2 Some Notes for an Analysis of Accumulation.

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I INTRODUCTION

1. If we were to ask ourselves what determines the speed of capital accumulation and of growth in an economy, we would get two different answers from today's economics. The first is the traditional one, according to which the community's decisions to save in conditions of full utilization of resources (defined so as to allow for a normal succession of booms and slumps) will determine the trend of capital accumulation. This trend of capital accumulation, taken together with the growth of population and the development of technical knowledge, will then determine the trend of aggregate output.

The second answer is less homogeneous, and includes, in fact, two different positions sharing what may be called for short the Keynesian Hypothesis This shared hypothesis is that in the long period, in which productive capacity changes, no less than in the short period a analyzed by Keynes, it is an independently determined 'level of investment that generates the corresponding amount of savings, rather than an autonomous propensity to save that generates the level of investment as in the traditional answer. However, the savings can be generated by investment along two entirely different routes, and it is the route which is being postulated that separates the two Keynesian positions. The first route is by lowering the real wage thereby raising the normal rate of profits and, other things being equal, the proportion of profits in national income.[2] Since the propensity to save out of profits can be safely assumed to be higher than that out of wages, the rise in the proportion of savings to consumption will follow. The second route through which investment can generate the corresponding amount of savings is by raising the level of output together with the corresponding productive capacity, without any need to change the real wage and the normal rate of profits.[3] For brevity we shall refer here to the theoretical positions character-

ized by those two routes as, respectively, the .'First' and the 'Second' Keynesian Positions.

The First Keynesian Position is that which has attracted more attention, leaving the Second in the shadow. However, once some misunderstandings are cleared up, it may become apparent that the second of those two routes is that which a market economy is more likely to take in adjusting to the incentive to invest. In fact, this division in the theories of accumulation based on the Keynesian Hypothesis does not seem to have been sufficiently analyzed and discussed. The purpose of this paper is to contribute to that analysis.

2. For the sake of simplicity, our analysis (section II) will be conducted on the asaumption of a competitive, closed economy, with homogeneous labor and no scarce natural resources, so that the social product is divided into wages and profits only. We shall also argue as if the availability of labor did not constitute a limit to the growth of the economy. We shall assume that the real wage rate w^* and the technical conditions of production are both given, so that the corresponding normal rate of profits r^* and the system of relative prices are known.

We shall indicate by y the ratio which the output bears to the capital; reckoned at the given prices and when capacity is utilized at the normal or 'desired' level,[4] and we shall assume that y remains constant as capacity changes. We shall assume further that the marginal net propensity to save s *i*s constant and equal to the average propensity. None of the above assumptions appears, however, to be essential to our conclusions.[5]

3. Our argument will proceed in three steps. In the first (Section 2) we shall indicate how, in the long period in which productive capacity can change, investment can engender the corresponding amount of savings by varying the level of productive capacity and output, rather than by changing the real wage rate and the normal rate of profits. It will be shown there that this can occur in the long period with even more ease than it can in the short period with a given productive capacity, for which the generation of savings through changes in aggregate output was originally envisaged by Keynes, It will thus emerge that increases (decreases) in output, accompanied by increases (decreases) in productive capacity, may be the long-run normal effect of changes in effective demand, with the real wage and the normal rate of profits left to be determined by other circumstances - in particular, by the circumstances envisaged in the classical theories.[6]

This conclusion may, however, appear to contradict the interpretation sometimes given of the so-called 'Cambridge equation':

$$s_c r = g$$

which we take here in its simplest familiar form assuming zero savings of workers and a given propensity to save of capitalists s_c. In fact, that equation has sometimes been interpreted to entail a necessary link between the real wage w^* and normal rate of profits r^*, on the one hand and, on the other, the ratio g between net investment and the value of the capital stock, or 'rate of accumulation' as we shall here call it for short.[7] The next two steps in our argument will accordingly be taken up with showing why such an interpretation of the equation would not be correct.

We shall argue that the Cambridge equation faces us with an alternative. In Section 3 we shall examine the first branch of the alternative - that in which the equation is taken to refer to the *normal* rate of profits r^*, and to the corresponding real wage w^*. It will be shown that the 'rate of accumulation' g^* which will then have to appear on the right-hand side of the equation will need have nothing to do with the *actual* rate of accumulation $g^\wedge$. In Section 4 we shall examine the second branch of the alternative — that in which we take the rate of accumulation appearing in the Cambridge equation as the *actual* rate of accumulation $g^\wedge$ .We shall show there that the rate of profits' $r^\wedge$ which will then have to appear on the left-hand side of the equation, will be what we may describe as an 'ex-post' rate of profits, and will need have nothing to do with the normal rate of profits r^* and the corresponding wage rate w^*.

Either way, it will emerge that the Cambridge equation entails no necessary relation between the actual rate of accumulation, on the one hand, and the real wage and normal rate of profits, on the other. The equation will thus confirm, and not contradict, the results of Section 2 about the independence of the real wage and the normal rate of profits from aggregate effectual demand.

II SPARE PRODUCTIVE CAPACITY AND THE GENERATION OF SAVINGS BY INVESTMENT IN A LONG-PERIOD ANALYSIS

4. The fact that a large underutilization of productive capacity cannot last indefinitely seems in fact to have led to the idea that the

burden of adjusting savings to investment in the long run will have to fall largely, if not exclusively, on the distribution between wages and profits. Thus Joan Robinson wrote in her *Essays on the Theory of Economic Growth* (1962, p. 11):

> In long-run competitive equilibrium the relation of total income to the stock of capital is determined within certain limits by technical conditions. The distribution of income however is influenced by the amount of investment.[8]

Now, the premise concerning the temporary nature of any large excess capacity may be correct, but the conclusion that the real wage and the corresponding normal rate of profits have therefore to be influenced by the amount of investment does not follow. When it is capacity that adjusts to aggregate output, rather than output to capacity, the disappearance of excess capacity in the long period is the *result* of a low aggregate demand, and cannot therefore have acted as a constraint upon it, imposing a choice between consumption and investment and, hence, between wages and profits. And as soon as aggregate demand revives, the process of destruction of capacity will be set in reverse, and productive capacity will be recreated, leaving space for additional investment *and* consumption.

