_{-1}i(r_{-1})a_1$; workers' consumption expenditure per bushel of corn output is $\overline{W}a_0$; finally, capitalists' consumption expenditure is a function of the (as yet) unknown rate of profit and price level: $P(1-s_c)ra_1$. Aggregate expenditure per unit of corn output, PX^d, is the sum of the three components,

$$PX^d = P_{-1}i(r_{-1})a_1 + \overline{W}a_0 + P(1-s_c)ra_1, \tag{14}$$

and aggregate demand in physical terms is

$$X^d = \frac{P_{-1}i(r_{-1})a_1 + \overline{W}a_0 + P(1-s_c)ra_1}{P}. \tag{15}$$

Net aggregate supply per unit of corn output is

$$X^s = 1 - a_1, \tag{16}$$

since we have already deducted replacement requirements of seed corn.

Equating aggregate demand and aggregate supply, we have $X^d = X^s$. Taking note of the price equation, equation (6), we can simplify this equation to read

$$P_{-1}i(r_{-1}) = Ps_c r \tag{17}$$

or

$$\frac{P_{-1}i(r_{-1})}{P} = s_c r. \tag{18}$$

equations (17) and (18) say the same thing, the first in money terms, the second in real terms: short-run equilibrium requires investment demand to equal the supply of saving.

The price equation, equation (6), gives the price profit rate as an increasing function of the price level,

$$r = \frac{1-a_1}{a_1} - \frac{\overline{W}}{P}\frac{a_0}{a_1} \tag{19}$$

which eliminates the remaining degree of freedom in determining P and r.

Real investment demand, on the left-hand side of equation (18) is a decreasing function
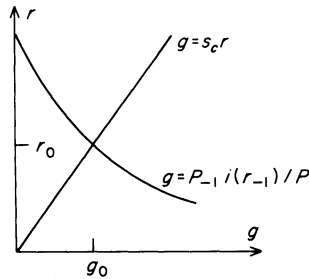
Fig. 6. *Neo-Keynesian short-period equilibrium*

of the rate of profit while saving, on the right-hand side, is of course an increasing function of r. Both equations are pictured in Fig. 6, and short-run equilibrium is given by their interaction at $<r_0, g_0>$. Observe that the growth rate is given by the common values of short-run investment demand and saving, $g_0 = P_{-1}i(r_{-1})/P = s_c r_0$; by contrast, long-run investment demand $i(r)$ will exceed or fall short of the current rate of growth according to whether the price level is rising or falling.

Despite the resemblance of Fig. 6 to the familiar Marshallian 'cross', the mechanism for achieving short-period equilibrium differs fundamentally from the neoclassical mechanism. In the neoclassical model, the variable on the vertical axis is a rate of interest, the price or cost of capital services which adjusts desired saving through income and substitution effects and at the same time adjusts investment demand by making capital cheaper or more expensive. In the present model, by contrast, r is a rate of profit or return to capital, which acts through the general price level (*à la* Kaldor, 1956, 1957) to shift control of resources between capitalists and workers, that is, between high and low propensity savers, and acts on investment demand, also through the price level, to vary the amount of capital goods that can be purchased with the money available, namely $P_{-1}i(r_{-1})/P$.[1]

At this point, capitalists appear to have no priority in their claim on output. On the contrary: capitalists and workers bid in a unified market and the price of corn reflects the pressure of their joint demand on supply. Moreover, capitalists as well as workers are frustrated. Not only do real wages fall as the price level rises, but capitalists are unable to realise their investment intentions.

However in the long run, assuming the sequence of short-run equilibria converges—which will be the case provided $i'(r) < s_c$, which is to say provided investment demand is less responsive than saving to changes in the rate of profit—the price level and profit rate approach stationary values: $P \to P^*$ and $r \to r^*$. Thus the difference between successive price levels and profit rates vanishes, and with it the frustration of capitalists' investment plans. In the long run the frustration is borne entirely by the workers, whose real wage is determined, given the technology, by capitalists' investment and saving propensities. In long-run equilibrium, capitalists' investment intentions are completely realised.

Thus the metaphor of the 'widow's cruse' (Keynes 1930) that magically refills as it empties: capitalists, in long-run equilibrium, 'get what they spend', while workers 'spend what

[1] Observe that the assumption of fixed coefficients precludes capacity utilisation from bearing any of the adjustment burden, on the face of it a result at odds with the assertion of a Keynesian pedigree for the present model. The distortion occasioned by fixed coefficients is however less serious than it might appear. In the long run, which is the focus of these lectures, the results are robust to the specification of production, even if the short-run mechanism is different when the rate of capacity utilisation can vary. The key assumption is that the rate of capacity utilisation varies on the transition path between steady-growth configurations, but not across steady-growth states.

they get'. As a class, if not individually, capitalists' pockets refill with profit as they are emptied by investment expenditures.

I have indicated that the assumption that wages are fixed in money terms is one ingredient of the magic. Now we can see what the other ingredient is: the implicit assumption—which my story about the Corn Exchange Bank is designed to highlight—that capitalists have a monopoly of bank credit. Capitalists borrow to finance investment, but workers do not borrow to finance consumption.

This may appear to be unrealistic. Workers do borrow and, in the United States at least, the average annual addition to household debt has been of the same order of magnitude as the addition to business debt. There are however important differences between household and business borrowing. First, business borrowing relative to corporate profit is much higher than household borrowing relative to disposable income. In part it is a question of collateral. Whatever the merits of regarding a worker's skills as 'human capital', it has been a long time since individuals could pledge their bodies as security for loans. Workers' borrowing is pretty much limited to house mortgages and hire-purchase loans to finance consumer durables.

There is a second difference that transcends the issue of collateral. Whereas workers can borrow only on their assets, capitalists borrow on their prospects as well as their assets: their collateral frequently falls short of their liabilities. In practice, the availability of credit reflects the same psychological variables that determine investment demand.

For both quantitative and qualitative reasons, therefore, it seems to me reasonable to ignore consumer borrowing and to attribute to capitalists a monopoly of credit, as the neo-Keynesian model does. Surely there can be little room for dispute whether modern credit-market institutions are the historical product of the needs of capitalists or of the needs of consumers.

I dwell on banking and credit because of the central role these institutions play in Keynesian theory in general and in the neo-Keynesian model in particular. Credit advanced by the banking system gives entrepreneurs command over goods and services and resolves the problem of how, starting from a position of equality between investment and saving (desired as well as realised), an increase in desired investment can be translated into effective demand without a corresponding increase in desired saving. In terms of Fig. 5, the question is how an outward shift in the investment function disturbs an equilibrium like $<r^*, g^*>$ if the propensity to save does not change simultaneously.[1] The muddled debate in the *Economic Journal* in 1937 and 1938 over the meaning of saving and investment is generally recognised to have produced more heat than light, but it did lead Keynes to appreciate that saving out of the income generated by investment expenditure does not answer the question. He introduced a new concept, 'finance' (Keynes, 1937B, 1937C), which is precisely the purchasing power created by banks to bridge the gap between investment and saving intentions and allow the process of income generation to get started. The full force of Keynes's concession was obscured by his insistence on assimilating finance to the demand for money. At issue is not the composition of the demand for money but the institutional framework of twentieth century capitalism (which Keynes took for

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[1] Dishoarding of cash balances—an increase in the velocity of the existing money supply—is an alternative to the creation of purchasing power through credit, but this should be recognised as an even less realistic story than my Corn Exchange Bank tale, which was designed to highlight the role of the banking system. Note the asymmetry: there is no problem when equilibrium is disturbed by an increase in desired saving because it is immaterial whether excess desired saving flows temporarily into cash balances or into bank accounts.

granted, but orthodox theory never comprehended) that allows purchasing power to be conjured up out of nothing for investment purposes.

