

ESSAYS IN THE THEORY OF ECONOMIC GROWTH

BY
JOAN ROBINSON

Time is a device to prevent everything
from happening at once.

BERGSON

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PREFACE

THE essays in this volume might be regarded as an introduction rather than as a supplement to my *Accumulation of Capital*. That book was found excessively difficult. The main fault, I think, lay in too terse an exposition of the main ideas, particularly in Chapter 8, and a failure to mark sufficiently sharply the departure from the confused but weighty corpus of traditional teaching that we are required to make when we adopt a Keynesian approach to long-period problems. I offer the present volume with apologies to readers whose heads ached over the earlier one.

In my experience a great deal of misunderstanding and argument at cross-purposes is caused by conflating notions derived from the Walrasian system of supply-and-demand prices with those derived from the Marshallian (or Marxian) conception of normal profits. The first essay endeavours to disentangle them.

The second, with its appendix, outlines a generalisation of the *General Theory* which I hope will be more perspicuous than my former attempts.

The most percipient of the critics of my *Accumulation* reproached me for a selective lowering of the degree of abstraction. Certainly it is not legitimate to set up a highly abstract model and then draw from it conclusions applicable to actual problems. In that book I dropped out here and there hints as to whither, in my own opinion, the analysis might be found to lead. This time I have refrained even from hints. My main concern is to get economic analysis off the mud of static equilibrium theory. Once it is afloat enticing voyages beckon in many directions.

The Model of Technical Progress makes the argument even more formalistic than the earlier version, but in doing so, I hope, clears up some points.

The Neo-neoclassical Theorem distils the essence of the analysis of the technical frontier which I made very heavy weather over at the first attempt.

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Of outright errors in the *Accumulation* I have found two. The first was pointed out by Mr. Little and corrected in the reprint of the book. It concerned the point about Mr. Harrod's formula; now, I hope, correctly stated in the footnote on page 12. The second concerns the idea that when non-employment emerges as a result of growth in the labour force ahead of the demand for labour provided by the stock of capital equipment in existence, a fall in money wages may increase the rate of accumulation. The assumption is that (with unchanged profit expectations) gross investment has inertia in money terms so that a fall in the money wage rate increases net investment in real terms. This seems plausible enough, but it was wrong to conclude that the rate of accumulation could be stepped up by this means. After a once-for-all fall of money costs, amortisation quotas in money terms are adjusted and the inertia of gross investment would thereafter apply at the new, lower, level. On both these points I fell into error through failure to see the implications of my own basic ideas. The corrections make my analysis more so, not less so.

I am indebted to the editors of the *Quarterly Journal of Economics*, *Rivista di Politica Economica* and the *Review of Economic Studies*, for permission to reprint, respectively, the first, the third and part of the last of the following essays.

JOAN ROBINSON

CAMBRIDGE, *March* 1962

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I

NORMAL PRICES

THE traditional teaching that goes under the title of the theory of Value and Distribution does not depict a single system of prices ; it consists of a variety of systems, each appropriate to the model of a different kind of economy.

The models can be divided into two broad classes, with a variety of intermediate types combining elements of each. In one class the main emphasis is on a vertical division between groups of producers with different endowments of factors suited (by quality or by the proportions in which they exist) to the production of different commodities. In the other, the emphasis is upon a horizontal division between the classes of society.

The problem is discussed in this paper in terms of a closed system with no economic activity of public authorities.

SUPPLY AND DEMAND

Prices imply exchange and exchange implies specialisation. In the first type of model the basis of specialisation lies in technical characteristics of factors of production. 'In the original state of society the labourer had neither landlord nor master to share with him.'¹ There was no price of labour ; the return to work was the physical product, to be consumed or traded. Adam Smith declared that in this situation 'the proportion between the quantities of labour necessary for acquiring different objects, seems to be the only circumstance which can afford any rule for exchanging them for one another'.² But where there are differences in the *quality* of labour this rule is of no use. If the hunters who traded beaver for deer belonged to different tribes, one settled on the river and the other on the hills, their trade would have been regulated by traditional rules,

¹ *Wealth of Nations* (Everyman Edition), i, 57.

² *Ibid.* p. 42.

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or by the laws of supply and demand.

The basis of specialisation may lie in property in natural factors of production or in human skill and knowledge. In the model which serves for the so-called theory of international trade the factors exist in separate bundles of arbitrary composition. The same model can be made to serve for an economy in which workers with heritable skill and lore for various occupations own the means of production that they operate and exchange their outputs for each other.