In fact, it is not difficult to show that even a small degree of excess capacity may involve a failure to obtain an appreciable increment of productive capacity in the subsequent periods, when account is taken of the cumulative, further investment output derivable from the capacity brought about by the increment in investment obtainable by using the initial excess capacity. As we shall presently see, such a potential increment of capacity grows over time like a sum at a compound rate of interest, and the rate at which it accumulates is given by the ratio of savings to capital at normal (desired) utilization of a capacity.

In the rest of this section we shall attempt to give an idea of the influence on future potential output of any failure to realize this year's potential output,[9] thus showing how in the long period in which productive capacity can change, the margins for expanding output in response to aggregate demand widen rather than narrow, contrary to what is implied in Joan Robinson's passage above.

5. Let us in fact assume an additional utilization of capacity in year 0 of " numerical value of 10, so that if the propensity to save s is 0.2, then potential increment of output would provide additional investment of the value of 2, which, given a ratio of output to capital y of

0.5, would establish a unit potential additional productive capacity (that is, we assume an additional utilization of capacity numerically given by $x = 1/ys$, engendering an additional capacity of $syx = 1$: see Table 2.1, p. 53). We are here measuring utilization of capacity by the corresponding amount of net output estimated at the given prices if production, just as we are measuring capacity itself by the amount net output obtainable from it when utilized at the normal (desired) level.

The unit additional capacity thus obtained will on the other hand be available from the year 1 onwards and will make possible, if sufficient effective demand is obtained. an additional yearly output of a unit for ever after. It would thus make it possible, in particular, to have an additional net investment of $s = 0.2$ in year 1 and therefore an additional productive capacity $ys = 0.1$ from year 2 onwards. [10] This will bring to a total of

$$1 + ys = 1 + 0.1 = 1.1$$

the additional capacity which would have come about by year 2, had there been a sufficient incentive to invest.

Then, in year 2 the potential additional investment could be

$$s(1 + ys) = 0.2 \times 1.1 = 0.22$$

and the potential additional capacity this investment would make available from year 3 onwards would be a fraction y of it, that is

$$ys(1 + ys) = 0.5 \times 0.22 = 0.11$$

bringing the total potential additional capacity engendered by year 3 to

$$ys\,(1 + ys) + (1 + ys) = (1 + ys)^2 = 1.1 + 0.11 = 1.21.$$

This will in turn make it possible a potential additional investment in year 3 of

$$S\,(1 + ys)^2 = 0.2 \times 1.21 = 0.242,$$

and this investment would make available a further potential additional capacity of

$ys.(1 + ys)^2 = 0.5 \times 0.242 = 0.121$

in year 4, bringing the total potential additional capacity created by year 4 to

$(1 + ys)^2 + ys\,(1 + ys)^2 = (1 + ys)^3 = 1.21 + 0.121 = 1.331,$

and so on and so forth as shown in Table 2.1 below.

A potential additional capacity of 1 engendered through an increased utilization of 10 in the year 0, could thus grow (if effectual demand were strong enough) to 1.6 after 5 years, to 2.6 after 10 years, to 17.5 after 30 years, to 118.3 after 50 years, etc. This means that a 10% underutilization of capacity for a single year would, other things being equal, forego a potential doubling of the overall initial capacity in less than 50 years.[11]

As Table 2.1 shows, this potential always-enlarging, never-ending process of creation of savings and productive capacity is strictly analogous to that of a sum of money increasing at a compound rate of interest. The growing sum is here the productive capacity initially brought into existence by an additional utilization of *existing* capacity, and the compound rate *ys* is the ratio of savings to capital when capacity is utilized at the normal or 'desired' level, or 'ratio of capacity savings' as we shall henceforth call it for short.

If we then proceed from the case of an underutilization of capacity lasting a single year to that of an underulilization of *x%* lasting over *t* years, the capacity which has failed to materialize after *t* years because of insufficient effective demand would have been numerically given by the sum of *t* annuities of *x*, accumulated over the *t* years at the compound rate *ys*, that is

$$\frac{syx[(1+ys)'-1]}{ys} = x[1+ys)'-1] \qquad (2.1)$$

Thus, under the hypothesis that the incentive to invest had been enough to ensure a 10% additional use of the initial productive capacity over the *t* years, a doubling of that capacity could have been achieved in 25 years, and a trebling in 32 years. An additional use of the initial capacity over the *t* years confined instead to 5% could have achieved the same doubling in 32 years and a trebling in 39 years, whereas a mere 1% additional use over the *t* years could have achieved them in 49 years and 56 years, respectively.

Table 2.1

Potential additional capacity C_1 *engendered by a use of spare capacity 1/sy in year 0* $C_1 = C_{t-1} + yI_{t-1}$ $= \sum_{t=0}^{t-1} yI_t = (1 + sy)^{t-1}$		*Year* t	*Potential additional investment resulting from the use of that additional capacity* $I_t = \delta C_1$
		0	$s[1/sy]$
	1	1	s
	$1+ ys$	2	$s(1+ys)$
$ys\ (1+ys) + (1+ys) =$	$(1+ys)^2$	3	$s(1+ys)^2$
$ys(1+ys)^2 + (1+ys)^2 =$	$(1+ys)^3$	4	$s(1+ys)^3$
$ys(1+ys)^3 + (1+ys)^3 =$	$(1+ys)^4$	5	$s(1+ys)^4$

Naturally these calculations can provide little more than rough indications. They ignore the complications associated with the age composition of fixed capital.[12] Above all they ignore the destruction of capital which is inevitably associated with any process of capitalistic accumulation because of bankruptcies, duplication of capacities by competing firms, etc. The rise of potential output will on the other hand depend on whether there is structural unemployment of labor as we have here supposed — or whether, additional labor being unavailable in sufficient quantity, the additional investment could take the form only of an anticipated renewal of plant, with a consequent rise in the productivity of labor in the system.[13] Our examples do, however, indicate the order of magnitude of the phenomenon.