In point of fact, one simply cannot tell a plausible story of how investment demand in excess of current saving becomes *effective* demand without bringing bank credit or its equivalent (for example, suppliers' credits)—credit accompanied by the creation of purchasing power—into the picture. It is significant, I think, that Joseph Schumpeter, whose birth centennial we also celebrate this year, found it necessary to devote a whole chapter of *The Theory of Economic Development* to bank credit. For Schumpeter, the ability of banks to create purchasing power was, outside the circular flow, the essential lubricant of investment.

Finance and saving continue to be muddled. Some of the present confusion about 'crowding out' almost certainly stems from a failure to distinguish the problem of finance from the problem of generating sufficient saving to match investment demand. To the extent the banking system fails to accommodate new investment demand, this demand will fail to become effective demand and hence will have no impact on output even in the presence of massive underutilisation of capacity. If, for instance, the banking system lacks reserves because it is stuffed to the gills with government bonds which the Central Bank refuses to monetise, *financial* crowding out may take place even if there is sufficient unutilised capacity to preclude *real* crowding out.

It is the implicit link between bank credit and investment demand as much as the rigidity of money wages that makes Keynesian (and neo-Keynesian) theory distinctive. In effect, the capitalist—unlike any other agent in the system—operates without a budget constraint. His investment budget is made up of purchasing power newly created to accommodate his purposes, purposes that depend only partly on any objective data of the system. It is said of the present Aga Khan, a fellow undergraduate at Harvard during the 1950s, that after sitting quietly through a lecture on indifference curves, household utility maximisation and the like, he put a question to the lecturer: 'Sir', he is supposed to have asked, 'that was all very interesting. But how does it work *without* the budget constraint?'

There are very few *consumers* for whom the budget constraint does not matter, but it is characteristic of capitalist *investment* that the entrepreneur is not constrained by an objectively given budget, at least not in an economy with a developed banking system. It is not my business to tell neoclassical economists theirs, but I would suggest that the existence of a class of agents who have no budget constraint offers a far more promising avenue for incorporating the fundamental Keynesian insight about the nature of capitalism into general equilibrium models than does the introduction of quantity constraints and other currently fashionable approaches.

This is not to suggest that there are no constraints whatsoever on investment: the industrial capitalist depends not only on his own psychology but on the willingness of financial capitalists to accommodate him. These constraints are no less real, but are of a very different kind from budget constraints determined solely by market values of endowments, on which neoclassical theory turns. The neo-Keynesian constraints are equally to be distinguished from class conflict, which constrains capitalists in neo-Marxian theory.

A stock-taking is in order. We have two models, each of which offers important insights into the functioning of a capitalist economy. By the same token, each leaves out something important. The neo-Keynesian model in my judgment goes awry in assuming wages to be fixed in money terms. However suitable an assumption for the short run—and even that is controversial—it can only be justified in the long run by assuming a supine working class. I have often suspected neo-Keynesians—despite their commitment to the jargon of class,
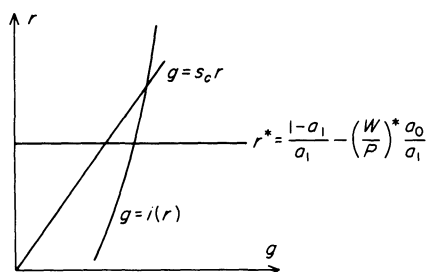
Fig. 7. *Overdetermination of equilibrium*

class struggle, and even class war—of substituting a kind of functionalism for class *struggle*. In the neo-Keynesian view, class conflict is long since over—the General Strike of 1926 was perhaps the last battle. In brief, Keynesian theory, as it has developed over the last half century, describes an economy without workers: read the typical principles text and you will find consumers, investors, and a government—but no workers.

As for the neo-Marxian model, it seems to me singularly anachronistic in its omission of effective demand as an independent variable. The great and enduring contribution of Keynes (1930, 1936) and Kalecki (1971), along with their followers, Harrod (1939, 1948), Kaldor (1956, 1957, 1961), and Joan Robinson (1956, 1962), was their insistence on an active role for investment demand, and no serious post-Keynesian study of long-run growth and distribution can ignore this contribution.

But how are we to accommodate all these considerations—investment demand, the conventional wage, and the supply of saving—in one model? Evidently, if we simply superimpose all these relationships into a single model, we have three equations in two unknowns—in short, an overdetermined system—as Fig. 7 shows. There is more than one way out, but all the non-neoclassical solutions with which I am familiar have the drawback of partitioning outcomes into 'regimes' in which one or another of the three relationships of Fig. 7 plays no role. The challenge is to allow all three relationships jointly to determine equilibrium, without falling back to a neoclassical position. I will take up this challenge in the next lecture.

II

At the end of yesterday's lecture, I posed the problem of how to bring investment, saving, and conventional wages to bear on equilibrium without overdetermining the system. There is, as I suggested, more than one way out. In the first place, it should be acknowledged that the system represented in Fig. 7 poses no problem for the neoclassically inclined. Whatever doubts might exist about the efficacy of the price mechanism in harmonising investment demand and the supply of saving in the short run, no neoclassical economist would hesitate to introduce an interest rate—the ρ of Fig. 4—as an argument of the long-run investment-demand function, and perhaps of the saving function as well. Adjustment of ρ would bring about long-run equality of saving and investment at the rate of profit corresponding to the conventional wage.

It would serve no purpose of mine to deny that the rate of interest exercises some influence on investment demand, and for the sake of argument I am even ready to allow that saving be sensitive to the interest rate. But it seems to me unrealistic—in the long run as well as in the short—to attribute to the rate of interest the equilibrating function

on which the neoclassical resolution of the overdetermination of Fig. 7 depends. It is to dramatise the inability of the interest rate to bear so heavy a weight that it is eliminated altogether from the neo-Marxian and neo-Keynesian analysis of growth, distribution, and inflation. Thus non-neoclassical solutions appeal to something other than the price mechanism.

Joan Robinson (1962) proposed the 'inflation barrier' to describe a solution based on the assumption that workers are able to defend real wages by successfully demanding higher wages as prices rise. As a result of 'real wage resistance', excess investment demand at the profit rate corresponding to the conventional wage—represented by $i(r^*) - s_c r^*$ in Fig. 7—does not increase profits, and capitalists' investment intentions are *permanently frustrated*.