To set this model up in its pure form we suppose that there is no employment of wage labour. The exchange of products is conceived to take place according to purely commercial principles (though in reality such trade is largely governed by traditional and ceremonial rules); each group of producers of a homogeneous commodity is sufficiently numerous for competition to prevail within it, in the sense that prices are independent of the volume of transactions of any one trader, and there is no collusion amongst them.

The conditions of supply and demand for tradeable commodities depend on the tastes and habits of the individuals concerned and the distribution of purchasing power between them; and on the prevailing techniques of production, the numbers of producers with different aptitudes, the natural resources available to them and the stock of produced means of production in existence (looms and stocks of yarn, spindles and stocks of flax, for the production of cloth; forges and stocks of iron, furnaces and stocks of ore, for the production of horse-shoes; and so forth).

Any one set of conditions is satisfied by a particular pattern of outputs and prices. This is exhibited in the Walrasian general equilibrium system, and there is no need to rehearse it here.

The fact that equilibrium prices are ruling at a moment of time does not entail a stationary position. The equilibrium of supplies and demands may be such that investment is going on. Some demands, that is to say, may be for additions to stock. A blacksmith with two sons may be spending part of his current output of horseshoes upon having a forge built. A blacksmith with one son may consider that the advantage of the higher future output of horseshoes per unit of effort which would be

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provided by a more labour-saving forge is worth a present sacrifice of current consumables.

Moreover (a point that is not often stressed), there is no presumption that the equilibrium prices are such that everyone in the story can make a living. We start off with an arbitrary set of conditions, an arbitrary quantity of factors of production of each type and an arbitrary number of owners of factors. The prices that rule in equilibrium, at a particular moment, may well be such that some of the individuals in question are in process of being starved out of existence.

Interest, Lending and Saving

One of the problems that give rise to confusion is the nature of the monetary system that is being assumed. This model can be set up in a *non-monetary* form, in the sense that it contains no generally accepted unit of account or vehicle for storing purchasing power. Each family provides its own labour force. Each type of work brings its own return in kind. There is an equilibrium pattern of prices of commodities in terms of each other, but there is no general price level. For convenience, the observing economist may make his calculations in terms of units of one commodity chosen as a *numéraire*, but each family within the economy is interested in the purchasing power of its own products over whatever other things it would like to buy. The price level in terms of the *numéraire* is only the inverse of the purchasing power of a unit of one particular commodity, and it has no more significance than any other.

The fact that the model is non-monetary does not exclude lending at interest, so long as transactions are directly between the parties concerned ; there is no rediscounting and no market in second-hand debts (transferable obligations are the essence of money). Loans consist of a supply of commodities, to be consumed, used, or traded for others to be used or consumed, against a promise of future repayment. At any moment loans are offered by families whose receipts from production and trade (and from interest payments on past loans) have exceeded, over the recent past, their purchases of commodities to be consumed or added to their own stock of means of production ; that is to say, by families whose saving exceeds their own investment.

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The supply of loanable funds is also fed by repayments of past loans which the creditor wishes to lend again. The demand for loans comes from families whose purchases for consumption and additions to stocks of means of production exceed their current receipts. The rate of interest at which loans are negotiated fluctuates from day to day under the varying pressures of supply and demand. (Since there is no riskless and costless store of value available to would-be lenders who desire to carry purchasing power forward, the rate of interest will be negative when there is a sufficiently strong pressure of supply relative to demand for loanable funds.)

For each individual family there is an expected marginal efficiency of investment in terms of its own products (for a blacksmith, the ratio of a flow of future horseshoes to the present horseshoe price of a forge) depending upon technical conditions and the relation between the labour available in the family and its existing stocks of means of production. Its subjective value to the family depends upon expectations about the future purchasing power of its products over various other commodities, and expectations about the future needs of the family. The influences governing its investment decisions are evidently extremely complex, but it is possible to say, in general, that a low rate of interest will tend to encourage both investment and consumption, for when the charge on a loan in terms of its own product is expected to be less than the marginal yield of the investment that it pays for, expected future income can be increased without the family itself having to provide any saving.¹

Every change in the stock of means of production brings a new equilibrium pattern of prices into being. Conditions may be such that there are sharp corners for a particular commodity at which a small increase of output saturates requirements and brings its purchasing power down to starvation levels; or a relative increase in output of other things sends its price shooting up; one equilibrium position is then violently different from another, although containing only small differences in factor supplies.