III THE CAMBRIDGE EQUATION: A FIRST INTERPRETATION

6. The elasticity that a capitalist economy is thus shown to have in reacting to incentives for a more rapid growth by bringing about additional productive capacity, or, symmetrically, by eliminating excess capacity and erasing the visible traces of the losses in output due to a low such incentive,[14] should have already made clear that no necessity exists for a change in the real wage, and in the associated normal rate of profits, in order to generate (eliminate) the savings corresponding to any increased (decreased) demand for investment.

This result about the independence of the real wage and rate of

profits from investment and accumulation may, however, seem to fly in the face of the Cambridge equation, which we may take here in the same simplest form we saw above,

$$s_c r = g \qquad (2.2)$$

and where g, the rate of accumulation, is treated as an independent variable because of the Keynesian Hypothesis (para. 1 above). Since s_c can be plausibly assumed (at least as a first approximation) to be determined by institutions or slowly changing individual habits, it may then seem to follow from equation (2.2) that a theory of accumulation founded on the Keynesian Hypothesis implies that the incentive to invest underlying g will determine the real wage and the normal rate of profits.

7. This interpretation of the Cambridge equation into which some authors seem to have slipped at times,[15] appears, however, to confuse two radically different meanings of the equation. As already indicated above, the first meaning occurs when the distribution thus asserted to depend on the rate of accumulation consists of the normal rate of profits r^* and of the associated real wage rate w.. In that case, as we shall see in the remainder of this section, the rate of accumulation g^* appearing on the right-hand side of equation (2.2), which we may then rewrite in the form

$$r^* s_c = g^* \qquad (2.3)$$

need no longer bear any relation to the actual rate of accumulation, call it $g^{\wedge}$, and this even when the latter is taken as an average over any sufficiently long period of time. It would in fact be more correct to refer then to g^* simply as the ratio of savings to capital when the aggregate income is that corresponding to the normal or 'desired' utilization of existing capacity - that 'ratio of capacity savings' which we have already encountered above - and not as a rate of accumulation. Then, clearly, the Keynesian Hypothesis by itself will in no way entail that g^* can be treated as an independent variable in equation (2.3) and. therefore, equation (2.3) will not entail g^*. determining r^* any more than r^* determining g^*.

The second meaning of the Cambridge equation (2.2) occurs when g is instead taken to refer to the actual rate of accumulation $g^{\wedge}$ which can indeed be taken as an independent variable in the Cambridge equation, rewritten in the form

$$r\hat{}s_c = \hat{g} \qquad (2.4)$$

Then, however, as we shall see in Section 4 below, the 'rate of profits' $r\hat{}$ determined by ĝ need not have anything to do with the normal rate of profits r^*, and, in particular, it can change with $\hat{g}$ without in the least affecting the real wage. It will then again be illegitimate to interpret the Cambridge equation as entailing that the rate of accumulation determines the normal rate of profits and the real wage rate. That interpretation can arise only from a confusion between the two meanings of the equation, when the equation is read as if ĝ could appear on the right - hand side with r^* appearing on the left-hand side.

8. In order to examine these two alternative meanings of the Cambridge equation, and the distinction between them, we must start by considering more closely the concept of a normal or 'desired' degree of utilization of capacity, to which we have already repeatedly referred. It is the degree of utilization of capacity desired by the entrepreneurs, and on which, therefore, they base their investment decisions about the size of a new plant relative to the output they expect to produce.

This desired level of capacity utilization, we should be careful to note, is never likely to be the technically possible maximum. There are several reasons for this fact, the relevance of which for the elasticity
of aggregate output we discussed in Section 2 should be obvious. There
may in the first place be reasons of costs, for unit costs may rise as the utilization of productive equipment gets close to its technical maximum
(*e.g.*, a rise in labor costs because of night shifts).

There arc, however, also other reasons which may induce entrepreneurs to keep the output made technically possible by their investment above the average output they expect to produce over the lifetime of the plant. These are reasons relating to the desire to keep the customers which a firm already has, and, if possible, enlarge their number. Productive capacity will thus generally be planned so that it can meet the peak levels, and not only the average levels, of demand,[16] when the latter is expected to fluctuate. Further, if the average level of demand is expected to increase during the lifetime of the productive equipment, the entrepreneur, taking into account the indivisibilities of a plant, may well plan it in excess also of the peak demand expected in the earlier life of the plant, so as to be able to deal better with the increased demand in its later life. And, finally, some such excess capacity may be planned even independently of any

increase in demand definitely expected during the lifetime of the plant. This may be in order not to lose opportunities of extending the sales which might unexpectedly arise during that time.[17]

9. The fact that this desired level of capacity utilization will be that on which the decisions of entrepreneurs ;about the size of new plant will be taken has some important implications. which we must now consider.