The difficulty with Robinson's inflation barrier is that it throws the Keynesian baby— investment demand—out with the fixed money wage bathwater. The model becomes neo-Marxian in its real elements, and the only role left for investment demand is to influence the monetary side of the model, chronic inflation reflecting capitalists' chronic frustration.

Nicholas Kaldor's way out (1957) was a *succession* of regimes. Equilibrium is defined by the minimum profit rate of the solutions to the neo-Marxian system, in which saving and the conventional wage determine growth and distribution, and the neo-Keynesian system, in which saving and investment operate. Kaldor relied on technical change to reduce a_0 progressively over time, which increases the profit rate corresponding to a *fixed* conventional wage. At some point in time the profit rate defined by the neo-Marxian system ceases therefore to be the minimum; the neo-Marxian regime is superceded by the neo-Keynesian one.

There are important difficulties with Kaldor's argument. First, with technical change, the conventional wage is more appropriately formulated as a *share* than a *rate*. There is thus no reason why the profit rate associated with the conventional wage should rise over time. Kaldor's solution would require a_1 as well as a_0 to fall over time, but this runs up against one of the most fundamental of his 'stylised facts'.

One could easily argue for a reversal of Kaldor's order of neo-Marxian and neo-Keynesian regimes. Indeed, the central thesis of Lester Thurow's *Zero Sum Society* is, in my terminology, that the problems of contemporary capitalism stem from the metamorphosis of a neo-Keynesian regime into a neo-Marxian one! There is some historical support for this thesis. In the eighteenth century, Adam Smith took the rigidity of money wages in the face of a fluctuating price level as important evidence against the idea of a biologically determined subsistence, and Keynes appealed to a less distant past in defending the idea of money wage rigidity. There might thus be a certain plausibility in characterising the first two centuries of capitalism—say, 1740–1940—in terms of a neo-Keynesian regime.

But, as I have suggested earlier, rigid money wages are hardly a defensible hypothesis for the post-war period. In fact I know of no empirical study of the evolution of money wages in the post World War II period that does not accord an important explanatory role to changes in the price level. The wage *bargain* may be formulated in terms of money, but in the long run *bargaining* takes place in real terms.

Nevertheless, I do not find any characterisation in terms of successive regimes satisfactory. In my judgment, all three constituents of the two models play a role not just hypothetically, but actually, that is to say, concurrently.

Equilibrium can be characterised in terms of investment, saving, and conventional wages, but to do so we must abandon the static characterisation of equilibrium in favour of a dynamic one. Using the disequilibrium dynamics of the two systems, we can synthesise

Marxian and Keynesian insights into a just-determined model in which investment, saving, and the conventional wage jointly determine equilibrium. Equilibrium profit and growth rates are defined by equality between the rate of *wage* inflation and the rate of *price* inflation.

Let me begin the exposition of this model with the neo-Marxian wage-adjustment equation

$$\Delta(\frac{W}{P}) = -\theta[(\frac{W}{P})_{-1} - (\frac{W}{P})^\star]. \tag{10}$$

With the price level endogenous to the model, adjustment takes place in terms of money wages. The simplest modification of equation (10) is

$$w = -\theta[(\frac{W}{P})_{-1} - (\frac{W}{P})^\star] \tag{20}$$

where w is the rate of change of money wages,

$$w \equiv \frac{\Delta W}{W_{-1}}. \tag{21}$$

The short-run neo-Keynesian price-determination equation,

$$\frac{P_{-1}i(r_{-1})}{P} = s_c r, \tag{18}$$

can be solved directly for the rate of change of the price level

$$p = \frac{i(r_{-1}) - s_c r}{s_c r}, \tag{22}$$

where

$$p \equiv \frac{\Delta P}{P_{-1}} \tag{23}$$

The short-period equilibrium is determined entirely by neo-Keynesian mechanisms. But the succession of short-period equilibria does not follow a neo-Keynesian trajectory because the wage rate, fixed in the short run, changes from period to period. The condition of steady growth—a constant real wage and profit rate—is satisfied if the rates of wage and price inflation are equal, that is, if

$$w = p. \tag{24}$$

The long-run equilibrium is shown diagrammatically in Fig. 8, in which the first quadrant replicates Fig. 7 and the second quadrant represents wage and price inflation as functions of the rate of profit. The 'wage curve', labelled w, is defined by substitution from the price equation, equation (6), into equation (20). In the short run we have

$$w = -\theta[\frac{1}{a_0} - (1+r_{-1})\frac{a_1}{a_0} - (\frac{W}{P})^\star] = \theta(r_{-1} - r^\star)\frac{a_1}{a_0}, \tag{25}$$

which under conditions of steady growth, characterised by $r = r_{-1}$, becomes

$$w = -\theta[\frac{1}{a_0} - (1+r)\frac{a_1}{a_0} - (\frac{W}{P})^\star] = \theta(r - r^\star)\frac{a_1}{a_0}. \tag{26}$$
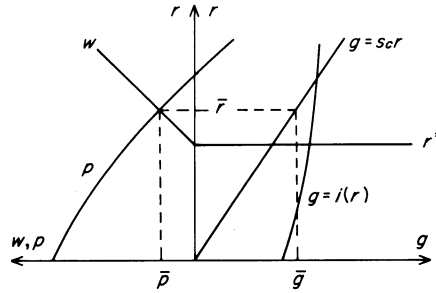
Fig. 8. *Growth, distribution, and inflation*

Similarly, price dynamics under steady growth are summarised in the 'price curve', labelled p, which is defined by substituting r for r_{-1} in equation (22)

$$p = \frac{i(r) - s_c r}{s_c r} .$$ (27)

The saving equation, $g = s_c r$—which says that saving intentions are always realised—completes the characterisation of long-run equilibrium. The steady-growth configuration—$<\bar{p}, \bar{r}, \bar{g}>$—is, as promised, a just-determined system.

The reserve army adjusts labour supply to labour demand. But even apart from the labour market, the equilibrium is not a conventional, supply = demand one. The inequality between investment demand and the supply of saving is a permanent feature of the model, not a transitory, disequilibrium phenomenon. So for that matter are both the departure of the equilibrium real wage ($\overline{W}/\overline{P}$) from the conventional wage (W/P)* and the existence of inflation permanent rather than transitory. Indeed equilibrium may be described in terms of a balance between the pressure of aggregate demand on aggregate supply and the pressure of workers on wages: inflation measures both the frustration of workers trying to maintain a conventional wage and the frustration of capitalists trying to carry out their investment intentions.

The existence of a long-run equilibrium does not of course guarantee convergence of the sequence of short-run equilibria. Convergence requires another assumption, namely that the price curve be less steep than the wage line, which is to say

$$\frac{dp}{dr} < \frac{dw}{dr} .$$ (28)

Evidently this assumption is satisfied in Fig. 8. Indeed Fig. 8 implicitly makes a stronger assumption, namely,

$$\frac{dp}{dr} < 0$$ (29)

at the long-run equilibrium.

It would be premature to claim any more for this model than that it is a good starting point for the study of a capitalist economy. It has the merit of directing attention to central features of capitalist dynamics: the interaction of investment demand, the supply of saving, and real-wage resistance.