¹ From the above account of the rate of interest in a non-monetary model it is possible to pick up the thread of several lines of thought which become sadly tangled when they are followed without further consideration into the problems of a modern industrial economy.

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A Static State

A stationary state obtains when the labour force is constant for each group of producers separately ; and when all families are satisfied with the stocks of means of production that they own, and are keeping them intact, so that gross investment is equal to wear and tear, item by item, and net saving is zero. With unchanging habits and tastes, there is an equilibrium pattern of outputs and prices corresponding to the supplies of all factors of production then in existence.

Individual families save so long as the return that they can get, on further investment in means of production for themselves or as interest on loans to others, exceeds their subjective preference for present over future consumption. Zero saving entails that the marginal efficiency of investment is equal, for all families, to the rate of discount which expresses that preference for the family for which it is lowest. Then, and only then, is there a uniform marginal productivity of investment throughout the economy.

The amount of outstanding debt is rather a matter of historical accident. Families who happen to be operating means of production that were not acquired by their own saving are paying interest to those who own wealth (the fruit of past saving) that happens to be in excess of the means of production which they operate. The rate of interest that is being paid on old debts must be only a little less than the marginal efficiency of investment, for an offer of loans at an appreciably lower rate would set investment going. (An offer at a higher rate would find no takers.)

It is to be observed that, even when these rigorous conditions are satisfied, there is nothing in the picture that corresponds to a *rate of profit on capital*. We can, if we like, value all the goods in existence at their equilibrium prices in terms of some *numéraire*, and call the resulting sum 'capital' ; and we can value the total net flow of production in the same terms, but there is no way of telling what part of that flow belongs to the 'capital' and what part to the work being done with the aid of the means of production which it comprises.¹

¹ We can elaborate the model by allowing the artisans to employ workers — the unwanted younger sons or bastards of other families. Then, given the

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The Meaning of Equilibrium

The general equilibrium analysis can do no more than depict the position corresponding to any one set of conditions, and compare the positions corresponding to specified differences in conditions. It can say nothing about the effects of changes in conditions.

An equilibrium position is stable, in a purely formal sense, when the relevant curves cut each other the right way. It is stable in a real-life sense, *once it has been reached*, when minor chance departures from it quickly reverse themselves.

It is quite another matter to say that it has the property of persisting through time. This would be true of the stationary state, provided that no change in basic conditions occurs and perfect tranquillity prevails. But an equilibrium position which contains accumulation of means of production, consumption of exhaustible resources or starvation for some group of producers, is in course of upsetting itself from within, and chance events may upset it from without. When an economy more or less corresponding to this model is in trading relations with a different type of economy, changes taking place in the latter may be drastically disturbing to it.

The time taken to get close to equilibrium from an arbitrary initial starting-point may be long, in some circumstances indefinitely long. (Walras guarded himself by supposing that the equilibrium position is discovered before any trade takes place.) Thus, when changes in the conditions are liable to occur, the analysis predicts that equilibrium is not likely ever to be realised.

To make the argument applicable to actual situations, we have to leave equilibrium analysis behind and approach the amount of land and equipment that he owns, there is a definite marginal net product of labour to each employer, from which we can derive his demand curve for workers in terms of his own product. The level of wages, for raw hands, must be more or less the same in terms of whatever product it is earned. The marginal prospective return on investment in equipment then tends to be higher for everyone the easier the labour market: that is, the lower the cost of additional labour in terms of own product for each investor. Even so, there is no way of calculating the average return on equipment independently of the 'reward of enterprise' that the employer enjoys. When the number of employers going in for different lines of production varies with the prospective profits to be made in each, the model dissolves, for there are then no given supplies of specific factors.

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problem in terms of an historical process, the system continually lurching from one out-of-equilibrium position to another.¹

WAGES AND PROFITS

In the second type of model there are no persistent differences between factors of production. Labour can be trained and equipment designed for any use. To keep the argument simple we will postulate that all workers are alike.² Workers own no property and must take service with those who can provide means of production for them to operate.