The profits expected from investing in a new plant will of course depend on the level of utilization expected for that plant. And that *expected* level of utilization will tend to be the 'desired' level because, by the very definition of the latter, the size of the new plant will be *designed* to make it such. The expected level of utilization will therefore tend to be independent of the levels of utilization and profits *experienced in the past.* A high past level of utilization of the plant might well result in a higher amount of investment, and a larger new plant, but there is no reason why it should imply a higher expected level of utilization of that plant. That level will remain equal to the desired level chosen by the entrepreneurs themselves when deciding their investment.[18]

10. Thus, the rate of return expected from investment will be that corresponding to the 'desired' level of utilization of the productive equipment to be set up. However, it is with respect to decisions to invest - when from the point of view of the investor, capital is 'free' to take any physical form[19] - that the concept of a rate of return or rate of profits on capital acquires relevance, as distinct from that of the quasi-rents obtainable from an already existing plant. It appears therefore that when economic theory has traditionally referred to a single 'normal rate of profits corresponding, under competitive assumptions, and with given technical conditions. to each level of the real wage and of the other distributive variables, that single rate of profits has been that corresponding to the 'desired' level of utilization of capacity.[20] This single rate of profits is that which we have indicated as the normal rate of profits r^* corresponding to the given real wage w^*

11. Equipped with this notion of desired level of capacity utilization and with the associated definition of the normal rate of profits r^*,.. we can now return to the first possible meaning of the Cambridge equation and examine more closely the fallacy of thinking of g^* in equation (2.3) as reflecting the actual (average) rate of accumulation and, therefore, as the independent variable determining r^*, in that equation. We shall proceed by means of an illustration.

Let us assume an initial situation in which the productive capacity

of the economy happens to be utilized at the desired level. The rate of accumulation will then be g^*, equal to the 'ratio of capacity savings' (p. 52 above) and will therefore be given by the quantity $s_c r^*$, as shown by equation (2.2).[21] Let us then assume that in the year t a fall in the incentive to invest occurs, such that - after the changes we shall see, required in order to adjust capacity to that very fall - investment will become, say, one-half of what it would have been at the same date, had the previous trend of investment continued unaltered. Now, no obstacle arises against assuming, for the sake of our argument, that through an initially even smaller time rate of gross investment, entrepreneurs will, by year t' , have adjusted productive capacity to the new lower trend of investment, and to the correspondingly lower level of aggregate output. When that has occurred, the rate of accumulation will necessarily be back to the ratio of capacity savings g^* .[22]

12. The above example illustrates how the rate g^* -which has to appear on the right-hand side when, as in equation (2.3), the Cambridge equation is referred to the normal rate of profits and the real wage-need have little if anything to do with the *actual* rate of accumulation $\hat{g}$, and how this remains true even when the latter is taken as an average over any number of years. In fact, in our example, $\hat{g}$ will be below g^* over any period which would include the years between t and t'.

More generally, given as in our example the real wage and the normal rate of profits r^*, and therefore the ratio of capacity savings g^*, the economy can easily accumulate at any rate $\hat{g} < g^*$ and also, within a certain range, at a rate higher than g^*. It is then clear that the rate g^* , unlike the actual rate of accumulation g^*, cannot be taken as a measure of the incentive to invest: in our example that incentive had fallen to half as measured by the amount of investment without affecting g^* at all. There is accordingly no reason why the Keynesian Hypothesis of the independence of decisions to invest from decisions to save should allow us to take g^* as independent of either s_c or r^* within equation (2.3) and, therefore. as susceptible of determining r^* in that equation.

In fact, if we turn again to our example, in which we fully exploited the Keynesian Hypothesis by our assumption of a halving of the investment from t' onward~, the rate of accumulation g^*, far from being an independent variable determining r^*, was fully determined by the latter. This was of course the result of the fact that we did *assume* the normal profit rate r^* and the real wage w^* to remain

constant as the incentive to invest changed. But the point is exactly that we had no difficulty in dealing with that change, while assuming r^* to remain constant.

Indeed we can now see that if we took g* as an independently variable rate of accumulation in equation (2.3), we would be begging the question of the determination of distribution under the Keynesian Hypothesis. We would be assuming independent changes in the rate of accumulation when the utilization of capacity is kept at the desired level, and therefore we would be *assuming* changes in the ratio of capacity savings. And the propensities to save of each class being given, together with the output/capital raios,[23] a change in the ratio of capacity savings can be achieved only by a change in the real wage w^* and normal rate of profits r^*. .This begging of the question would be there whenever we attempted lo deal with the Keynesian Hypothesis in terms of a situation of steady growth and of the associated desired utilization of capacity. Indeed, in some instances, the First Keynesian Position appears to have been favoured by an unwarranted tendency to view steady growth analysis as an analysis of average actual growth.[24] We have found here one important additional reason why that view is unwarranted.

13. What becomes clear in this connection is something which was perhaps not immediately evident, namely that the possibility that investment should generate the corresponding amount of savings through changes in aggregate productive capacity (the Second Keynesian Position) is inconsistent with the assumption of an economy working over time at the desired level of capacity utilization, even only on an average taken over booms and slumps.

To see that inconsistency let us consider an economy for which, as we have assumed so far, I we are given (a) the real wage and the propensities to save out of wages and profits; and (h) the initial level of productive capacity. If then the average utilization of capacity over time were to be at the desired level, the path of future capital accumulation would he completely dctermined.[25] Such a utilization of capacity would in fact be sufficient to determine the amount of investment of each period in the future in terms of the definite amount of savings forthcoming in that period under those conditions. It would thus rule out a determination of investment by factors other than those acting on circumstances (a) and (b) above and, therefore, given the propensities to save and the initial productive capacity, by factors other than the normal rate of profits and the real wage. That would allow for the determination of investment by the decisions to

save, as in marginal theory, or for the determination or the real wage (normal rate of profits) by an independent amount or investment in the First Keynesian Position. It would not, however, allow for any independent determination of investment which would leave the real wage (normal rate of profits) unaffected, such as is envisaged in the Second Keynesian Position. It would evidently be a fluke if an independently determined average amount of investment were to coincide with the average amount of savings forthcoming over the period considered as determined, under conditions of continued desired utilization of capacity, by the given real wage and by the given initial productive capacity.