There are many dimensions in which this model might be criticised. In the first place, the results hinge critically on the assumption that investment commitments are made in

advance, before the equilibrium price is known. This assumption did little harm in the pure neo-Keynesian model because there inflation (or deflation) was a transitory phenomenon. In long-run neo-Keynesian equilibrium $P=P_{-1}$; in the absence of equation (20), the system described by equation (22) converges to a steady-growth path despite the myopia of the capitalist class, and on the steady-growth path the price level is constant. By contrast, in the present model a changing price level is a permanent characteristic of long-run equilibrium as well as of transitory disequilibrium. In this context the assumption that investment commitments are made in advance raises serious problems. First, it might seem to contradict the assumption that the capitalist faces no budget constraint. Surely if he cannot revise his commitments in the light of information about the price level, he is financially constrained. But the constraint is of a different sort than the usual budget constraint. It is a constraint that exists in the short period alone, one that might be argued to reflect the problems of decision and implementation lags characteristic of large-scale organisations like the contemporary corporation. In effect the capitalist is assumed to be free to fix the level of investment expenditure *ex ante*, but not to be in a position to revise his expenditure plans once they are made, at least not until the next period. The Walrasian auctioneer is replaced by a neo-Keynesian croupier who after bets are made, but before the wheel comes to rest, announces '*les jeux sont faits; rien ne va plus*'.

There is a further problem. Why do capitalists never learn to anticipate price changes and incorporate this information into their *ex ante* investment planning? Once again, the assumption of myopia doesn't matter very much in the pure neo-Keynesian model, but myopic expectations well might make a difference in a model in which inflation (or deflation) is a permanent feature. Are the main results robust with respect to assumptions about expectations? In particular, what happens if we substitute rational expectations for myopic expectations?

It all depends on what one means by rational expectations. Evidently if we substitute P for P_{-1} in equation (22), the equilibrium condition becomes

$$i(r) = s_c r, \qquad (30)$$

and we are back in a neo-Keynesian world. The resulting model is in fact diametrically opposed to the Robinsonian inflation-barrier model. It is neo-Keynesian in its real elements and neo-Marxian in its monetary elements; growth and distribution are determined by investment and saving, inflation by the wage-adjustment equation.

But rational expectations do not necessarily mean that capitalists act on the basis of expected price, that is, on the basis of the mean of the probability distribution of prices. I have constructed an example—too complicated to develop here—in which capitalists act as if the future price level were known to lie between the current price level and the mean of the future price level. The key assumption is that capitalists are risk averse in the sense that, faced with uncertainty with respect to how much real investment a given level of expenditure will purchase, they prefer to end up with too little investment than too much. In this case the qualitative behaviour of the model is no different from the case we have analysed, with myopic price expectations.

The wage-adjustment equation is equally open to question. In criticising neo-Keynesian wage theory I argued that wage demands reflect price inflation, and the argument applies as well to equation (20). Formally, it is easy to modify the wage-adjustment mechanism to accommodate this criticism: we simply add a price-change term so that equation (20) becomes

$$w = \theta[(\frac{W}{P})_{-1} - (\frac{W}{P})^\star] + \gamma p_{-1}. \tag{31}$$

This modification does not change the model qualitatively provided $\gamma < 1$.

Observe that as $\gamma \to 1$, the model becomes neo-Marxian in its real parts. Robinson's inflation barrier operates with full force, and the influence of investment demand and the supply of saving is limited to determining the rate of inflation. But this is a limiting case that is not likely to obtain: it imputes leverage to workers that only the most powerful trade unions have been capable of. Unlike capitalists, for workers to anticipate inflation correctly does not necessarily imply the ability to translate their expectations into wage claims. My own estimates of a wage equation of the general form of equation (31)—the most important difference is that current and conventional wages were measured as shares rather than rates—suggest for the United States a γ of the order of $0\cdot6$. I should not like to be judged by St Peter on the accuracy of this estimate, but if it is the correct order of magnitude, then the inflation barrier operates but with only partial effectiveness.

Even with these modifications, the present model is a rudimentary one but, I believe, instructive—provided you are willing to suspend disbelief not only with respect to all that has been left out of the model—natural resources, variable proportions, market imperfections, international trade, and the like—but also with respect to the use of comparative statics to analyse changes that take place in time. With the requisite leap of faith, the model can, I think, shed useful light on such problems as the Phillips curve and the effects of fiscal policy on growth, distribution, and inflation.

First let me deal with the Phillips curve. I particularly want to focus attention on its 'now you see it, now you don't' quality, the bane of macroeconomics for a decade. (I should indicate that I use the term Phillips curve in the generalised sense of a *positive* relationship between growth of real output and employment and the overall rate of inflation. Having argued for the endogeneity of the labour supply, I could hardly do otherwise; in the strict sense of a negative relationship between rates of unemployment and wage inflation the Phillips curve is undefined.)

If we look at the steady-growth configuration corresponding to two different investment demand functions, as in Fig. 9, we see that higher demand is associated with higher growth and inflation rates, as well as with a shift in the distribution of income to profits. In other words, we observe the Phillips-curve pattern: real growth and inflation move together across steady states. Of course, the basis of the Phillips curve differs in the present model from its basis in the neoclassical model. It is not the unemployment rate that drives wages, but the level of aggregate demand that drives both wages and employment.
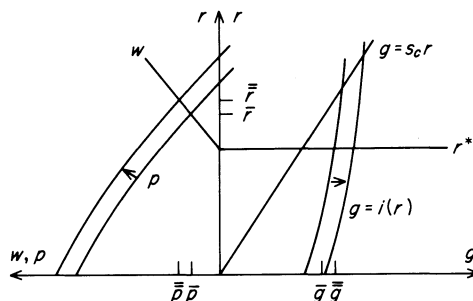

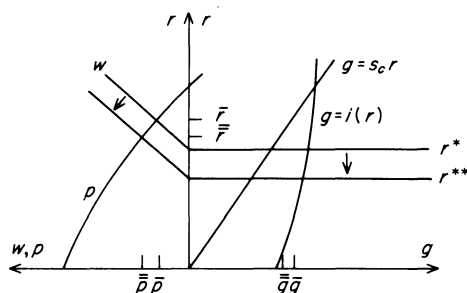Fig. 9. *Equilibria with two different investment-demand functions*

Fig. 10. *Equilibrium with two different conventional wages*

The 'now you don't see it' aspect of the Phillips curve derives from the fact that the correspondence between growth rates and inflation rates across steady states is not invariant with respect to the source of the disturbance. Put another way, the lack of invariance with respect to the source of the disturbance provides a plausible explanation of why the Phillips curve has shifted so dramatically that it no longer appears to exist in any meaningful sense. Consider what happens if the conventional wage increases. First, observe in Fig. 10 that a higher conventional wage implies a lower 'conventional' profit rate: $r^{**} < r^*$. Equilibrium wage and profit rates move with conventional rates, but by less in absolute amount (except in the limiting case when the price curve is parallel to the vertical axis). A change in the rate of profit changes the rate of growth in the same direction, just as in the previous exercise: so the rate of growth falls as the conventional wage rises. But as long as $dp/dr < 0$, an increase in the conventional wage and a decrease in the conventional profit ratio lead to an *increase* in the equilibrium rate of inflation, in contrast with the previous exercise, in which profits and inflation were positively correlated.