An economy in which owners of property hire workers (directly or through the agency of managers of firms) cannot be conceived to operate without money, in the sense of some generally acceptable medium of exchange. Wage rates are agreed in terms of money and prices of products are established in terms of money. The real earnings of a worker and the real cost of labour to an employer then emerge from the relations between prices and wages in terms of money. Wage rates in terms of money are purely arbitrary. *Changes* in money-wage rates have important 'real' consequences, but *differences*, in equilibrium positions, affect nothing but the words and numbers used to describe prices and incomes and the number of units making up the stock of the medium of exchange. In what follows, all values are to be understood as relative to the level of money-wage rates.

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A firm (that is, the unit in which employment is organised) is not confined to any particular range of production, but can set

¹ The doctrine that market forces tend to establish equilibrium amongst traders in primary products, which is used to support opposition to any form of regulation in such markets, seems to be based upon a very superficial reading of the general equilibrium analysis.

² This is not necessary to the argument, provided that the supply of labour with different sorts of skills responds to differences in expected earnings in such a way that the return on an investment in training is everywhere the same. But when a worker's family provides for his training, it is artificial to regard his earnings as a return on investment; and, if we did so, we should have to allow a different rate of profit on this type of investment from that expected on capitalist investment. Highly qualified employees are introduced in the third model.

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labour to work upon whatever promises the best return. The choice amongst investment opportunities is therefore conceived to be made in such a way as to maximise the prospective profit on the sum of money committed. In this model competitive conditions have a different meaning from that required for the first model. There competition was a feature of the day-to-day operation of markets ; here it is a feature of long-run investment plans. Here it is not necessary that there should be a perfectly elastic demand for the output of each seller in each market at each moment of time ; it is necessary that there should be no limitation on access, given time, to any market, so that an equal rate of expected profit on investment tends to be established throughout the system. In a state of tranquillity, when expectations are realised, the criterion that competitive conditions prevail, in this sense, is that there is a uniform rate of net profit on the value of capital in all lines of production. The prices that obtain in these conditions are the 'normal long-run supply prices' of Marshall, or 'prices of production' of Marx.

The rate of profit on investment dominates the rate of interest on loans. True, when there is a market in second-hand debts (a stock exchange) the level of the rate of interest at which new loans are negotiated is strongly influenced by the prices obtaining in that market, and this, in turn, is strongly influenced by expectations about what the future level of the rate will be. Keynes' liquidity preference theory is designed to answer the questions : Why does anyone hold money (above the requirement for convenience balances) when it is possible to get interest on loans ? And the answer runs in terms of the relation between current and expected future interest rates. It was not intended to answer the question : Why is anyone willing to pay interest on a loan ? Keynes was taking it for granted that the dominant reason for borrowing is the expectation of profit on investment. Whatever the rate of interest charged for new borrowing may be, the opportunity cost of any one investment, from the point of view of the firm considering it, is the rate of profit obtainable on other investments. Thus, it is the rate of profit, not the rate of interest, that enters into the normal supply price of any particular commodity.

When normal prices obtain, each seller receives, over any

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period, sums equal to the costs that he has incurred in production of the goods sold, including a notional charge for interest, at a rate equal to the ruling rate of profit, compounded over the interval from the moment when cost was incurred to the moment of receiving payment. Products enter into the production of each other and producers are selling to each other ; the number of stages into which the chain of operations is divided makes no difference to the result. When one producer buys from another, he pays a price which includes the notional interest-cost up to date, and notional interest is added to that cost in obtaining the final price. When the intermediate product is part of his own output, notional interest is compounded on the costs that he incurs to produce it, over the period that it is passing through his hands. Thus the final sum of interest-cost is the same in either case.

The total net value of the output of all firms taken together over any period is the sum of final sales (cancelling out transactions between firms) *plus* the value of stocks in existence at the end of the period (including the value of long-lived equipment appropriately depreciated), *minus* the value of stocks (including equipment) in existence at the beginning of the period. This net value is equal to the wages and net profits earned in the period. The whole of the wages are paid out in money over the period (assuming that the interval of wage payments is sufficiently short) but part of the net profit accrues in the form of the increased value of stocks and equipment. In an uncertain world, both the calculation of depreciation and the valuation of stocks are full of puzzles, but their evaluation at normal prices on the basis of a given rate of profit is merely a matter of arithmetic. By the same token, the value of the stock of capital has an unambiguous meaning when the rate of profit is given.

Non-produced means of production, such as the 'land' of traditional theory, are a link between this model and the first one, in which supply and demand govern relative prices.¹ For the moment we assume them away in order to consider this model in a pure form.

¹ This is true also of qualitative differences in the supply of workers. See above, p. 7, note 2.