This, of course, does not mean that the Second Keynesian Position ignores the tendency of entrepreneurs to adjust capacity to output. The entrepreneurs will certainly attempt to bring about, through investment, a capacity which can be used at the desired level. And the degree or their success will depend on how well they will be able to forecast the outputs which it will be convenient for them to produce. But given the initial arbitrary level of capacity that success show only in shifting, so to speak, backward in time the deviation of the utilization of capacity from the desired level. Even correct foresight of future output will not eliminate average utilization of capacity at levels other than the desired one. Thus, suppose the prospect emerged of a faster expansion of aggregate demand than would have been taken care of by the growth of a capacity utilized at the desired level, and therefore entirely determined by the initial capacity and distribution of income. The earlier that prospect has been perceived, the more capacity will have been adjusted by the time the expansion comes. But — supposing for simplicity that in the earlier period capacity would otherwise have been utilized at the desired level — the additional investment required to advance the desired capacity for the future faster expansion will cause a deviation from the desired level of utilization in that earlier period. Thus *either* the deviation is admitted in the later period (in the case of lack of foresight) *or* (in the case of correct foresight) it has to be admitted for the earlier period.[26]

IV THE CAMBRIDGE EQUATION: A SECOND INTERPRETATION

14. We have seen that if equation (2.2) is understood to relate to the real wage and the corresponding normal rate of profits r^*, then the ratio of capacity savings g^* appearing in the equation will need have little to do with the actual (average) rate of accumulation $\hat{g}$. Accordingly, the Keynesian Hypothesis will not entail a treatment of g^* as an independent variable in equation (2.3) and, when correctly interpreted, the Cambridge equation will in no way contradict our argument in Section 2 concerning the independence of distribution from accumulation.

However, we are not yet out of the difficulty we saw at the beginning of Section 3. If, as we did in equation (2.4), we interpret the Cambridge equation to refer to the *actual* rate of accumulation $\hat{g}$, then $\hat{g}$ will have to fall and rise as the incentive to invest does, and the Keynesian Hypothesis would justify its treatment as an independent variable in the equation. Given the saving propensity s_c, $\hat{g}$ will then determine the 'rate of profits' $\hat{r}$ of equation (2.4), and it might again seem that distribution depends on accumulation. As we must now see, this conclusion would be misleading: the 'rate of profits' $\hat{r}$ of equation (2.4) need in fact have little to do with the real wage and the corresponding normal rate of profits r^*, and hence with distribution in the relevant sense.

15. We meet here the confusion we mentioned above between two different notions of the rate of profits. We have in the first place the 'normal' rate of profits which we analyzed above, and which is uniquely determined once the real wage is given. It could be ideally observed within a firm using the dominant technique, on the assumption of a utilization of capacity at the desired level, and of normal prices for both inputs and outputs. This is the normal rate of profits which in Section 2 and 3 we could assume to remain unaffected together with the real wage, as the incentive to invest varied.

We have then. In the second place, the different notion of what, for brevity, we may here call an 'ex-post' rate of profits. This rate is the ratio between what may be reckoned to be the amount of 'net' profits realized in the economy in the year, and what may be reckoned to be the value of the capital stock during the same year. This is the 'rate of profits' $\hat{r}$ of equation (2.4) which has to vary with the actual rate of accumulation $\hat{g}$.[27]

Significantly enough, even a definition of this second notion suf-

sufficiently exact for theoretical purposes appears to meet difficulties. The difficulties are of course those of estimating the capital goods in existence, many of which will not belong to the 'dominant technique'. Though we postponed mentioning them at the time, these difficulties already underlay the concept of a 'rate of accumulation' referred to in Sections 1 and 3 in connection with the Cambridge equation.

In order to obtain a valuation of the capital stock in the denominator of the rate of profits $\hat{r}$ that would first of all be independent of the ex-post amount of profits appearing in the numerator — and which will of course generally affect the current prices of capital goods as reckoned, e.g., in a Stock Exchange — we may avoid referring to the actual capital stock in use in the economy and to some current value of it. We may instead refer to the physical capital stock as it would have been, *if* all outputs had been produced with the 'dominant techniques'.[28] And we should then estimate that stock at the 'normal' prices corresponding to the given and constant real wage and normal rate of profits. This value we should also put in the denominator of our rate of accumulation $\hat{g}$. This definition of the value of capital appears to be in fact necessary if the ex-post rate of profits $\hat{r}$ is to become the 'normal' rate of profits r^* — and the actual rate of accumulation $\hat{g}$ is to become the ratio of capacity savings g^* — when capacity is utilized at the desired level.[29]

Now, when the rate of capital accumulation changes, the 'ex-post' rate of profits $\hat{r}$ has evidently to change accordingly, owing to the windfall profits or losses connected with the utilization of capacity at other than the 'desired' revel. That change, by itself, can however leave entirely unaffected the real wage and the normal rate of profits.[30]

16. A point seems now to arise naturally, and should be dealt with before drawing our conclusions. We have seen that g^*, the ratio of net savings to capital at desired capacity utilization, provides no indication of the actual rate of accumulation of the economy. It might then seem that the same reasons which prevent that ratio from being a guide to the actual rate of accumulation deprive of much of its meaning the 'normal' rate of profits, similarly reckoned for the desired level of capacity utilization and which, together with the associated real wage rate, has instead been at the center of the conception of distribution referred to in this paper.

However that analogy would be misleading and the reason essentially lies in what we said in para. 10 above. The asymmetry; in this respect, between rate of accumulation and rate of profits is due to the

fact that whereas the meaning of the rate of accumulation is that of a ratio between the corresponding aggregate quantities in the economy over a given period of time , that is not in fact so for the rate of profits. The theoretical importance of the latter lies in the first place in its influence on investment. And since entrepreneurs will generally aim to re-establish through investment the desired relation between capacity and output - then, as we saw (p. 56), the normal rate of profits will be that on which they will base their decisions to invest - a rate which, as we saw, will need bear no close relation to a ratio between aggregate actual net profits and aggregate existing capital, however the latter might be defined.[31]

No difficulty on the other hand seems to arise for taking into account, where relevant, those effects which generalized extra profits or losses resulting from deviations of the utilization of capacity from the desired level may exert on the purchasing power of profit earners, or on the possibility to finance investment, or on the expectations of future demand and therefore on the *amount* of investment. These factors like all the others affecting aggregate demand, as well as the demand for particular commodities, can be taken care of in the course of the separate determination of such magnitudes (Garegnani, 1984, pp 296-9).