A change in the conventional wage thus produces the anti-Phillips curve characteristic of stagflation: growth and inflation rates move in opposite directions. A similar analysis holds—though you must take this on faith—if we introduce exogenous productivity growth or energy costs into the model, and ask what happens if the rate of productivity growth slows or the cost of energy rises. The effect of either of these parametric changes is the same as an increase in the conventional wage: the wage curve moves downward, and growth and profits move in the opposite direction from inflation. Once again we have an anti-Phillips curve.

I bring energy costs and productivity growth into the picture because both, along with the conventional wage, are implicated in the stagflation that took hold in earnest in the 1970s. The contrast with the 1950s and early 1960s when capitalist dynamics could be described in terms of shifts in aggregate demand, and hence in the price curve, is dramatic; since the late 1960s major shifts in the wage curve have caused the shift from a Phillips-curve to an anti-Phillips-curve regime.

I would hesitate to assign numerical weights to the three factors that have made the wage curve shift, but my impression is that in Europe increases in energy costs—the two oil shocks—and increases in the conventional wage—as a rule more gradual than the abrupt changes during the French May and the Italian Hot Autumn of 1968—have been more significant than the fall in productivity growth. By contrast, the decrease in the rate of productivity growth has been more important in the United States.[1]

[1] I use the term 'productivity growth' rather than the more common term 'technological change' because of the role of *non-technical* changes in determining productivity growth. We now understand much more about these non-technical determinants of productivity growth than we did a decade ago, and there is a significant literature
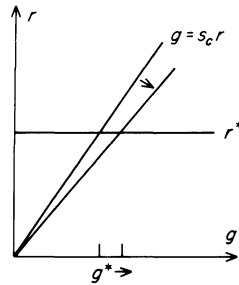
Fig. 11. *Neo-Marxian comparative statics: increase in s_c increases r^* and g^**

My intention here is not, I hasten to make clear, to give a detailed account of the structural changes in the determinants of growth, distribution, and inflation over the post World War II period. My purpose is rather to argue that a model synthesising Marxian and Keynesian insights into the nature of capitalism provides a useful framework for discussing those changes. To this end, let me turn to my second example, the effects of fiscal policy on growth, distribution and inflation.

Consider first taxes, specifically a tax on profits at the rate t. The after-tax profit rate becomes $(1-t)r$, and saving per unit of capital $s_c(1-t)r$. In the absence of government expenditures, taxes (tr per unit of capital) represent government saving; total saving, public and private, per unit of capital is therefore

$$g = s_c r + (1 + s_c) tr. \tag{32}$$

It is, of course, difficult to tax profits without affecting the profitability of investment and hence the investment demand function. This observation will be reflected in rewriting investment demand as a function of the after-tax rate of profit $(1-t)r$, $i((1-t)r)$, instead of as a function of the before-tax profit rate, $i(r)$.

Government expenditures present certain conceptual difficulties, but we can elide the most important complications by assuming first, that expenditures are non-productive: cruise missiles would do as an example except that they are counter-productive rather than non-productive. Second, expenditures are fixed in real terms (so many missiles) rather than in financial terms (so many pounds or dollars); third, that if expenditures exceed taxes, the deficit is monetised by the Central Bank. With these assumptions, government expenditure per unit of capital, which I shall denote e, presents a drain on saving, just as taxes increase saving. The relationship between growth and saving becomes

$$g = s_c r + (1 - s_c) tr - e. \tag{33}$$

Now we can ask, what are the effects of taxes and expenditures on equilibrium? What does a change in the surplus or deficit on the government account do to the rate of inflation,

Footnote 1 (cont.)

on the subject. I am being only slightly partial if within this literature I emphasise the microstudies of the cotton-textile industry by my colleague William Lazonick (1979, 1981, 1983). At the macro-level a recent study by Thomas Weisskopf, Samuel Bowles, and David Gordon (1983) makes a plausible case that a composite variable reflecting the reduction in the effectiveness of employer control accounts for a significant part of the slowdown in productivity growth in the United States since the late 1960s. These studies support a revisionist view, for which I confess great sympathy, that—far from simply being determined by the forces of production, as canonical Marxism argues—the social relations of production play at least as important a role in shaping the development of the productive forces.

the distribution of income, and the rate of growth? The answers to the first two questions are unambiguous, but the effects on growth present a sharp contrast to the certainties—diametrically opposed certainties, I should add—to which pure neo-Keynesian and neo-Marxian models, not to mention the neoclassical model, lead.

To facilitate the argument, let me run through a preliminary exercise that captures the issues at stake: what happens in a model without government if the propensity to save, s_c, rises? In the neo-Marxian model, an increase in s_c straightforwardly increases growth without having any effect on distribution: if capitalists plow back a larger percentage of profits into plant and equipment, the economy will simply grow at a more rapid rate, as Fig. 11 illustrates. By contrast, in the neo-Keynesian model an increase in s_c reduces the rate of growth and decreases the rate of profit. This result, counterintuitive to both neo-Marxians and neoclassicals, is the long-run version of the 'paradox of thrift'. Attempts to save a higher proportion of profits mean that less aggregate profit, and therefore a lower profit rate, is required to accommodate existing investment demand. But the lower profit rate induces lower investment demand and consequently a lower growth rate. The comparative statics are illustrated in Fig. 12.

The mathematics are straightforward. In both models, the effect of a change in the propensity to save on the rate of growth is given by the total derivative $dg*/ds_c$, according to the formula

$$\frac{dg^\star}{ds_c} = \frac{\partial g^\star}{\partial s_c} + \frac{\partial g^\star}{\partial r^\star} \frac{dr^\star}{ds_c}. \tag{34}$$

Differentiating the equilibrium condition given by equation (8)

$$g = s_c r \tag{8}$$

with respect to s_c and r^*, we have

$$\frac{\partial g^\star}{\partial s_c} = r^\star, \qquad \frac{\partial g^\star}{\partial r^\star} = s_c. \tag{35}$$

The derivative $dr*/ds_c$ is different in the two models. In the neo-Marxian model, equilibrium is determined jointly by equations (8) and (9),

$$r^\star = \frac{1-a_1}{a_1} - \left(\frac{W}{P}\right)^\star \frac{a_0}{a_1}. \tag{9}$$