V CONCLUSIONS

17. We have seen why, contrary to what has sometimes been supposed to follow from the Cambridge equation, the Keynesian Hypothesis in no way entails that, in a long-period analysis, autonomous investment decisions generate the corresponding amount of savings by affecting the real wage and the normal rate of profits. Through comparatively small increases (decreases) in the degree of utilization of the already existing capacity, changes in the level of investment can bring about those faster (slower) increases of productive capacity itself, which will then result in that rough correspondence between productive capacity and output which can be observed historically.[32] Indeed while waiting for a more accurate analysis of the relevant facts concerning the development of capitalist countries, it seems that once the Keynesian Hypothesis is accepted, the margins of unutilized capacity which are normal in a capitalist system make it plausible to think that, in the long period, even more than in the Keynesian short period, autonomous changes in the incentive to invest will usually

generate the corresponding amount of savings through changes in output rather than through changes in the real wage rate and normal rate of profits.

There are in fact some considerations that may strengthen this provisional conclusion. A first such consideration is that an increase in the incentive to invest will generally be gradual. It will manifest itself at first in shorter slumps and longer booms rather than in drastic changes in the level of peak demand. This will make it easier to produce the additional investment goods by utilizing at first the existing capacity and then the increased capacity which has been generated by the initial increments of investment.

That of course applies to the long period in which productive capacity can change. But on the other hand, and this is the second consideration, in a short period, capacity is generally given in a highly specialized form. The short-period possibility to accommodate increased investment by lowering consumption would therefore seem in any case to be small or non-existent. That would seem to be so except in two cases. The first would be when the economy faced a general shortage of labor whose amount was insufficient for a fuller utilization of existing capacity. The second would be when a limitation was present in the productive capacity of the wage goods industries, such that increased employment in the rest of the economy had to result in a fall of real wages. However both these cases would have their roots in disproportions — between the available aggregate capacity and labor, in the first case, and between the available capacities of different sectors, in the second — which we should ignore when discussing the general questions of aggregate output.[33]

A third consideration is that even if the increased investment were to cause a fall in real wages, such a fall would seem unlikely to last. On the one hand, the shortage of productive capacity causing that fall in real wages would probably not last for .tong. On the other hand, the bargaining position which was reflected in the initial level of the real wage is not at all likely to have been weakened by the increased investment. As a result, as the impossibility of maintaining the same real wage fades because new productive capacity becomes available, so real wages are likely to be brought .back to their former level. Indeed the increased incentive to invest with the consequent increase in employment is likely to enhance, if anything, the bargaining position of workers and therefore to raise, rather than lower, the real wages over a long period in which productive capacity will be increasing.

A further element of elasticity in the productive system emerges, of course, if we abandon the assumption of a closed economy. Increased imports can easily make good a temporary pressure on existing capacity, caused by an unexpected increase in the incentive to invest. Then, in the long run, such increased imports could, in principle, be compensated by increased exports from the additional productive capacity which the increased investment has brought about.

It should finally be stressed that the present argument for which a long-period rise in investment needs not alter distribution in order to generate the corresponding savings, should not be taken to deny the possibility — or, indeed the likelihood — of interactions between the real wage and the normal rate of profits on the one hand, and the speed of capital accumulation on the other. We have just mentioned, e.g., the possibility that a rise in the incentive to invest and the consequent improvement in the situation of labor employment might result in a *rise* of the real wage (rather than the fall which we would expect from the First Keynesian Position). What is disputed is only the necessity of the particular effect postulated in the First Keynesian Position.

Notes

* This paper summarizes parts of a longer one delivered at a conference organized by the Centre for Advanced Economic Studies in Udine in August 1982. Other commitments have so far prevented me from preparing the longer paper for publication, and I have been flattered into thinking that the present one may be of some use as it stands. This explains the almost complete absence of references both to the previous literature and, above all, to the literature which appeared on this subject in *Political Economy; Studies in the Surplus Approach* after 1982. Some of the ideas in this paper had been advanced in a mimeographed volume of 1962 (Garegnani, 1962), concerning the role of aggregate demand for Italian economic development. In revising the present paper I have with Dr Roberto Ciccone of Rome University, Professor Heinz Kurz of the University of Graz, and Professor Franklin Serrano of the Federal University of Rio de Janeiro. Work on this paper has been made easier by research grants from the Consiglio Nazionale Delle Ricerche and by the Italian Ministry of Education.

1 Cf. Kaldor (1955-6) p. 195.

2. The rate of profits (interest) here referred to as 'normal' is that to which economic theory has traditionally referred when associating a level of that rate with any given level of the real wage under conditions of free competition. We shall later distinguish this notion of a 'normal' rate of profits from a second 'ex-post' notion of the rate of profits (see below).
3. By 'productive capacity' of the economy in the given situation we shall mean, as is generally meant, the 'productive equipment' in existence, together with that part of the workforce which is required to operate it. By 'productive equipment' we mean, on the other hand, the aggregate of what has traditionally been referred to as the 'plant' of a firm or industry, that is those inputs, mostly fixed capital goods, which cannot be adjusted to the level of outputs, with the same rapidity as, e.g., the stocks of raw materials. It is here assumed, as is generally assumed, that the capacity is distributed among the sectors according to the given composition of aggregate demand at the level which would enable a normal (desired) utilization of aggregate capacity.
4. The notion of normal or 'desired' level of utilization of capacity will be discussed below.
5. The independence of our conclusions concerns in particular the assumption of a given aggregate propensity to save s which may in some cases become incompatible with the assumption of given propensities to save out of profits and wages. In fact though both the real wage w* and the ratio *y* of capacity output to capital are assumed constant in our analysis in Section 2 below, the *proportion* in which the social product is divided between wages and profits may yet change when, in that analysis, we consider changes in the level of capacity utilization. A constant aggregate propensity to save *s* becomes then incompatible with constant propensities to save out of wages and profits.
6. Cf., e.g., Garegnani (1984, pp. 294-6).
7. Cf. the passages reported in para. 4 and n. 3. As for the value of capital to he put in the denominator of the rate of accumulation *g*, see para. 15.
8. Similarly S. Marglin was more recently to write

> In the short run ... the rate of capacity utilisation changes in accordance with aggregate demand. …. But in the long run ... there is no excess capacity to accomodate demand. Distribution must bear the brunt of adjusting aggregate demand to supply (Marglin, 1989, pp. 974-5; I owe this quotation to Professor Heinz Kurz).

To eliminate a possible ambiguity it should be added that a few lines before the passage quoted in the text, Joan Robinson had made it clear that the question of 'distribution of income' to which her passage refers is that of 'what determines the *normal* rate of profits, when the real wage is not to be taken as given' (emphasis mine). The context of (the passage by Marglin also makes it clear that he understands the real wage and hence the normal rate of profits (see n. 2 above) to be the 'distribution' which is affected by investment. We should in fact distinguish the effect on the wage rate and normal rate of profits postulated in the First Keynesian

Position, from any change in the amount of profits relative to capital which results merely from changes in the level of capacity utilization and may well leave the real wage and normal rate of profits unchanged (cf. the ex-post rate of profits ^*r* in para. 14).

9. In the otherwise rich literature on potential output only Okun seems to have remarked on how the failure to use this year's potentia1 fully will influence future potential aggregate social product (Cutilli. 1980, p. 1354). Okun in fact writes:

> To the extent that low utilization rates and accompanying low personal incomes hold down investment … the growth of potential GNP will be retarded (Okun, 1970, pp. 314-15).

But Okun also left it at that.

10. The (potential) investment we are considering is evidently net investment since it is assumed to bring about additional (potential) productive capacity: hence our definition of *s* as a net propensity to save (para. 2). The assumption of the same net propensity to save out of the initial additional aggregate income resulting from increased utilization of *existing* capacity, and out of the subsequent aggregate income resulting from utilization of *new* capacity, might he questioned on the grounds that the need for the replacement of plant is likely not to increase in proportion to the degree of its utilization. If that is so, a smaller amortization would need to be deducted from the gross income obtained from an additional use of existing capacity than from the gross income out of new capacity. However, a consideration of the former net propensity to save as higher would only have strengthened our case, by rendering smaller the additional use of existing capacity necessary to set up a given new capacity in year 1.

11. It should be noted that in passing from absolute changes to per cent changes in levels of utilization of capacity and of capacity itself, we are assuming that the output/capital ratio is the same for new capacity *y* (investment) as for existing capacity.

12. We may mention here a difficulty associated with the age distribution of fixed capital. We have assumed that the ratio *y* of (net) income to capital will be the same for the additional capital (investment), as for the capital already in existence (on the valuation of the latter, see para. 15). We have seen in n. 11 above the doubts this might raise because the needs of replacement of plant may, in a certain range at least, be less than proportional to the degree of its utilization. A different kind of doubt might be raised because, where fixed capital is involved, investment will consist of machines which are new and therefore more valuable than most of those which constitute existing capital-and which, for simplicity, we may here assume to be of a uniform age distribution. It might then seem to follow that, other things being equal, productive capacity will increase by *less* than in the proportion which current net investment bears to the value of existing capital and the ratio *y* of output to capital will have to be lower for new capital (investment) than for existing capital. This conclusion would not, however, be correct. It overlooks the

fact that as a result of the net investment considered, productive capacity will ultimately increase by more than the new machines of which that net investment initially consists. In fact, the *gross* output obtainable from the new machines of which that investment initially consists will provide 'replacement' machines already in the first years of life of the original machines, before any replacement is required. The result will be that the number of machines resulting from the initial investment will change over time tending (as the age distribution of the machines brought into existence with that net investment tends to uniformity) to a fraction of the existing machines equal to the fraction which the initial investment bears to the value of capital.

13. In such a case, the incentive for additional investment would probably go together with a stimulation to technical innovations directed to overcoming the labor shortage.
14. Steindl noted this elasticity of the productive system as 'characteristic of capitalism' (1952, pp. 10-11).
15. II is from this that Joan Robinson appears to derive the following (immediately after the quotation in para. 4):

> Whatever the ratio of net investment to the value of the. stock of capital may be, the level of prices must be such as to make the distribution of income such that net savings per unit of value of capital is equal to it. Thus, given the propensity to save from each type of income (the thriftiness conditions) the rate of profit is determined by the rate of accumulation of capital (Robinson, 1962, pp. 1l-12).

and indeed a version of equation (2.2) appears in the footnote appended at the end of the passage. See also:

> In my model the rate of accumulation and the propensity to save out of profit are the independent elements that determine the rate of profits on capital while the rate of profit together with the technical conditions, determine the real wage (Robinson, 1963, p. 409).

Similarly Richard Kahn (1959) states that the Cambridge 'identity' leaves open only two possibilities: either 'a system of ideas under which the rate of growth of capital is derived from the rate of profits' or a 'system under which the rate of profits is derived from the rate of growth' (1958, p. 194). Kahn can then conclude that under the conditions stated there, amounting to what we have here called the 'Keynesian Hypothesis', the second possibility is the only acceptable one. In fact, as we hope to show in this paper, the 'Cambridge identity' does leave open a third possibility: that the rate of growth and the rate of profits are independent of each other.

16. The notion of 'demand' used here, although referring to the product of each individual firm, can be understood along the lines of the classical notion of effectual demand, that is a quantity demanded at the given production price of the commodity.