Thus, we have

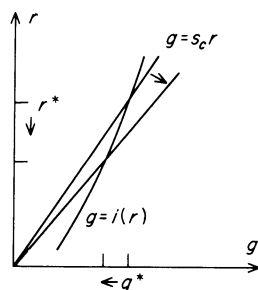$$\frac{dr^\star}{ds_c} = 0, \tag{36}$$

Fig. 12. *Neo-Keynesian comparative statics: increase in s_c decreases r^* and g^**
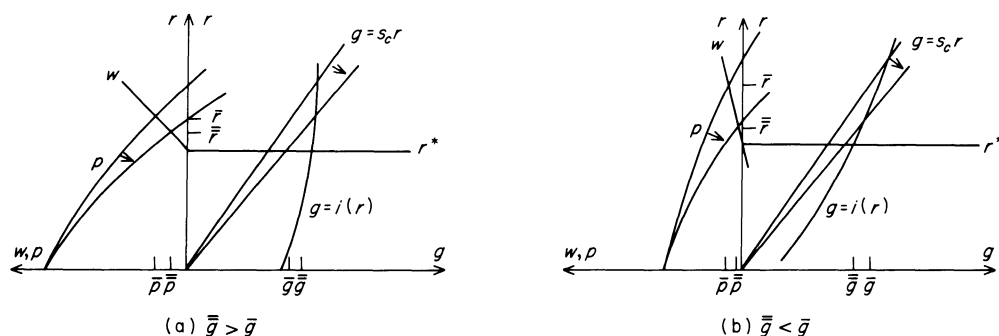
Fig. 13. *Comparative statics in the hybrid model: the ambiguous paradox of thrift*

and, substituting into equation (34),

$$\frac{dg^\star}{ds_c} = r^\star. \tag{37}$$

In the neo-Keynesian model, the second equilibrium condition is

$$g = i(r), \tag{13}$$

so

$$\frac{dr^\star}{ds_c} = \frac{r^\star}{i' - s_c}, \tag{38}$$

where

$$i' = \frac{di}{dr} \tag{39}$$

evaluated at $r^\star$. Substituting into equation (34), we obtain

$$\frac{dg^\star}{ds_c} = r^\star \frac{i'}{i' - s_c}, \tag{40}$$

the denominator of which is negative if $<r^\star, g^\star>$ is a stable equilibrium.

In the hybrid model, the effects on growth of a change in s_c are ambiguous because the model incorporates both Keynesian and Marxian considerations. As Figs 13(a) and (b) show, an increase in the saving propensity can increase or decrease the equilibrium rate of growth. By contrast, an increase in s_c unambiguously decreases both the rate of profit *and* the rate of inflation. Mathematically, we have

$$\frac{d\bar{g}}{ds_c} = \frac{\partial \bar{g}}{\partial s_c} + \frac{\partial \bar{g}}{\partial \bar{r}} \frac{d\bar{r}}{ds_c} \tag{41}$$

corresponding to equation (34). From equations (8) and (24) we obtain

$$\frac{d\bar{r}}{ds_c} = - \frac{\bar{r}i(\bar{r})/(s_c\bar{r})^2}{\theta \frac{a_1}{a_0} - [i's_c\bar{r} - s - _c i(\bar{r})]/(s_c\bar{r})^2}, \tag{42}$$

$$\frac{d\bar{g}}{ds_c} = \frac{\bar{r} \left(\theta \frac{a_1}{a_0} - \frac{i'}{s_c\bar{r}}\right)}{\theta \frac{a_1}{a_0} - [i's_c\bar{r} - s_c i(\bar{r})]/(s_c\bar{r})^2} \tag{43}$$

with i' evaluated at r. The denominator of equations (42) and (43) is once again sign definite—positive in this case—by virtue of stability:

$$\frac{dw}{dr} = \theta \frac{a_1}{a_0} \tag{44}$$

and

$$\frac{dp}{dr} = [i's_c r - s_c i(r)]/(s_c r)^2, \tag{45}$$

so

$$\frac{dw}{dr} - \frac{dp}{dr} = \theta \frac{a_1}{a_0} - [i's_c \bar{r} - s_c i(\bar{r})]/(s_c \bar{r})^2 \tag{46}$$

at $r = \bar{r}$. The numerator of equation (42) is also positive. Hence $d\bar{r}/ds_c < 0$. From equation (26) we have

$$\frac{d\bar{p}}{ds_c} = \theta \frac{a_1}{a_0} \frac{d\bar{r}}{ds_c}, \tag{47}$$

so that inflation moves in the same direction as the profit rate. But the numerator of equation (43) is of ambiguous sign: whether it will be positive or negative depends on the relative strengths of the responses of investment, saving, and wages to changes in the profit rate.

With this background it is easy to appreciate the ambiguities of fiscal policy; changes in tax rates or expenditures shift the saving function in a similar fashion to changes in the propensity to save. (The effect of taxes on investment demand is an inessential complication.) Figs 14(a) and (b) illustrate the effect of a debt-financed increase in the tax rate and Figs 15(a) and (b) the effect of a debt-financed increase in expenditures. In both cases, the effects on distribution and inflation are unambiguous, but the effects on growth are indeterminate without more knowledge about saving, investment, and wage demands.

In the special case, however, of a balanced government budget, the qualitative effects on growth do not depend on the shapes of these curves. Rewriting equation (33) as

$$g = s_c(1-t)r + tr - e, \tag{48}$$

it is easy to see that with $tr = e$ we have

$$g = s_c(1-t)r. \tag{49}$$

Defining r' as the after-tax profit rate, $r' = (1-t)r$, saving and investment behaviour are given by the equation $g = s_c r'$ and $g = i(r')$. Thus the price curve is described by the equation

$$p = \frac{i(r') - s_c r'}{s_c r'}. \tag{50}$$

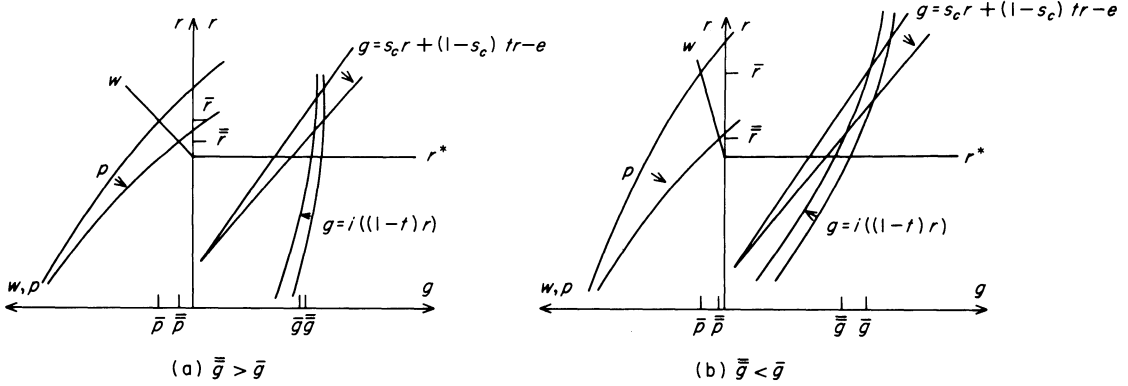The price equation (6) now gives the after-tax profit rate associated with the conventional wage, r^*, as
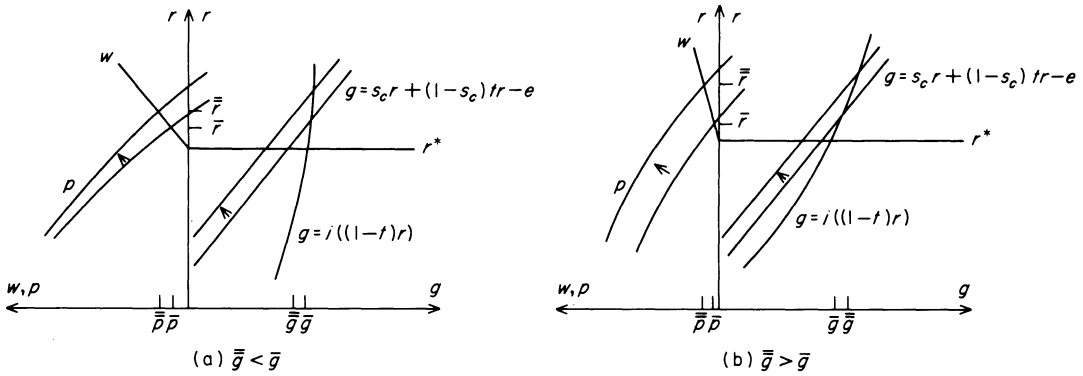
Fig. 14. *Comparative statics of a tax increase*

(a) $\bar{\bar{g}} > \bar{g}$　　　(b) $\bar{\bar{g}} < \bar{g}$

Fig. 15. *Comparative statics of an expenditure increase*

(a) $\bar{\bar{g}} < \bar{g}$　　　(b) $\bar{\bar{g}} > \bar{g}$

$$r'^* = (1-t)r^* = (1-t)\left[\frac{1-a_1}{a_1} - \left(\frac{W}{P}\right)^* \frac{a_0}{a_1}\right], \tag{51}$$

and in place of equation (26) the wage curve becomes

$$w = \frac{\theta}{1-t}(r' - r'^*). \tag{52}$$

Observe that an equal change in taxes and expenditures shifts only the conventional profit rate r'^* and the wage curve (both the slope and the intercept). The other schedules do not shift as long as r' rather than r is the independent variable. Hence in a pure neo-Marxian model a balanced-budget increase in public expenditure reduces the after-tax profit rate as well as the rate of growth, leaving the real wage unchanged. By contrast, in the pure neo-Keynesian model, a balanced-budget increase in the level of government expenditure leaves the after-tax profit rate and the rate of growth unaffected, the tax burden being shifted onto real wages *via* an increase in the price level. In the hybrid model, a balanced-budget increase in tr and e, as pictured in Fig. 16, decreases the growth rate as well as the after-tax rate of profit, and although this is not directly observable in Fig. 16, the real wage also decreases. Finally, the equilibrium rate of inflation increases. Observe that these shifts are independent of the shapes of the various functions, except for the assumption $dp/dr > 0$.
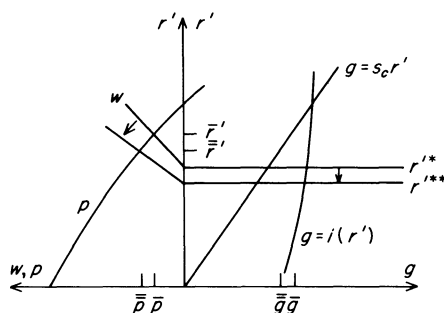
Fig. 16. *Comparative statics of a balanced-budget increase in taxes and expenditure*

Let me summarise. The hybrid model supports orthodox views of the separate effects of taxes and expenditures on inflation, but it also indicates why capitalists might be ambivalent about restrictive policies: raising taxes on profits or lowering government expenditures will lower before-tax as well as after-tax profits, increasing real wages into the bargain. As for the effects of fiscal policy on the rate of growth, the best one can do in general is to borrow Keynes's words on another occasion: 'we simply don't know'. Real 'crowding out' of private investment by debt-financed public expenditure *is* a possibility, if not the certainty it is in the neo-Marxian (or for that matter in the neoclassical) model, or the impossibility it is in the neo-Keynesian model. Only if investment demand is highly responsive to the rate of profit will an increase in government expenditure operate in neo-Keynesian fashion to 'crowd in' sufficient private investment demand to increase the rate of growth.

In contrast with the ambiguity that surrounds the separate effects of taxes and expenditures on growth, the joint effects of balanced-budget changes are largely independent of the shapes of the curves whose interaction determine equilibrium. In opposition to Keynesian intuition, an equal increase in taxes and expenditures decreases the equilibrium growth rate as well as both the after-tax profit rate and the real wage. Provided that $dp/dr' < 0$ at r', it will also increase the rate of inflation.

These exercises suggest—insofar as we dare draw policy inferences from simple models—why macroeconomic management has become increasingly difficult since the late sixties: macropolicy ordinarily operates on the price curve, and shifts in the wage curve have put the trade-off between growth and inflation into an unacceptable region of the diagram.[1] Monetary policy might be used to stimulate investment demand, but higher growth would entail a higher rate of inflation—the Phillips curve at work—and would almost certainly provoke the hostility of workers who focus on the erosion of real wages. Inflation could be combated through demand restraint—tight money—but this would reduce real growth. Orthodox counterinflationary fiscal measures—higher taxes and lower expenditures—would indeed moderate the growth of nominal wages and prices, but the effects on growth are uncertain. And the concomitant decrease in the profit rate and increase in the real wage rate would not be likely to sit well with the business community.

In this context, the attraction of a balanced-budget reduction in government expenditures and taxes must be obvious: inflation would moderate, the rate of growth would

[1]It is fair to ask why inflation has loomed so large in macro-policy discussion. But it would take me too far afield to respond to this question at any length. Let me say simply that there are both sensible and foolish reasons, and that the arguments about inflation generally mix up sense and foolishness in equal measure. In any case, I think we may take it as given that price stability and real growth must receive roughly equal weight in policy determination.

improve, and both the after-tax profit rate and the real wage rate would increase. However the problems of implementing balanced-budget reductions limit the effectiveness of this approach. Unless one is willing to take on the military budget, cutting government expenditures soon becomes an exercise in drawing blood from a turnip. The bottom line, given the position of the wage curve, is that conventional monetary and fiscal policies no longer provide a politically acceptable mix of growth and inflation.

Operating directly on the wage curve would appear more promising. But if we put energy costs and productivity growth aside, along with balanced-budget reductions in government expenditures, this leaves the conventional wage as the only policy lever. Reducing the conventional wage *will*—provided inflation responds negatively to higher profits—have the desired effects on both growth and inflation. The problem is how to contain conventional wages.

We are witnesses, in both the United States and the United Kingdom, to a grand experiment to this end. A central point of Ronald Reagan's policies—and I suspect the same is true for Margaret Thatcher's—is to maintain a sufficient level of unemployment to moderate real wage resistance. Such policies may work, but two economic factors militate against their success. First, in the short run, conventional wages respond much less, I would guess, to the *level* of unemployment than to its direction (and rate) of change. And if I am right about the long run, the labour supply is endogenous and will eventually adapt to demand conditions. In short, I cannot offer you much hope that Reaganomics or Thatcherism will succeed—not that you expected I would.