17. The obvious reference for an analysis of the concept of desired level of capacity utlilization is Steindl (1952, ch. II). For the cost elements, cf. Kurz (1986).
18. This choice of the entrepreneurs, of course, in no way implies that new plant will in fact turn out to be utilized at the desired level. As we shall show below, any long-run adjustment of capacity to output - as distinct from that of output to capacity - does entail that the new plant cannot be utilized at desired capacity, even on an average.
19 Cf., e.g., the concept of 'free capital' used by Wicksell (1935, pp. 145, 234).
20 Of course this will have to be done with respect to the dominant technique (cf. para. 15 and n. 28 below).
21 The rate $s_c r^* = g^*$ is in fact Harrod's 'warranted rate of growth'. As we shall see below, assuming desired utilization of capacity, as is done in the analysis of steady growth and in the definition of Harrod's 'warranted rate of growth', prejudges the question as to which of the two Keynesian Positions is acceptable with respect to how the economy adjusts to different intensities of the incentive to invest.
22 We may note here that our assumption according to which, after the necessary adjustments, the time rate of investment will be half of what it would have been at the same date, had the earlier trend continued, implies that investment at the new level will itself grow at the rate g^*. (and be therefore compatible with a continuing utilization of capacity at its desired level).
23 Cf. n. 3 above.
24 Cf. in particular the passage by Kahn in n. 15 above, where he may have been misled by the assumption of steady growth into his statement that the Cambridge equation leaves room for only two possibilities: either a determination of the rate of profits by the rate of accumulation or of the latter by the former. The case is different in Kaldor (1959); Kaldor appears to recognize that the First Keynesian Position rests on the possibility of demonstrating a tendency to the full (desired) utilization of capacity - and not simply on the fact of some long-run congruity between capacity and output, which may well result from the former adjusting to the latter, rather than the contrary, with the consequences we saw in Section 2. Even in Kaldor's case, however, the implications of that congruity do not appear to be fully recognized, since the latter is taken as that factual support for the theoretical argument of a long-run tendency to the full utilization of capacity, which it cannot in fact be. Cf., e.g. the following passage:

> Yet in the history of advanced capitalist societies periods of severe unemployment were exceptional and not the rule; apart from depressions, unemployment did not appear to exceed a few percent on the average since the latter half of the 19th century. (In the forty years, 1881-1920, in the U.K. it averaged less than five percent including both boom and depression years.) As the actual level of employment averaged 95 percent of the full employment level, this is unlikely to have been a mere coincidence (Kaldor, 1959, p. 214).

Here Kaldor assumes also a coincidence between full (desired) utilization of capacity and full employment of labor. Indeed, over a sufficiently long run labor may be not unlike productive equipment in failing to leave open traces of its underutilization. Over such long runs labor unemployment would in fact have to remain hidden in a backward sector of the economy, or disappear through emigration.

25 This would be so except for the effects we can here ignore of different time distributions of the deviations of the utilization of capacity from the desired level.

26 We may mention here as a curiosum, what seems to be the only conceivable way of reconciling the Second Keynesian Position with an average utilization of capacity at the desired level over a number of years $n>1$, from a year t to a year $(t+n)$. We would not only have to assume that each entrepreneur had sufficiently confident forecasts about his , future most profitable output, and that such forecasts of different entrepreneurs be consistent with each other within the year to which they refer. For such output forecasts to be verified with a desired level of capacity utilization, we shall have to assume, besides, that the resulting aggregates of forecasts are 'consistent' over time. By such 'consistency' we mean that the investment $m\ (t+i)$, for $i = 0, 1 \ldots(w-1)$, which, given the propensity to save, is necessary in order to verify the output forecasts of the period, will be such as to ensure that capacity in the subsequent period $(t+i+1)$ be adjusted to the output forecasts of *that* period. And the Keynesian hypothesis entails that the price system buys no ground at all, even an approximate one, for such a 'consistency', This is why the situation in which the Second Keynesian Position could be made consistent with desired utilization over time, even only for a limited time period, appears to be no more than a topical exercise.

It remains in any case true that the inconsistency between that Position and desired utilization of capacity wou1d remain and would, so to speak, be shifted to the years preceding and to those following $(t+n)$, when the productive capacity would have to re-emerge as a given magnitude relatively to the independently determined outputs.

27. A seemingly analogous distinction is drawn by Joan Robinson between an 'expected rate of profit' and a 'current rate of profit,' defined as 'the ratio of current gross profits, minus depreciation, to the value of the stock of capital at current replacement costs'. (Robinson, 1962, p. 28) and she asserts the importance of such a distinction in 'constructing a historical model'. However no link is there established between the 'expected rate of profit, the degree of utilization of capacity and the normal rate of profits she mentions elsewhere (see, e.g., the passage quoted in n. 8 above) or between the latter two circumstances. Indeed the concept of a normal rate of profit seems to be confused with the rate we can find in a stationary or steady growth equilibrium.

28. By 'dominant technique' we mean that, among the several in simultaneous use in the industry, which is relevant for determining the normal price of the commodity. It will be a technique intermediate between those which are obsolete and those which on the contrary are not yet sufficiently widespread to have lowered the price or the product so as to

Eliminate extra profits for the entrepreneurs using it.

29. We would not generally have such a coincidence if, for example, we included in our estimate of the capital stock the obsolete capital goods still in use, reckoned at their current prices.
30. This concept of an ex-post rate of profits r^ is in fact the same to which we referred in n. 8 above as that share of profits relative to capital which is bound to change as the degree of utilization of capacity changes. We may also note here that if s_c were to change in the same direction with the rate of accumulation occurring with constant 'normal' distribution will affect to a correspondingly smaller extent the degree of utilization of capacity and hence the ex-post rate of profits as compared with the 'normal' rate.
31. However, as we saw above, the nature of the normal rate of profits as the rate of return expected on investment does not mean that the normal rate of profits cannot be observed. It can be observed where entrepreneurs can observe it: under certain conditions, and in particular firms.
32. Cf. the passage by Kaldor quoted in n. 24 above.
33. See the definition of productive capacity given in n. 3 above.

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