But the problem of achieving reasonable growth with reasonably stable prices will not go away, so the likely failure of present policies will not end the search for a solution. The solution to which more and more people on both sides of the political spectrum will, I believe, come is wage controls. But, where people vote, wage controls are feasible only if coupled with price controls. Let me be clear. I am here predicting, not prescribing. Nothing, of course, is sure in economics, but I regard wage–price controls as being as close to certain as can be in the business of predicting institutional change.

I should acknowledge at once the neoclassical objection to controls: permanent wage–price controls are incompatible with a market economy. The inevitable consequence of controls is more or less general imbalance between demands and supplies in goods markets: on the one hand gluts, and on the other shortages and black markets. In doing away with the market mechanism, wage-price controls will necessitate a complex system of physical planning, and more, physical controls—controls over the allocation of investment as well as over its aggregate level, controls over raw materials and intermediates, and perhaps even controls over labour mobility.

The neoclassicals do have a point: suppress the invisible hand, and you must replace it with a visible hand. But, contrary to neoclassical belief, this hardly clinches the case against controls. If the model I have outlined fairly captures the dynamics of a capitalist economy, wage–price controls will come because there is no politically acceptable alternative for combining growth and price stability, not as a result of a careful analysis of the benefits and the costs.

I indicated a moment ago that I was predicting rather than prescribing. But, as Hegel taught us, an understanding of necessity is the precondition of freedom. The real issue for the 1980s and 1990s is not *whether* we shall have controls, but what kind of controls we shall have.

Here some of you may wish to tune out, for I am now going, as I warned you I would, to speculate on the political consequences of economic arguments which—however convinc-

ing they might be to me—can hardly be considered as well established. However, two points might be made in defence of these speculations. First, although I would defend the economic arguments I have made as *sufficient* to pose the political choices I shall sketch, these arguments are hardly *necessary*. Quite different arguments lead to similar conclusions. Secondly—and here I recognise that many might disagree—it seems to me highly artificial to separate economic theory from politics. It is rather in the better tradition of our subject to recognise the intimate links between the two.

Utopias apart, there seem to me two alternatives, The Right will seek to impose a system of controls in which the interests of the corporations and their allies are paramount. They will try to persuade, as Charles Wilson, Chairman of the Board at General Motors and Dwight Eisenhower's Secretary of Defence, did a generation ago, that 'what's good for the United States is good for General Motors, and *vice versa*'. Especially *vice versa*. The forms of planning and policy making will be governmental, and there may be a token labour leader and an academic or two, but the substance will be *for* big business and *by* big business.

I won't say a corporatist programme cannot work. On the contrary, something very much like it has worked rather well in Japan for a fairly long period. But I will suggest that the corporatist programmes runs counter to our political institutions and culture—in particular, to our emphasis on equality, democracy, and participation. It may be impossible to put the corporatist vision into place without corresponding changes in our political institutions to fit the realities of corporate power.

A Left program, I would suggest, must respect the logic of the economic situation. Productivity does place limits on wages, and not just physical limits. As long as profitability remains the mainspring of investment, there are economic limits that constrain the wage share. Under capitalism, profits are indeed the geese that lay the golden eggs.

A Left program must therefore accept limitations on real wages. But the Left can at the same time demand something in return for wage restraint. One obvious demand is a gradual extension of worker participation in the private preserve of management prerogatives: the size and content of capital budgets, the product mix, the production process, hiring and firing, plant shutdowns, supervision and discipline—all are areas where workers can legitimately stake a claim for a real voice in decision making, especially in those industries likè automobiles and steel—these are American examples—where management incompetence has compounded the problem posed by exorbitant wage claims.

Let me be clear here on two points. First, I do not mean to suggest by emphasising worker participation either that it is the only conceivable *quid pro quo* for wage restraint, or that it is a complete programme in itself. But it does seem to me an appropriate *quid pro quo*, both tactically and strategically. However insufficient, worker participation is, I believe, a necessary part of any programme aiming at meaningful social and political change.

Second, I should be clearer on what I do and do not mean by 'participation'. I do not intend participation to mean representation on corporate boards; codetermination, in the German fashion, is not the model. I mean rather a participatory restructuring of the workplace from the bottom up: representation may facilitate this task, but *meaningful* representation can only follow it.

My enthusiasm for workplace democracy is coloured by my view, which the very visible minute hand of the clock prevents me from laying out in detail, that capitalist structures of production relations owe more to control than to efficiency (Marglin, 1974, 1979, 1982). These institutional structures exist not to maximise the size of the economic pie, but the

size of the boss's slice. There is no necessary reason to believe that greater worker partici-
pation will be at the expense of productivity and efficiency. Quite the contrary: much of
the energy that now routinely goes into struggle and conflict could be harnessed to
production.

The participatory model provides an alternative resolution to the tension between wages
and growth. Participation must mean that workers will have an important voice in determin-
ing how much of the enterprise's income will be used for investment, how much distributed
as current income. A programme like the Meidner Plan (Meidner, 1978) of the Swedish
trade-union organisation simply formalises the arrangement.

Some of you will object that, despite my protests to the contrary, all this has a decidedly
Utopian ring. How will workers be able to participate effectively in resolving questions
of accounting, marketing, choice of technique? What do workers have to say about
depreciation, innovation, or financial leverage? I do not underestimate the complexity of
these questions or the need for changes in the relationship between production and edu-
cation if participation is to be made effective. One of the many important lessons of the
Mondragon co-operatives in Spain—not all that participatory themselves—is the need to
integrate the educational system with the productive system, both in preparing the next
generation of workers and managers and in continuing education for the present generation.

When all is said and done, democracy is, as Winston Churchill once remarked, an imper-
fect system, and this is true of a democratic economy as well as of a democratic polity.
But, it is worth remembering that every argument that you might make against economic
democracy has also been made against *political* democracy. Go back to Plato, if you wish,
who used division of labour as an argument for an authoritarian political order. Indeed,
in both our countries, every extension of the right to vote and to hold office—for instance,
the abolition of property qualifications and women's suffrage—was opposed on the grounds
of the supposed incompetence of those outside the charmed circle. In the words of Bertolt
Brecht,

> Those who lead the country into the abyss,
> Call ruling too difficult
> For ordinary men.[1]

Long ago the apostle Mark told us 'If a house be divided against itself, that house cannot
stand'. Before the American Civil War, Abraham Lincoln used the apostle's words to
dramatise the contradictions of a nation half free and half slave. I suggest to you that it
is an apt metaphor for the present as well. Our political institutions are in profound conflict
with our economic institutions. In the polity, men and women vote. In the economy, pounds
and dollars vote. 'One person, one vote' versus 'one pound, one vote'. Equality and democ-
racy versus hierarchy and authority. This contradiction, I would submit, has been at the
bottom of the shift of the wage curve over the last decade and a half. It has put us on
the brink of controls, and finally will force us to put our money where our mouths are
with respect to our political and economic institutions.

In truth, a house divided against itself cannot stand: either the polity will come to
resemble the economy, as in the corporatist vision, or the economy will come to resemble
the polity, as in the democratic vision. In the words of Milton Friedman, we are 'free to
choose'.

I need not tell you which choice I hope we shall make.

[1]From 'Those who take the meat from the table' in *Selected Poems*, copyright 1947 by Bertolt Brecht and
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